



LONG RUN IMPLICATIONS OF GREEN ACCOUNTING ON SUSTAINABLE DEVELOPMENT IN NIGERIA

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Abstract

The objective of the study was to determine the long run effect of green accounting on sustainable development in Nigeria using data obtained from firms financial statement, CBN and world bank publication for Sustainable development data for the period 2003 to 2022. The study adopted panel cointegration tests, to evaluate the long run properties of the dataset with different integration and the Bounds test suited for autoregressive distributed lags used for testing the cointegration status for the three combination of variables that make up the model. The Pooled Mean Group (PMG) estimation technique was used in the empirical analysis to estimate the long-run and short-run relationship amongst the variables for the panel data. The study found green initiatives by companies on sustainable development in Nigeria are more long-term than short-term. Short-run effects are more negative and mostly insignificant while the long run stable effects give indication that these initiatives could help to address sustainable development problems in Nigeria. Economic cost has positive long run effects on human capital development. Only economic cost has significant effect on Human development index thus indicating that social and environmental sustainability policy by firms has failed to achieve improved human capital development. Result also show environmental expenditure has significant and negative impact on GDP growth in the short run but positive in the long run. Policy makers within the companies need to consider the sustainability policies as a long term planning strategy while also improving linkages of economic expenditures to GDP growth. Policy action by the firms and Government on sustainable development and green economic planning must consider long run implications and applicability in all economic segments. Government can energise green initiatives through mandatory payments tied to turnover or profit for environmental remediation with a deliberate policy on administration of such funds to improve sustainable growth.

Keywords:

Green Accounting, Real Gross Domestic Product, Human Development index, Sustainable Development.



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INTRODUCTION

Man has always exploited the earth and the environment right from creation. This activity has never been without the impact on the earth surface and sustainability of life. Right from the early days where man was created to stone age where man ignited fire and use it for cooking; to the consumption of fruits; to farming which creates deforestation, man has always been a risk to the environment which it exist and derive benefits and to the sustainability of the resources which the earth is endowed resulting in environmental degradation. The problem of earth degradation was exacerbated by a slew of economic activities during the industrial revolution in the 18th Century. Many communities changed occupation from agriculture to manufacturing. New businesses that evolved from the industrial revolution exploited natural resources to create value. The industrial revolution brought economic improvement to the industrialized societies and business people were encouraged by these huge profits to migrate and exploit other societies to reap in higher profit and swim in wealth. Production of goods shifted from small locations to factories and deployment of machines to mass produce goods took the centre stage with the attendant emission of harmful gas and pollutants and greater land use which harm the environment. Animal and plants lost their natural habitats and the symbiotic relation between man, animals and plants perished resulting in major environmental crisis. Many species of animals became extinct, deforestation and environmental dislocation created global warming and climate change. Oil spillage due to oil exploration resulted in loss of aquatic life and occupation by fishermen. Drinking water became polluted, gas flaring contributed to global warming whilst at the same time creating health hazards. Movement of heavy machines stretched road infrastructure while the communities became poorer and hostile. The spiral effect created conflicts between host communities and companies setting up the factories.

The effects of social conditions as well as climate change and the attendant degradation of the environment have become entrenched in both policy and research agenda across the globe. There are clear concerns that different segments of the economy have historically contributed to the weakening of climate systems and these economic components need to be redirected to ensure long run sustainability of growth and overall development among economies. Consequently the United Nations Sustainable development goals highlighted economic growth, green accounting and human development as part the millennium development goals for 2030 for member states which Nigeria is a signatory.

The manufacturing sector constitutes a major segment of the industrial sector of the economy. This sector has been the bedrock for economic growth and prosperity in advanced economies and it is also expected to provide the backbone for sustained income growth over time in developing countries like Nigeria. Thus, activities of the manufacturing sector have received various consideration with the goal of channeling underlying benefits of the sector to other aspects of economic development. A major question however remains as to whether sustainability measures by firms in the manufacturing sector contributes to sustainable development in the economy. This is a critical aspect of the growth story in Nigeria since sustainable development is the main goal of economies around the world. At the corporate level, Manufacturing companies by their nature interact with and make use of people, technology, environmental and economic resources, in the process of converting raw materials or inputs to output or finished goods. These chain of activities contribute significantly to social, environmental and economic problems or solutions in form of negative or positive externalities. Further, in Nigeria there are weak institutions and poor enforcement of laws. Decree no. 42 of 1988 in Federal Republic of Nigeria made dumping any harmful waste in the waters and landmass a criminal offence. It also emphasizes gathering and assessing data on an entities environmental status taking into consideration its products life cycle from introduction to disposal, recycling or termination. There are however defaults by many manufacturing, oil and gas sector firms thereby making the business

environment volatile and uncondusive for businesses to thrive as these firms are perceived by host communities as environmentally unfriendly which impedes corporate image and adversely affects sustainable development. Therefore, it is cogent to examine the basic sustainable development issues that necessitated green initiatives with the intent to proffer policies and strategies that will enable green initiatives translate to sustainable development. It is against this background that this study examined long run implications of green initiatives and sustainable development. Therefore, this study is poised to examine the implication between green initiatives and sustainable development in Nigeria with a focus on manufacturing firms. This study deviates from other studies that focus on short term green initiatives at the firm level and focuses on its long term implications for sustainable development in Nigeria

Litterature Review

Theoretical Perspectives

The issue of Green initiatives has generated debates over the decades and many theoretical propositions have been made while some are in support of Green initiatives others do not from shareholders perspectives. This study examines a few theories relevant to the issue. First **Legitimacy theory** argues that firms try to obtain legitimacy from the environment they operate so as to be perceived as good corporate citizens by addressing societal norms and expectations. . Hence firms incur social and environmental cost and discloses these information to fulfil social contract with the society (Fernando & Lawrence, 2014; Hahn & Lulfs, 2014). **Accountability Theory** however is **anchored on** governmental role in affecting a firm's behaviour. Hence, sustainability disclosure results from government control based on political strategy and agendas (Bramwell, 2011). According to Deegan (2000) people in society have a right to be informed about certain facets of the corporation's operations. In this context, accountability can offer recognition of how stakeholders see a firm as responsible for its environmental impact along with its financial impact (Milne & Gray, 2007; Gray et al., 1997; Gray et al., 1995). This theory contrasts with voluntary sustainability reporting and supports mandatory sustainability reports (Comyns et al. 2013; Gillet-Monjarret, 2015; Wong & Millington, 2014; Simnett et al., 2009). As argued by Gray (2007), the lack of mandatory laws associated with sustainability reporting is seen as a barrier to contributions through spending for environment and social as well as reporting.

Opposing the growth of green accounting and theories that support green accounting is **Shareholder Expense Theory** which proposes that social responsibility activities are perceived to be beneficial to the society at the expense of investors and shareholders. Thus, firms should not be engaged in sustainability activities unless they have excess returns. Manchiraju and Rajgopal (2017) showed that forcing firms to invest in sustainability activities leads to a drop in their returns. **Slack Resource Theory** states that firms with high financial performance may have a surplus of monetary or non-monetary slack resources which can be allocated to environmental and social issues, such as environmental protection and stakeholder relationships (McGuire et al., 1988; Waddock & Graves, 1997). Therefore, only financially strong firms are able to adopt sustainability practices (Awan, 2015; Soana, 2011). Under this theory, if a firm is not doing well financially, sustainability practice implementation will have an adverse effect on its financial performance. **Trade-off Theory** suggests that sustainability practices create additional expenses that reduce profitability (Aupperle et al., 1985). Firms that spend on sustainability activities will have lower profits (Balabanis et al., 1998; Friedman, 2007). The theory that supports this study is the circular Legitimacy and economy theory. Circular economy contribute to sustainable development through social environmental and economic costs

Conceptual Review

Green Accounting

Green Accounting is the process of recognizing, measuring value, recording, summarizing, reporting and disclosing information on objects, transactions, events or impacts of corporate economic, social and environmental activities on society and the environment and the corporation itself in an integrated accounting information reporting package that can be useful for users in economic and non-economic decision making.

Economic

Economic , which refers to long-term economic growth by promoting environmental, social, and human sustainability. Economic sustainability can be achieved by adopting sustainable business practices such as using renewable energy resources, reducing carbon emissions, using recycled materials, and saving natural resources.

Social

Social aspect of green initiatives is about ensuring social equality, social well-being, inclusivity, and social cohesion and firms' provision of fair working conditions to people and ensures communities have access to basic human rights, health care, education, and social services. Social sustainability involves promoting social justice, and equality. In Sum, the objective is to build the society that is prosperous, equitable, and socially cohesive with equal opportunity for growth.

3. Environmental Initiative

Environmental initiative is urging firms to ensure responsible use of natural resources without compromising the ability of future generations to meet their own needs. It involves balancing development's environmental, social, and economic aspects to ensure that the natural environment is protected and preserved for future generations. In order to encourage the sustainable use of natural resources, such as water, air, and land, environmental initiatives aims to lessen the damaging effects of human activity on the environment. This includes promoting renewable energy, reducing greenhouse gas emissions, and protecting biodiversity and ecosystems. Overall, environmental initiative seeks to create a healthy and sustainable natural environment that supports life and human well-being.

4. Human Initiative

The fourth sustainable development, refers to humans' ability to maintain their well-being and quality of life over the long term. Human sustainability involves promoting the physical, mental, and emotional health of individuals and communities, while also recognizing the interconnectedness of social, economic, and environmental factors.

Empirical Review

Many studies on the subject of green accounting and sustainable development are focused on firm level analysis with just a few studies looking at green accounting and sustainable impact at the economy level. A few of these studies are shown in this section although this study departs from other studies by looking at Green accounting impact at the macro level with long term perspective as against prior studies with short run methodologies.

Ogbonna et.al (2020) examined the relationship between environmental accounting and sustainability development in Nigeria from 2007 -2016. Oil spillage cost, oil drilling waste disposal cost and degradation cost were the proxies of environmental accounting while human development index and human poverty index were sustainability development proxies. The researchers adopted correlational research design for the study. The outcomes of the study depicted that environmental accounting variables (OSC and ODWDC) has no significant relationship with sustainability development in Nigeria in the period of this study. However, Degradation cost revealed significant relationship with both human development index and human poverty index.

Isa Rehanet, Isa Fatima, Ovosimohammed Bilkisu & Kabir Haruna DANJA (2016) analysed the present and future likelihood trend of green accounting in terms of gas flaring on the economic development of Nigeria. Trend and correlation analysis of time series data was employed for the yearly data collected from the World Bank database. Two functional models were fitted to the collected data and forecasts were made based on these models with the use of MINITAB for the period 1980 – 2030. The findings of the study revealed that the impact of green accounting on economic development caused the gross domestic product (GDP) of Nigeria to produce a negative downward shift within 1980 - 2009, thereby reducing the GDP figures of Nigeria in the short run. It further revealed that apart from the years where negative growth rates were experienced, the effect of green accounting in terms of gas flaring also crowded out all possible benefits that could be derived from such growth in 14 of the 29 year period studied in the short run. Furthermore, it also showed that green GDP proved to be a better welfare indicator than the traditional GDP in the long run.

Utile, Tarbo and Ikya (2017) investigated the effect of environmental reporting on the financial performance of listed manufacturing companies in Nigeria. The study adopted an ex-post facto research design using the random effect regression analysis as the major technique for data analyses.. It was found that both erosion control reporting and air pollution reporting has significant effect and respectively with firm financial performance while waste management reporting has negative but significant effect on firm financial performance of companies under investigation.

Caesaria and Basuki (2017) investigated the effect of Sustainability Report Disclosure to the Firm's market performance. Three material aspects disclosed in the Sustainability report such as economics (EC), environmental (EN), and social aspect (SC) are used as the independent variables in this research and, furthermore, the dependent variable is the market performance which is proxied by using Tobin's Q. The results showed that economics, environmental, and social aspects have positively significant influence to the companies' market performance.

Uwalomwa, Obarakpo, Olubukola, Ozordi, Osariemen, Gbenedio and Oluwagbemi (2018) ascertained the bi-directional relationship between sustainability reporting and firm performance in quoted Deposit Money Banks (DMBs) in Nigeria. The empirical findings show that there is a bi-directional relationship between sustainability reporting and firm performance of quoted Deposit Money Banks (DMBs) in Nigeria. The study observed that the market price per share of the sample firms had a significant negative influence on sustainability reporting. In addition, the study also found that sustainability reporting had a significant positive influence on revenue generation of the sampled firms.

Iliemena (2020), investigated the effect of environmental accounting practices on corporate performance of listed oil and gas companies in Nigeria, 2012-2018.. Findings reveal environmental accounting practices and accounting have significant positive effects on both turnover and Return on capital employed; while the effect on net profit even though positive, was insignificant.

Amacha and Dastane (2017) researched the relationship between sustainability practices and performance in a financial sense for Malaysian Oil and Gas sector. The result shows that the majority of oil and gas companies in Malaysia had poor performance in terms of sustainability disclosure. On all three chosen profitability parameters, the companies that practiced sustainability were found to perform better than their counterparts that did not. Strong and significant relationship exists between sustainability practices and better financial performance.

Erhirhie and Ekwueme (2019) examined corporate social sustainability reporting and financial performance of Oil and Gas Industry in Nigeria. This study assessed the effect of corporate social sustainability reporting on Return on Assets, Return on Equity, and Return on Capital Employed of oil and gas companies listed on the Nigeria Stock Exchange. Ten oil and gas companies were sampled for the study. The study utilized secondary data collected via financial ratios and accounts of the individual companies and content analysis. The findings showed that social sustainability reporting exerts negative effect on all three performance proxies, howbeit only its effect on return on equity was statistically significant. The study recommends, among others, that existing sustainability reporting standards should be aligned to reflect country-specific social and environmental challenges, while its implementation should rather be obligatory rather than voluntary.

METHODOLOGY

The study adopts cross sectional and longitudinal ex-post facto design with census sampling method to examine the long run implications of Green accounting of manufacturing firms on sustainable development in Nigeria for the period 2003 to 2022. Green accounting is represented by social economic and environmental costs while sustainable development variables are Real gross domestic product and human development index. Data was sourced from annual financial statements of the manufacturing firms and Central bank of Nigeria, World Bank and Federal office of statistics website. Multiple regression and autoregressive lag was used to analyse the data.

The independent variables used in the study are Environmental costs, Social costs and Economic costs. These represent the various component of Green accounting which generate the total Green components in Nigeria. The dependent variables sustainable development for this study are change in gross domestic product, and human development index.. The control variable for the study are money supply and exchange rate. This represents the amount of money in circulation and the amount of naira that is exchanged for foreign currency especially the United States dollar. In view of the impact these two variables have on sustainable development.

Table 1: Measurement of Variables summarized

Independent Variable: Green Accounting	Measurement	Expected Sign
Environmental cost (ENC)	Natural log of total expenditure on environmental cost	Positive
Social cost (SOC)	Natural log of total expenditure on corporate social responsibility	Positive
Economic cost (ECC)	As recommended by UNCTAD (2003). GRI (2001). Value Added (Net Sales -Costs of Goods Purchased)	Positive

Dependent Variable: Sustainable Development		
Real Gross domestic product (GDP)	Real Gross domestic Products (RGDP) Defined as the increase of the value of the goods and services produced by the nation's economy less the value of the goods and services used up in production	Positive
Human Development index (HDI)	A summary composite measure in health, knowledge and standard of living as published by Federal office of statistics	Positive
control Variables:		
Money supply (MOS)	Total amount of money in circulation in a fiscal year as published in CBN annual bulletin	Negative/positive
Exchange Rate	Amount of naira that will be exchanged for a unit of united states dollar as quoted by Central Bank of Nigeria	Negative/positive

Model Specification

The functional relationship based on the dependent and independent variable is stated thus:

SUD = Sustainable development

RGDP = economic growth (proxied by RGDP)

HDI = Human Development Index

MOS = Money supply in circulation

EXC= amount of naira required to purchase a unit of United States dollars as published by CBN

Where β_0 are the regression intercepts and U_{1t} , U_{2t} , U_{3t} , U_{4t} are the autoregressive coefficients or persistence terms.

$$SUD = f(ENC, SOC, ECC, MOS, EXC) \dots \dots \dots (i)$$

$$SUD = GDP, HDI, \dots \dots \dots (ii)$$

Specifically, we formulate that:

$$\text{LogRGDP} = f(ENC, SOC, ECC, MOS, \text{and } EXC) \dots \dots \dots (iii)$$

$$HDI = f(ENC, SOC, ECC, MOS, EXC) \dots \dots \dots (iv)$$

From the functional relationship we derive the estimation thus:

$$RGDP = \beta_0 + \beta_1 \text{LogENC} + \beta_2 \text{LogSOC} + \beta_3 \text{LogECC} + \beta_4 \text{PLogMOS} + \beta_5 \text{PLogEXC} + U_1, t, \dots \dots \dots (v)$$

$$HDI = \beta_0 + \beta_1 \text{LogENC} + \beta_2 \text{LogSOC} + \beta_3 \text{LogECC} + \beta_4 \text{PLogMOS} + \beta_5 \text{PLogEXC} + U_2, t, \dots \dots \dots (vi)$$

For hypotheses 1, our focus is on model (iii), which expresses Growth in Gross Domestic Product as an econometric function of its own one period lagged value, Green accounting component variables which in this study is ENC, SOC and ECC, with the control variable Money supply and exchange Rate. The green accounting cost profile is rising so we expect that there will be increase in sustainable development. Hence our expectation is that all Green accounting components (ENC, SOC and ECC) would enter the growth model positively and significantly. In other words, we expect apriori, that all will be positive and statistically different from zero.

For hypotheses 2, our focus is on model (ii), which expresses Human Development Index as an econometric function of its own one period lagged value, ENC, SOC and ECC and control variables Money supply and Exchange rate. We expect that the variables would enter human development index model positively and significantly. In other words, we expect apriori, that all would be positive and statistically different from zero.

Unit root test

Macroeconomic variables are generally known with their random walk nature, which can be mitigated when converting it into first differencing. Datta and Kumar (2011) note that regressing a non-stationary series on another would generate spurious results. In an attempt to guide against this, Augmented Dickey-Fuller (ADF) technique developed by Dickey and Fuller (1979) was employed. This test is necessary as it guides the study on the selection of appropriate estimation techniques required for the analysis. The trend and intercept of the unit root are represented in equations (10) and (11), respectively:

Autoregressive distributed lag (ARDL)

Following the unit root test, the study proceeds to examine short and long run relationship among the variables. This is done using autoregressive distributed lag (ARDL) known as the bound test approach to co-integration. ARDL model developed by Pesaran, Shin and Smith (1996) and later popularized by Pesaran, Shin and Smith (2001). In line with Pesaran et al. (2001), the unrestricted error correction mechanism for testing co-integration among the variables used in this study is stated as follows:

$$\Delta RGDP_t = \beta_0 + \sum \beta_1 \Delta \text{LogENC}_{t-1} + \sum \beta_2 \Delta \text{LogSOC}_{t-1} + \sum \beta_3 \Delta \text{LogECC}_{t-1} + \sum \beta_4 \Delta \text{LogMOS}_{t-1} + \sum \beta_5 \Delta \text{LogEXC}_{t-1} + \alpha_0 + \alpha_1 \Delta \text{LogENC}_{t-1} + \alpha_2 \Delta \text{ENC}_{t-1} + \alpha_3 \Delta \text{LogECC}_{t-1} + \alpha_4 \Delta \text{LogMOS}_{t-1} + \alpha_5 \Delta \text{LogEXC}_{t-1}$$

$$\Delta HDI_t = \beta_0 + \sum \beta_1 \Delta \text{LogENC}_{t-1} + \sum \beta_2 \Delta \text{LogSOC}_{t-1} + \sum \beta_3 \Delta \text{LogECC}_{t-1} + \sum \beta_4 \Delta \text{LogMOS}_{t-1} + \sum \beta_5 \Delta \text{LogEXC}_{t-1} + \alpha_0 + \alpha_1 \Delta \text{LogENC}_{t-1} + \alpha_2 \Delta \text{ENC}_{t-1} + \alpha_3 \Delta \text{LogECC}_{t-1} + \alpha_4 \Delta \text{LogMOS}_{t-1} + \alpha_5 \Delta \text{LogEXC}_{t-1}$$

The ARDL long-run model is estimated if cointegration is found while the short-run model is estimated if otherwise

$$\Delta RGDP = \beta_0 + \beta_1 \text{LogENC} + \beta_2 \text{LogSOC} + \beta_3 \text{LogECC} + \beta_4 \text{PLogMOS} + \beta_5 \text{PLogEXC} + U_1, t, \dots \dots \dots (xvii)$$

$$\Delta \text{HDI} = \beta_0 + \beta_1 \text{LogENC} + \beta_2 \text{LogSOC} + \beta_3 \text{LogECC} + \beta_4 \text{PLogMOS} + \beta_5 \text{PLogEXC} + U_4, t \quad (\text{xx})$$

$$\Delta \text{RGDP} = \alpha_0 + \alpha_1 \sum \Delta \text{Log ENC}_{t-1} + \alpha_2 \sum \Delta \text{Log SOC}_{t-1} + \alpha_3 \sum \Delta \text{Log ECC}_{t-1} + \alpha_4 \sum \Delta \text{Log MOS}_{t-1} + \alpha_5 \sum \Delta \text{Log EXC}_{t-1} + \text{ECM} + U_1 \dots \dots \dots (\text{xxi})$$

$$\Delta \text{HDI} = \alpha_0 + \alpha_1 \sum \Delta \text{Log ENC}_{t-1} + \alpha_2 \sum \Delta \text{Log SOC}_{t-1} + \alpha_3 \sum \Delta \text{Log ECC}_{t-1} + \alpha_4 \sum \Delta \text{Log MOS}_{t-1} + \alpha_5 \sum \Delta \text{Log EXC}_{t-1} + \text{ECM} + U_4 \dots \dots \dots (\text{xxv})$$

RESULTS

Trend Analysis

The initial trends considered in the study are the sustainable development indicators in Nigeria. Figure 1 shows the trend in human development index in the country over the study period. It is seen that HDI has been on the increase over the years, moving from below the median level of 0.5 to 0.53 in 2022. This shows that the human development component in the economy has experienced some level of improvement over the years. However, the current score for HDI is still low given that South Africa had a score of 0.71 in 2022, while Egypt had a score of 0.73 in the same year. Hence, Nigeria still needs to strive to improve the human development ranking. The trend for real GDP growth over the period is also shown in Figure 2. The trend in the GDP growth rate is a downward spiral since 2004, although there were periods of improvements like in 2008 and in 2014. The general downward trend in the real GDP growth sets the pace for poor outcomes for other sustainable indicators in Nigeria.

Figure 1: Trend in HDI

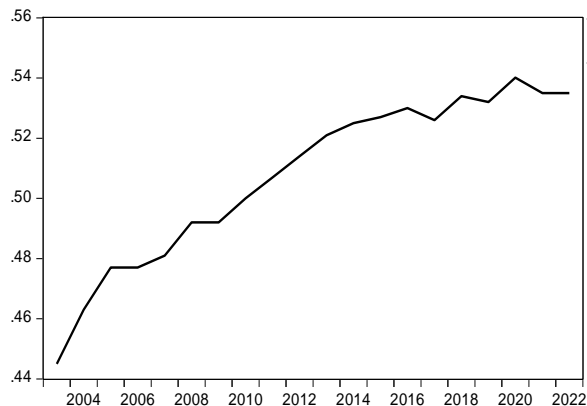


Figure 2: Trend in real GDP growth



The trend in total economic costs by the individual firms used in the empirical analysis. For most of the companies, the economic cost has increased over the years, especially for Nigerian Breweries, Dangote Sugar, Nestle, and Nigerian Flour Mills. Apart from Pharma Deco and UAC, none of the companies reported a declining economic costs over the years, This suggests that the firms have pursued higher economic endeavours which may have been reflected in output growth and expansion of plants across the country, with remarkable carbon footprint

Descriptive Stastictics

The descriptive statistics for the panel of twenty-one companies used in the empirical analysis is presented in Table 2. Note that the descriptive for the sustainable development variables are for the economy as a whole. Average annual growth in real GDP is 4.91 percent over the period, with a maximum of 10.44 percent and a minimum of -1.94 percent. This shows that the Nigerian economy

has not grown smoothly over the period and that the growth rate is generally low. The standard deviation of 3.45 for the real GDP growth variable is less than the mean value. This shows that annual growth rate for the years were generally close to the reported mean rate. The average HDI for the period is 0.51, which is slightly above the median value and indicates that human development is still generally low in the economy. Both the standard deviation (0.02) and the skewness (-0.56) scores show that the HDI in Nigeria has remained very close to the mean value over the years

Table 2: Descriptive Statistics for Panel Data

Variable	Mean	Max.	Min.	Std. Dev.	Skewn.	Kurt.	J-B	Prob.
RGDP	4.91	10.44	-1.92	3.45	-0.33	2.28	16.67	0.00
HDI	0.51	0.54	0.46	0.02	-0.56	1.94	39.49	0.00
SOC	14.55	20.86	-0.22	3.32	-2.20	10.32	1205.06	0.00
ECC	15.23	22.76	4.41	2.31	-0.46	3.95	28.71	0.00
ENC	14.84	21.95	1.06	3.61	-2.12	9.14	919.02	0.00
MOS_Growth	19.30	68.57	2.30	15.34	1.83	6.29	400.57	0.00
EXC_RATE	242.79	770.50	118.57	161.00	1.94	6.53	454.86	0.00

For the firms' environmental, social and governance (ESG) factors, the averages are also reported in Table 2. Average social cost outlay for the firms is 14.55, while that for economic cost is 15.23, and environmental cost is 14.84. It is therefore shown that economic cost outlay is larger for the firms in comparison with the social and environmental costs. The maximum economic cost is also higher, although the minimum cost is the lowest among the cost outlays. This suggests that the companies are consistent in accounting for social and environmental costs over the years, Average exchange rate is high, while average growth in money supply far surpasses average economic growth in the country.

Table 3. Among the sustainable development variables, it is seen that a high negative correlation exists between real GDP growth and human development index. This reveals that contrary to expectation, rising periods of high GDP growth are correlated with lower human capital development.

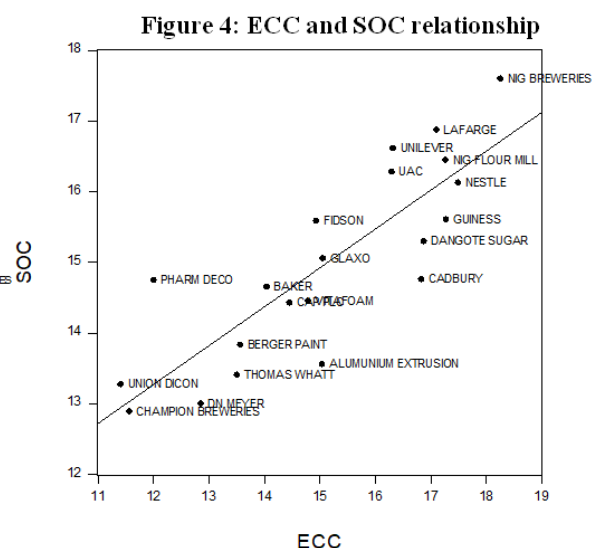
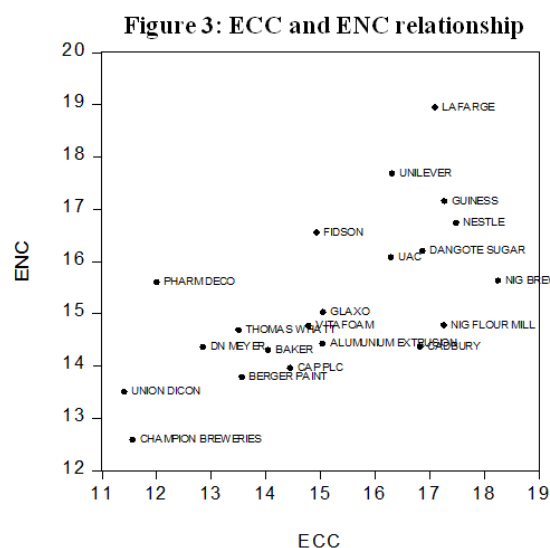
Table 3: CorrelationMatrix

Variables	RGDP	HDI	ECC	ENC	SOC	EXC_RATE	MOS
RGDP	1						
HDI	-0.823	1					
	0.000	-----					
ECC	-0.132	0.157	1				
	0.007	0.001	-----				
ENC	-0.112	0.137	0.316	1			

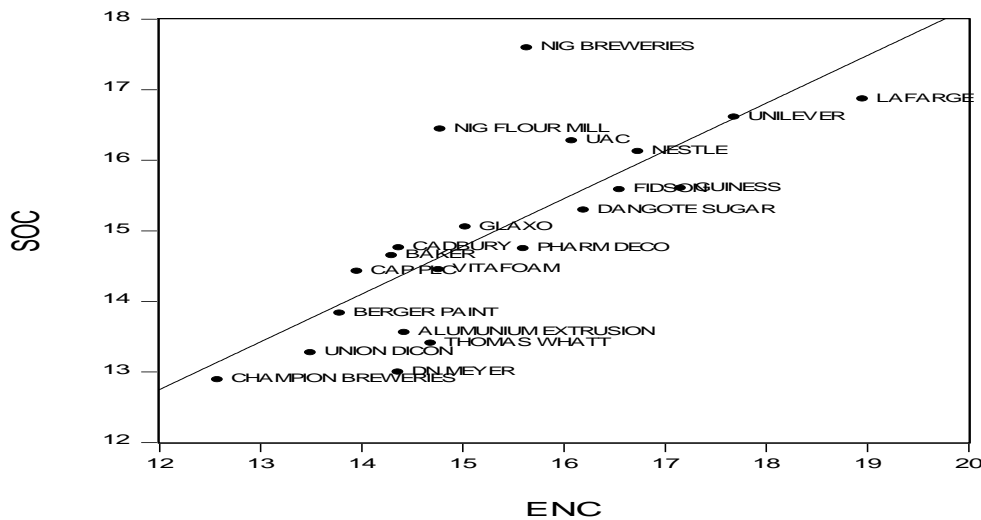
	0.023	0.005	0.000	-----			
SOC	-0.094	0.122	0.429	0.708	1		
	0.055	0.013	0.000	0.000	-----		
EXC_RATE	-0.546	0.621	0.122	0.103	0.152	1	
	0.000	0.000	0.013	0.035	0.002	-----	
MOS	-0.759	0.882	0.156	0.131	0.154	0.898	1
	0.000	0.000	0.001	0.007	0.002	0.000	-----

In terms of the green accounting variables for the firms, a positive and significant correlation is revealed among the variables. This shows that all green accounting components move together among the firms. The strongest correlation is between social cost and environmental cost outlay, indicating that companies that focus on social cost accounting also pay strong interest to environmental costs. This clearly shows that companies work with both green accounting components together over time. Positive correlation also exists between the three green accounting components of the firms with exchange rate and money supply in Nigeria.

A further analysis of the relationships among the variables is conducted using scatterplots with focus on the financial development indicators. The goal is to observe how movements in one financial development variable influences the others. The plot in Figure 3 shows the relationship between economic costs and environmental cost. The scatterplot shows a positive relationship, indicating that as the economic cost outlays are increasing, the environmental cost outlays are also rising simultaneously. A positive relationship is also shown for the scatterplot between economic costs and social costs.



The relationship between environmental cost and social cost outlays is also shown in the scatterplot in Figure 5. The positive relationship is also shown to be very strong and the regression line indicates that there is a more than 1 to 1 relationship. This implies that an increase in environmental cost outlay leads to a more than proportional increase in the social cost outlay of the firms.

Figure 5: SOC and ENC relationship

Tests of Time Series and Cross-sectional Properties of the Panel Data

Test for Normality

Normality test for datasets reveal the distributions do not lie entirely on the straight diagonal. This clearly shows that the panel dataset for variables all the variables are non-normally distributed. Note that the application of a panel data framework (PMG) in the empirical estimation of the dataset is useful in order to account for the non-normality of the dataset.

Panel Unit Root Test

The second pre-analysis test in the study is to investigate the time series dimension properties in terms of the level of stationarity of the dataset. The panel units is therefore conducted to identify the stationarity status. In this study, the test developed by Levin, Lin and Chu (LLC) is used to examine the stationarity properties of the homogenous panel. The LLC test however assumes identical cointegration vectors among the companies (common unit roots). However, each of the companies in the study is likely to exhibit significant differences in terms of their green accounting policies and operations. This means that the common unit roots assumption may not fully hold in the unit root test. In order to improve on the robustness, heterogenous-based tests (that assume individual unit roots) are also included by using the Im, Pesaran and Shin (IPS) as well as both the Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) tests. The unit root tests for the variables are conducted in levels given the nature of the dataset in the study. The results of the unit root test in levels are presented in table 4 below.

Table 4: Panel Data Unit Root Tests Results in Levels

Variables	Common unit process	individual unit root process		
	LLC	IPS	ADF	PP-Fisher
RGDP	-23.38**	-17.68**	310.88**	124.29**

HDI	-12.45**	-6.518**	114.80**	227.61**
SOC	-2.247*	-3.194*	77.54*	118.30**
ECC	-3.980*	-3.125*	75.328**	95.093**
ENC	-5.372**	-5.186*	106.32**	138.70**
MOS	1.839	-1.779*	46.81	123.22**
EXC_RATE [†]	0.668	1.336	0.010	0.000

Source: Estimated by the Author. *Note:* ** and * indicate significant at 1% and 5 % levels respectively; IPS = Im, Pesaran & Shin; LLC = Levin, Lin & Chu; [†] indicates that variable is stationary at first difference or I(1).

The unit root test is based on the significance of the coefficients of the test statistics at the 5 percent level. It is seen that the test statistics for the variables (except EXC_RATE) pass the significance test at the 5 percent level, which shows that these variables are stationary in levels. Thus, most of the variables are shown to be integrated of the order zero or I(0). For the other three variables, the test statistics are not significant, and it shows that the variables are only stationary after the first difference. The unit root test for these variables show that they are integrated of the first order or I(1).

Cross-sectional Dependence Test

The companies used in the empirical analysis are drawn from the manufacturing sector which implies that they are likely to exhibit similar cross-sectional characteristics since they are all faced with similar operational and regulatory environment. This similar pattern of annual behaviour is likely to lead to correlations across cross-sections which needs to be accounted for. In this study, the test for cross-sectional dependence is conducted in order to observe the presence or absence of the cross - correlations among the panel data. This test is implemented using the Pesaran (2004) cross-sectional dependence (CD) test. The Pesaran cross-section dependence test results are presented in Table 5.

Table 5: Cross-section Dependence Test Results

Equation series tested	Pesaran CD	P-value
<i>RGDP</i>	0.318	0.822
<i>HDI</i>	1.406	0.119

Source: Author's computations

From the results reported in Table 5, it is seen that the Pesaran CD test statistics for each of the equations fails the significance tests at the 5 percent level (p value > 0.05). This shows that for these equations, there is absence of cross-sectional dependence in the estimates. The absence of cross-sectional dependence indicates that the estimated equations are free of heteroskedastic influences.

Test for Cointegration

The final pre-analysis test is to evaluate the variables to check the presence of long run relationships. This is because, the absence of long run relationship among the data may lead to the estimation of

spurious regression that have no meaningful empirical value. The test for long run relationship is based on the cointegration tests for each of the equations in the study. The result of the panel cointegration test for the variables is resented in Table 6. Two tests for panel cointegration are reported: the Pedroni test (which uses both the PP and ADF test procedures) and the Kao test which is more direct in measuring cointegration. The PP and ADF tests are conducted for the data using within-dimension and between-dimension. The test results show that the RGDP, HDI equations are all cointegrated, since either the panel PP or ADF statistics are significant at the 5 percent level. The Kao test however shows that there is cointegration in for the two the equations given that the test statistic is significant for each of the equations. Based on this result, it is demonstrated that there is long run relationship among the variables in the study.

Table 6: Panel Cointegration Test Result

	Within dimension				between-dimension		Kao Test
	Unweighted		Weighted				
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	
RGDP							
PP-Statistic	-3.255	0.001	-3.386	0.000	-6.027	0.00	
ADF-Statistic	-3.992	0.000	-3.741	0.000	-3.773	0.00	
HDI							
PP-Statistic	-9.100	0.000	-8.185	0.000	-9.605	0.00	
ADF-Statistic	-2.244	0.012	-1.380	0.084	-1.178	0.12	

The unit root test in the study however shows that the variables in the analysis have mixed orders of integration, with some integrated at order zero and others integrated at order one. This means that although the panel cointegration test captures the panel structure of the dataset, it may not fully embody the integration patterns of the data. Hence, in addition to the panel cointegration tests, an appropriate cointegration test is also required to be able to evaluate the long run properties of the dataset with different integration. Hence, the Bounds test for cointegration, which is suited for autoregressive distributed lags (ARDL) based analysis is used for testing the cointegration status for the three combination of variables that make up the model specified. Moreover, the application of error correction processes (based on the ARDL approach to cointegration) further indicates the relevance of the cointegration tests.

Regression Analysis

The PMG regression analysis is performed for the panel of twenty-one manufacturing companies in Nigeria, which implies that both the short-run and the long run relationships are determined. Note that the optimal lag length for estimating the PMG analysis was selected using both the Akaike

Information criterion (AIC) and the Schwarz Information criterion (SIC). Both of the criteria indicated that the lag length of two is optimal for estimating the panel data relationship.

Green Accounting and Real GDP Growth

The results (both short run and long run) for the real GDP as a sustainable development component are presented in Table 7. Given that the PMG results are reported, the goodness of fit statistics (including R-squared and F-statistics) are not estimated. Rather, we consider the ratio of the standard error of estimates to the mean of dependent variable to evaluate the goodness of fit for the relationships. In the results the ratio of the standard error of estimates to mean of dependent variable is sufficiently low, suggesting that the estimates (both short-run and long-run) have overall good fit.

The upper panel of the estimation Table shows the short run estimates which are the temporal relationships. In the result, the coefficient of both SOC and its lag fail the significance test at the 5 percent level. This shows that social costs accounting of firms does not significantly affect short run changes in real GDP growth in Nigeria. The coefficients of environmental cost passes the significance test at the 5 percent level for both the current and lagged effects. This implies that environmental costs have significant immediate and delayed effects on real GDP growth in the short run. The effects are however negative, which shows that an increase in the environmental costs for the companies tends to lead to lower economic growth in the short run. The two coefficients of economic costs also fails the significance test at the 5percent level, indicating that economic cost accounting by companies has no significant short run effect on real GDP growth in Nigeria. The coefficients of the two control variables are significant in the short run, indicating that both money supply and exchange rate significantly affect short run economic growth in Nigeria.

Table 7: PMG Results for RGDP

Variable	Coefficient	t-Statistic	Prob.
<i>Short Run Equation</i>			
ΔSOC_t	-0.036	-0.14	0.89
ΔSOC_{t-1}	-0.293	-1.51	0.13
ΔENC	-1.321	-2.50	0.01
ΔENC_{t-1}	-0.571	-2.30	0.02
ΔECC_t	1.505	1.45	0.15
ΔECC_{t-1}	-0.054	-0.07	0.94
ΔMOS_t	-4.577	-2.61	0.01
ΔMOS_{t-1}	6.091	4.14	0.00
ΔEXC_RATE_t	0.006	1.60	0.11
ΔEXC_RATE_{t-1}	-0.034	-2.84	0.01
Constant	12.028	4.93	0.00
ECM_{t-1}	-0.727	-7.24	0.00

<i>Long Run Equation</i>			
SOC	-0.114	-1.42	0.16
ENC	1.097	10.86	0.00
ECC	0.207	1.01	0.31
MOS	-3.124	-18.25	0.00
EXC_RATE	0.003	1.88	0.06
Mean dep. var	-0.408		
S.E. of reg.	1.899		

The coefficient of the ECM term measures the link between short run changes and long run stability. In the result in Table 7, the coefficient of the EM term is negative and significant at the 1 percent level. The negative sign shows that there is long run stability in the model. Following any short run shocks or disequilibrium in the system, there is capability for long run stability to be restored over time. The coefficient is high at -0.727, indicating that adjustment to long equilibrium is rapid since over 72 percent of the adjustment is shown to be completed in the first period.

The lower panel of the result shows the coefficient for the long run estimates. Note that the long run estimates are the stable results since they measure the behaviour of RGDP after all adjustments in short-term movements have been accounted for. In the result, only the coefficient of ENC passed the significance test at the 1 percent level among the green accounting variables. The coefficients of the other two variables fail the test even at the 5 percent level. This shows that only environmental cost accounting by Nigerian firms has significant positive impact on economic growth in the long run in Nigeria. A one percent rise in cost outlay for environmental degradation leads to a 1.09 percent rise in long run real GDP. This result reveals that environmental accounting by firms matters significantly for the overall economy in Nigeria over time. The result also shows that economic costs and social costs have no significant impact on long run economic growth in Nigeria.

Green Accounting and HDI

The results for the effects of the green accounting variables by companies on human development index in Nigeria is presented in Table 8. The model shows that there is impressive level of overall fit since the ratio of the standard error of regression and that of the mean of dependent variable is low. A close evaluation of the individual coefficients of the explanatory variables in the short run reveals that lagged HDI has both positive and negative significant impacts on itself over time. This shows that increased human development can immediately limit further human development in the short run, although the delayed effect is positive. For the green accounting variables, none of the coefficients is significant in the short run estimates. This result shows that cost outlays by firms for economic, social or environmental costs do not significantly influence the level of human capital development in the short run. Money supply is however shown to have a significant positive impact on short-run human development, while exchange rate has a significant negative effect. The coefficient of the ECM term also has the expected negative sign and is significant at the 1 percent level. This also shows that any short run deviation of HDI from equilibrium will be restored in the long run. The adjustment is

however slow, given that the ECM term is low at -0.283. Only 28 percent of the adjustment to long run equilibrium is completed in the first period.

Table 8: PMG Results for HDI

Variable	Coefficient	t-Statistic	Prob.*
Short Run Equation			
ΔHDI_{t-1}	-0.306	-8.91	0.00
ΔHDI_{t-2}	0.356	13.51	0.00
ΔSOC_t	0.037	1.07	0.29
ΔENC_t	-0.030	-1.03	0.30
ΔECC_t	0.001	0.01	0.99
ΔMOS_t	1.793	18.54	0.00
$\Delta\text{EXC_RATE}_t$	-0.001	-7.32	0.00
ECM_{t-1}	-0.283	-27.75	0.00
Long Run Equation			
SOC	0.031	0.85	0.40
ENC	0.022	0.65	0.51
ECC	0.101	2.68	0.01
MOS	5.291	73.72	0.00
EXC_RATE	-0.011	-12.21	0.00
Mean dep. var	0.342		
S.E. of reg.	0.245		

The long run result is shown in the lower panel of the Table. All the green accounting variables are positive in terms of their coefficient. This shows that they all have the tendency to improve human capital development in the long run. Only the coefficient of ECC is however significant at the 5 percent level; the coefficients of the other variables fail the significance test at the 5 percent level. This shows that an increase in economic cost outlay by the companies will lead to an improvement in the human capital in Nigeria after all adjustments have been made. Thus, it is the economic performance of firms that influences human development in Nigeria, rather than environmental or social development. The coefficient money supply is significant and positive, showing that increase in money supply significantly promotes HDI over time in Nigeria.

Robustness Test for Results

In order to check for the robustness of the estimates in the study, the multicollinearity and normality tests are conducted, and the results are presented.

A. Multicollinearity Tests

The regressors in the models used contain variables that may effectively measure similar effects. For instance, the three financial development variables are measures of the dimension of the financial markets in the respective countries. It is therefore important to specifically test whether the effects of each of these variables are sufficiently measured in the estimations. The test for multicollinearity in the estimates is therefore conducted in this regard. In Table 9, the results of the multicollinearity test for the three models for the PMG estimation are presented. The results show the estimates of the centred variance inflation factors (CVIF) variables. The CVIF value must be less than 5.0 for the variable in an equation to be free from collinearity. In the report on Table 9, the CVIF values for all the variables are less than 5.0. This shows that the estimated coefficients for the equations do not integrate excessively among themselves and the estimates are therefore reliable. The absence of multicollinearity implies that the coefficient estimates in the regression results are well defined for each of the explanatory variables.

Table 9: Post Estimation Test Results – Multicollinearity test

Variable	RGDP	HDI	INFL	UNE	MSI
SOC	0.968	1.012	0.746	2.859	2.988
ENC	0.435	0.455	0.785	4.824	4.041
ECC	0.341	0.356	0.615	2.038	2.130
MOS	0.444	0.464	0.801	0.157	0.676
EXC_RATE	0.609	0.636	1.098	1.701	0.395

The robustness checks provided for the ARDL-based PMG estimates also involves evaluating the stability of the estimated results over time. This test is performed by considering that normality of the residual distribution. The normality test is conducted using the J-B procedure, and the result indicates that the J-B statistic failed the significance test even at the 5 percent level. Note that the null hypothesis is the absence of non-normality. This implies that the null hypothesis of normality in the residual distribution is accepted for the estimated panel relationships. Thus, the tests indicate that the residuals are normally distributed. With this outcome, each of the estimated equations can be adjudged to be stable and effective for long term prediction and analysis.

Test of Hypotheses

In this section, the working hypotheses that were formulated for the study are empirically tested. The 5 percent significance level is selected for conducting the test. The hypotheses tests are performed using the long run estimates in each equation. This is because long run estimates are more stable and provide better platform for making policy judgment.

H01: Social, environmental and economic cost of listed manufacturing companies does not have significant effect on Human development index in Nigeria

This hypothesis seeks to evaluate the roles of the three green accounting variables on human development index in Nigeria. The results in Table 8 are used for testing the hypothesis. In the long run result, the coefficient of SOC is 0.031 ($p > 0.05$), that of ENC is 0.022 ($p > 0.05$), while that of ECC is 0.101 ($p < 0.05$). This means that the coefficients of SOC and ENC fail the significance test at the 5 percent level, while that of ECC passed the test at the 5 percent level. Based on this result, the null hypothesis is partially rejected for ECC but accepted for SOC and ENC. Thus, while economic cost of listed manufacturing companies has a significant positive effect, social and environmental costs of listed manufacturing companies do not have significant effect on Human development index in Nigeria.

Hypothesis Two: Social, environmental and economic cost of listed manufacturing companies does not have significant effect on Real gross domestic product in Nigeria

To test this hypothesis, the long run results in Table 7 is considered. In the result, the coefficient of SOC is -0.114 ($p > 0.05$), that of ENC is 1.097 ($p < 0.01$), and that of ECC is 0.207 ($p > 0.05$). These results show that the hypothesis relating to SOC and ECC are accepted in this case, while the hypothesis relating to ENC is rejected. Thus, while environmental cost of listed manufacturing companies has a significant positive effect, social and economic costs of listed manufacturing companies do not have significant effect on Human development index in Nigeria.

Discussion of Findings

The goal of the research is to determine the effect of Green Accounting and Sustainable Development in Nigeria. First, the study found that in general, the effects of green accounting initiatives by the companies on sustainable development in Nigeria are more long-term than short-term. It was shown that while the short-run effects are more negative and mostly insignificant, the long run stable effects give indication that these initiatives could help to address sustainable development problems in Nigeria. This outcome is understandable and demonstrates that our study extends previous literature like Andania and Yadnya (2020), Ufuegbu and Asogwa (2020), Eboh and Chukwuka (2018) and Caesaria and Basuki (2017). These studies found that green accounting and sustainability disclosures by firms have direct significant positive impacts on firms' performance in form of productivity and profitability. Our study shows that the impacts found by previous studies that focus on firm-level effects are the short run impacts when the economy is taken into consideration. It is after these effects on the companies have fully internalized that the positive effects on sustainable development can be felt in Nigeria over the long run. This implies that the focus of companies in addressing sustainable development in the country needs to be more intentional and focus on a longer horizon of sustainability reporting, instead of using short term outcomes on the firms to gauge how the effects will play out in the economy.

The study also found that economic cost or green reporting on economic aspects of the firms has positive long run effects on human capital development. For these two sustainable development factors, only economic aspect of green accounting was found to have significant effect. This outcome is in line with previous findings by Andania and Yadnya (2020) and Iliemena (2020). It demonstrates that the social aspects of sustainability policy by manufacturing firms in Nigeria which is supposed to have the greatest impact on human capital development has not performed well in the long run in Nigeria. The focus therefore needs to be on ensuring that CSR aspects of green accounting are better

targeted by companies in Nigeria.

The study also found that the coefficient of environmental expenditure was significant and negative in the short run but it became positive in the long run. This shows that environmental sustainability provisions by the companies is the most important factor in driving GDP growth in the economy. This result reveals the strong link between firm environmental strategy and the overall output and productivity in an economy over time. This result is in line with previous studies by Eboh and Chukwuka (2018) and Caesaria and Basuki (2017) and confirms that green business initiatives effectively promote firms' productivity in the short and long run.

5.2 Recommendations

The following recommendations are made based on the empirical findings of the study.

1. The result from the study showed that social costs outlay by the companies do not have significant impacts on Human development index and real gross domestic product. This shows that social responsibility of firms in Nigeria does not appear to be having desired long-term effects, especially in directly improving welfare. Thus, firms need to re-visit their social commitments in terms of strategy and focus. The firms need to either change their CSR strategies or they may have to re-evaluate them in order to ensure that this important aspect of sustainability of the firms deliver long-term effects in the economy. Current areas of focus of social responsibilities may need to be changed to involve those that can deliver long term effect, especially in the area of human development and price stability over the long run
2. There is also the need for the manufacturing companies in Nigeria to improve on the linkage of their economic expenditures to GDP growth, especially in the long run. This will ensure that the manufacturing sector is a major contributor to real income growth as well as overall improvement in productivity in the economy.

5.3 Conclusion

In this study the effect of green accounting by manufacturing firms in Nigeria on sustainable development in the country was examined. In particular, the study considered the roles of different green accounting components of the companies, including social, environmental and economic aspects. The focus is on examining how responsible accounting and strategy in each of this component influences sustainable development in Nigeria. Sustainable development was measured in the study using real GDP growth, human development index (HDI). The Pooled Mean Group (PMG) estimation technique was used in the empirical analysis to estimate the long-run and short-run relationship amongst the variables for the panel analysis. The main finding of the study reveals that green accounting strategies by companies matter for sustainable development in Nigeria. Specifically, the following conclusions were made:

- a) That while economic cost considerations of manufacturing firms significantly promote human development in Nigeria, social and environmental costs of the firms do not affect human development.
- b) That only economic aspect of responsible reporting by manufacturing firms has significant positive effect on real gross domestic product growth in Nigeria. Neither environmental cost nor economic cost of firms has real effects on real gross domestic product in Nigeria.

5.4 Suggestions for Further Study

This study focused on Long run implications of Green Accounting and sustainable development using autoregressive distributive .Sustainable development was proxied using Human development index and real gross domestic product,. Other studies can use different methodologies such as Vector error correction model to study the effect of Green accounting on economic performance and growth. Also, other studies can use different variables to study the effect of Green accounting on sustainable development. More control variables such as public debt, interest rate can be introduced to decipher the effect of Green accounting on wsustainable development in NigeriaNigeria. The focus of the study was on manufacturing sector which is capital intensive. Other studies can focus on other sectors such as consumer business and banking or any service oriented sector. Furthermore, the millennium development goals surpasses only economic growth and encompasses poverty alleviation, improved standard of living and the preservation of the earth Other studies should consider other areas of the sustainable development goals not captured in this study

5.6 Contribution to Knowledge

The issue of sustainable development and Green accounting is a global issue. The millennium development goals to which Nigeria is a signatory emphasizes restoration of the earth environment, economic development, poverty alleviation and full employment.

1. This study contributes to knowledge by identifying the key drivers of sustainable development and Green accounting factors that drive macro economic indices.
2. The study contributes to knowledge by showing that green accounting initiatives by companies on sustainable development in Nigeria are more long-term than short-term. Short-run effects are more negative and mostly insignificant while the long run stable effects give indication that these initiatives could help to address sustainable development problems in Nigeria.
3. Economic cost has positive long run effects on human capital development and negative effect on inflation. Only economic cost has significant effect Human development index this indicating that social sustainability policy by firms has failed to achieve improved human capital development. Specifically, result contributes to knowledge by showing firms' social expenditures is limited to social aspects of sustainable development in Nigeria.
4. The study contributes to knowledge by showing coefficient of environmental expenditure was significant and negative in the short run but positive in the long run ; implying that environmental sustainability provisions by firms as important factor in driving GDP growth in the economy. This result contributes to knowledge by revealing strong link between firm environmental strategy and overall output and productivity in the economy over time. These findings are relevant in driving Macro economic policies and micro economic policies within the firm to provide linkages to overall economic growth.

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