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The Efficacy of Climate Change Financing on Sustainable Economic Development in Nigeria

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Abstract

Climate change has become an increasingly pressing issue across the world, particularly in developing countries, and Nigeria is no exception. As climate change continues to create severe weather cycles such as floods and droughts, Nigeria has looked for ways to tackle the resulting development challenges. One option that has arisen is the utilization of climate change financing to drive economic development. This paper seeks to evaluate the efficacy of climate change financing on sustainable economic development in Nigeria. A comprehensive literature review of relevant studies was conducted to assess the efficacy of climate change financing on sustainable economic development in Nigeria. The research showed that climate change financing has many potential benefits, such as reducing poverty and inequality, promoting economic growth, and creating employment opportunities. Climate change financing also has the potential to provide communities with the resources needed to adapt to the changing climate and improve their resilience. However, the research also revealed that the efficacy of climate change financing depends on proper management, governance, and coordination. The paper further discusses policy recommendations for the effective utilization of climate change financing for sustainable economic development in Nigeria. It emphasizes the need for a greater focus on improving the management, governance, and coordination of climate change financing projects. The paper concludes by proposing further areas of research that could be explored in order to better understand the efficacy of climate change financing on sustainable economic development in Nigeria.

Keywords: *Climate change, Economic development, Financing, Sustainable, Poverty, Employment opportunities*

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Background to the Study

Human operations starting from household energy utilization to large-scale industry has disrupted the atmosphere much more significantly in recent time. Industrial operations are largely responsible for this undesirable status of atmospheric conditions due to the constant emission of pollutants. Air pollution, deforestation, and land degradation are the major environmental challenges facing countries of the world (Oguntoke; Aboaba, and Gbadebo, 2009). The controversy surrounding whether mankind's activities can cause global warming has been an issue of debate (Coviello, 2019). Pollutants from industries have greatly caused climate change. The continuous emissions of greenhouse gases by industries are traceable to the Industrial Revolution of the late 18th century which led to economic improvement for most people in the industrialized society (Okafor, 2018). Though technological development improved the production of goods and standard of living, the persistent increase in climate change that is ravaging the whole world emanated from global emissions of carbon dioxide (CO2) by industries around the world. As a global phenomenon. Climate change has implications associated with extreme weather events that pose challenges to sustainable development (Stern, 2006). Climate change has hindered world development objectives including the objectives of Nigeria's Vision 20: 2020 and the SDGs (Onyeji, 2020).

However, in 2020, "the year like no other" according to IMF, Nigeria ranked 28th among countries with 2020 vision objectives (sustainable energy and poverty eradication) achieved. The economic condition of many Nigerians gets worse than ever with rising carbon emissions characterized by population growth. The effectiveness of the existing strategy of reducing emissions and generating additional economic development has been contested (FoE, 2009). While all effort is one of the development policies geared towards carbon emission reduction, little is known about their specific contribution to meeting the sustainable development needs of countries with diverse interests, as well as the specific needs of the vulnerable populations within the countries.

Being a signatory to the international agreement (Kyoto Protocol of 1998) which requires that industrialized nations reduce carbon emissions, Nigeria agreed to adopt policies that will enhance her obligation towards carbon emission reduction in the environment. As a fossil-fuel-dependent economy with a large means of livelihood centered on climate-sensitive activities, the development of climate change policies and response strategies in Nigeria is critical. One of the key pillars of Vision 20:2020 is an investment in low-carbon fuels and renewable energy. Achieving the goal of low carbon, high growth and resilient socio-economic system for equitable and sustainable socio-economic and environmental development faces some challenges which include stability of the enabling environment, adequate human resources capacity, and availability of adequate resources to address the initiatives for climate change mitigation. The argument around the world concerning climate change always focuses on the efforts that are needed to avert its implications while attaining sustainable development. Sustainable Development Goals (SDGs) are the most ambitious development agenda ever in human endeavors. In most African countries, the risks faced by the fight against climate change have not been properly evaluated.

The concern to achieve national development simultaneously with climate change reduction has far-reaching consequences for countries whose fossil fuel extraction underpins their economies (Nigeria with fuel export constitutes 89% of merchandise exports in 2021) (World Bank, 2022). All effort around the world is on how best to reconcile the agenda for climate change with the need for economic growth (United Nation 2015). Hence, this study examined the efficacy of climate change financing in the reconciliation of global challenges with economic development. Moreover, it investigated the prevalent potential benefits of climate change financing in view of poverty, inequality, economic growth, resilience, and employment opportunities.

Objectives of Study

The main objective of this study is to assess the efficacy of climate change financing on sustainable economic development in Nigeria. The specific objectives are to:

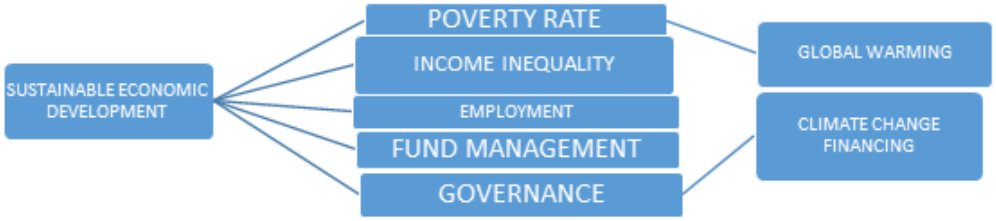
i. Determine the effect of climate change financing on Gross Domestic Product (GDP) in Nigeria
ii. Examine the effect of climate change financing on communities' resources needed to adapt to the changing climate and improve their resilience.

Conceptual Review

Conceptual Model and Hypotheses Development

This study develops a model of sustainable development by testing some propositions about the relationship between climate change, financial funds, and sustainable development which is schematically presented in Figure 1. Acknowledging that there are various factors (e.g. population growth, unemployment rate, technological development, poverty rate) potentially influencing climate change. We opted to examine climate change financial funds and sustainable development in Nigeria because countries across the world are working fiercely to address climate change, but access to climate finance at scale remains one of the biggest challenges. A recent survey for Africa Climate Week revealed that more than half of the countries have had problems mobilizing international and national climate finance, less than one-quarter of the countries have a financing strategy in place, and only one-third have put financial instruments in place. Yet two-thirds of the countries started implementing their NDCs, and around 80% have started implementing mitigation and adaptation measures to achieve the NDCs.

Figure 1: Hypothesized model of climate change Financing and sustainable Economic development.



Source: Onyishi, Enwereuzor, Ituma, & Omenma (2015)

Besides, even though these two factors have attracted considerable world attention, the effects of climate change are at an increase. We propose that the relationship between sustainable economic development and climate change financing is mediated by poverty rate, income inequalities, employment rate, fund management, and governance in Nigeria. We specifically argue that the policies for carbon emission reduction financing for climate change control are not easy as more complex issues occur as a result of such policies. According to United Nations Framework Convention on Climate Change (UNFCCC), Climate Change financing is the source of funds from the public and private sectors to support the mitigation and adaptation actions to climate change. Yet, with all the local and international aid on climate change issues, carbon emissions continue increase. The above model is used as a conceptual framework that guides the development of a set of hypotheses we subsequently tested. In the following section, we will discuss the components of the model and the rationale for linkages between climate change financing and, sustainable economic development.

Climate Change and Sustainable Development

The issue of climate change has a long history of increasing population and has attracted global interest. According to Frederick S. Goethel (2010), one of the answers that have been proposed by "geoengineers" is by trying several different techniques to lessen the amount of sunlight that is striking the earth. Climate change is increasingly challenging the international community. There is broad scientific consensus that climate change is likely to happen more quickly than was expected some years ago (Fatoki & Sasona, 2015). Scientific researchers have concluded that the low yield of agricultural products is a result of climate change. Decrease in food security and health challenges resulting from climate change undermine sustainable development.

Our model suggests that corruption, increase in population, unemployment, technological development, and poverty are major factors that mediate the relationship between climate change finance and sustainable development. Thomas Malthus, a famous 18th-century British economist, theorized that the population would continue to expand until growth is reversed by disease, famine, war, or calamity (Investopedia, 2021). Malthus specifically asserts that the human population increases geometrically, while food production increases arithmetically. Under this paradigm, the increase in population without a corresponding increase in

production will always leave a proportion of the population unemployed thereby increasing the rate of poverty. An increase in the poverty rate has a link to climate change as the need for livelihood can take in diverse activities that are susceptible to climate change. In another view, it is believed that technological development enhances an increase in production, it also creates labour lay-off which in effect increases the unemployment rate.

Concisely, the major factor that hinders sustainable development in any society is corruption. The national and international efforts towards carbon emissions reduction are particularly vulnerable to corruption since the project is being promoted or funded in most countries where corruption has played pivotal roles in their political economy (Fadairo, 2018). Martins and Elges (2013) noted that the burgeoning of new bodies tasked with allocating and spending on climate finance lacks transparency in financial management which was corroborated by Masullo and Brown (2014) who asserted that the sum of climate change finance contributions from developing countries and developed country partners for climate change mitigation and adaptation do not always reflect what developed countries report for climate finance. Falsified reports and data make climate change financing prone to corruption. For instance, state agencies may produce a false report on new development that enhances carbon emission reduction to attract more funds. This would mean that payments received for projects yielded a successful result while in actual reality no projects were implemented. Also, local beneficiaries of the climate fund incentives may influence officials to inflate results for more claims and entitlements. The act of corruption in climate change financial fund management led to the provision for verification of data collected by independent agencies in most countries. To ensure good quality of data, integrity, and independence are required. According to Fadairo (2018), the corruption risks assessment in Kenya's Ministry of Environment, Water and Natural Resources in 2013, reveals that misuse of funds by the central government is the greatest concern of stakeholders. The report revealed that 80% of respondents agreed on the low level of confidence that revenues received by the government can be transparent and well managed.

The quest for livelihood has left the unemployed population with the option of climate-sensitive activities such as wood fuel business, artisanal mining, and excavation activities. Wood fuels is a significant energy source for both household and industries for heating and building roofing. The exploitation of forest wood led to deforestation. The question is, will the rate of afforestation be able to cushion the effect of deforestation? Can there be an alternative to the need for forest products? The answer to these questions will enhance forest sustainability. Given the foregoing, it is believed that countries whose economies are based heavily on agriculture are responsible for causing climate change (Burney, Charles, and David, 2013). By and large, research on climate change financing suggests that there is a general belief that the level of financing currently reaching African countries is still insufficient to meet the adaptation needs (Norman, Barnard, Nakhooda, Caravani, ODI, and Schalatek, 2015). Based on the preceding arguments, we, therefore, expect that climate change financial funds will be negatively associated with sustainable development.

H1. Climate change financial fund will negatively predict sustainable economic development.

H2. Unemployment and inflation rates positively predict sustainable economic development.

Theoretical Framework

Value Maximization Theory

The objective of every organization is to maximize shareholders' wealth. According to Friedman (1970) in Jensen, (2001), the value maximization theory holds that the single objective of a firm's existence is to maximize shareholders' wealth in the long run. This is achieved through some specific objectives of the organization such as an increase in profitability, reduction in cost, increase in the market share of the organization, increase in growth rate, and some other ways.

Based on the value maximization theory, it is believed that most countries like Nigeria whose economy is highly dependent on fossil fuel will be striving to increase potentials through wealth maximization for the benefit of the society at large. This is the idea behind some member countries that are signatories to the Parish Agreement like the United States of America, under the administration of former President Donald Trump, announced their withdrawal from the Paris Agreement. Fighting climate change places constrain on performance. Hence, Rafael Reuveny's three-choice theoretical argument in Olaniyan and Ufa (2015) holds that people facing climate change problems have one of three options: (i) remain where they are and do nothing; (ii) remain where they are and try to mitigate the effects; and (iii), leave the affected area entirely. The second option among the three explained the objective of this paper. Climate Change Financing is geared toward reducing, and mitigating climate change effect while enhancing adaptation with the aim of increasing and maintaining the human resilience to climate change effect. It is an investment fund flow to all environmental related activities for the purpose of maximizing the adaptation and mitigation of climate change impact in every economic sector. The objective of Climate Change Financing is maximize investment in renewable and utility energy with financial resources extended by developed countries to developing nations to cushion the incremental costs of climate change. To maximize the objective of climate change financing, the effect of the carbon emission reduction policy should be linked closely with the need for job creation and an increase in National Production. More importantly, climate change mitigation and adaptation policies should aim at maximization of the national production capacity as sustainable development is measured by stable economic growth.

National Policy on Climate Change in Nigeria

The climate change policy in Nigeria is aimed at a strategic response to climate change through the attainment of a low-carbon, high-growth economic development path, and building a climate-resilience society. The Nigeria National Climate Change Policy Response and Strategy (NCCPRS) set objectives to strengthen national initiatives for adaptation and mitigation of climate change effects to enhance sustainable economic development. Its main objectives as to: implement mitigation measures that will promote low carbon as well as sustainable and high economic growth; strengthen national capacity to adapt to climate change; raise climate change-related science, technology, and R&D to a new level that will

enable the country to better participate in international scientific and technological cooperation on climate change; significantly increase public awareness and involve the private sector in addressing the challenges of climate change; strengthen national institutions and mechanisms (policy, legislative and economic) to establish a suitable and functional framework for climate change Governance.

Empirical Review

Studies have accumulated materials to investigate the implications of climate change policies on sustainable development. Among the climate change policies, finance policy is a major player in climate change conservation commitment. Studies show that policies mobilize private finance to canter climate change (Polzin et al., 2015). According to Alfaro et al. (2005), institutional quality government size, political stability, and openness are among the determinants of capital flows that have shaped their disbursement in the past thirty years. Contrary to expectations, some policies in the use and investment affect the investment efforts of private and foreign investors (Nygaard and Bolwig, 2018). Private sector investment in renewable energy has been curtailed by the absence of well-defined policies on private investment coupled with delays in the authorization of private sector projects (Kariuki, 2018). Sustainable economic development needs a more active role with finances that reduce the large financing gap, better management, and technical policy. To enable adequate climate change funding opportunities, the effective and efficient use of funds must be at the forefront of policymakers.

The lack of clear policies and regulatory frameworks in most countries imposes barriers to accessing climate funds (Mungai, Ndiritu, and Izael, 2022). The climate finance landscape is complex and fragmented thereby making the harmonization across multinational climate funds nascent and the process of fund assessment difficult. Barriers to accessing climate financing include lack of clear policies and regulatory frameworks on climate change, or if policies exist they are not fully implemented; low provision of climate funding in national budget lines; low government capacity in terms of complying with requirements, standards, and procedures of funding sources, developing "bankable" projects, and absorbing funding through the bureaucratic processes; lack of awareness of the various sources of climate finance and limited stakeholder engagement, including from the private sector; and perception of climate change as an environmental issue rather than a development issue, impeding multi-functional solutions and sources of funding.

Methodology

Research Design

Primarily, this research examines the effects of climate change financing on sustainable economic development in Nigeria. To achieve the objectives, an *ex-post facto* research design was adopted to investigate this impact between 2015- 2022. This study used journal materials that have been earlier on mentioned earlier in reputable journals. Specifically, the study utilized data from Nigeria's Financial Position in the Fund (Member Financial Data to the IMF) and Central Bank of Nigeria Statistical Bulleti**n** to examine the relationship and impact of the independent variables on the dependent variables using regression analysis. Regression

as a data analysis technique seeks to explain the economic phenomenon by identifying possible relationships among variables.

Variables Used and Sources

This paper seeks to examine the efficacy of climate change financing on sustainable economic development in Nigeria. To undertake this study, we resort to using variables for a proper understanding of the topic. The variables we put into consideration are:

i. Gross Domestic Product (GDP) is a proxy for sustainable development. This is usually employed to denote market size, which is indicative of the level of economic activity. Large market size is suggestive of a prosperous business climate and hence serves as a means of measuring the impact of foreign investment in the countries.
ii. Climate Change Financial Fund (CCFF). Climate Financial Fund (CFF) was established in 2008 by several multilateral development banks to influence climate investments in carbon emission reduction is included as a control variable (Fatoki & Sasona, 2015).
iii. Unemployment rate (UR). This refers to the proportion of the population that is actively in search of job engagement.

Method of Data Analysis

The study adopts regression analysis to estimate the hypotheses formulated at a 0.05 level of significance. The Eview econometric software version 9 was used for the analysis. The statistical test for the model random effects of parameter estimates was done through the standard error, F test, and t-test, while the model fixed-effect was tested through R^2. The economic criteria show whether the coefficients of the variables agree with the prior expectation. The significance of the overall regression was assessed through the use of statistical criteria.

Model Presentation

We developed the following model to present the relationship between tax optimization and the firm's value:

GDP = F(CCFF, UNPR, POVR, INFR, INTR,) equation 1

$GDPit = a_0 + b_1CCFFit + b_2UNPRit + b_3POVRit + b_4INFRit + b_5INTRit + \varepsilon it$ equation 2

GDP = Gross Domestic Product
CCFF = Climate Change Financial Fund
UNPR = Unemployment Rate
POVR = Poverty Rate
INFR = Inflation Rate
INT = Interest Rate
$a_0, b_1, b_2, b_3, b_4, b_5$ = Coefficient OF Regression
εt = Error Term
it = Time size

Results and Discussion

Table 1: Regression Result for the Test of Hypothesis

Dependent Variable: GDP
Method: Least Squares
Date: 08/19/23 Time: 10:35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.226705	0.175298	18.40702	0.0000
CCFF	0.055884	0.158824	0.351859	0.0320
UNPR	-0.00356	0.379900	2.630578	0.0312
POVR	-0.010560	0.102828	-0.102693	0.3207
INFR	-0.016231	0.105888	1.097679	0.0402
INTR	-0.010356	0.369100	2.520578	0.0302

R-squared	0.915825	Mean dependent var	3.448313
Adjusted R-squared	0.878738	S.D. dependent var	0.735424
S.E. of regression	0.245308	Akaike info criterion	0.311116
Sum squared resid	0.481407	Schwarz criterion	0.528404
Log likelihood	2.977747	Hannan-Quinn criter.	0.266453
F-statistic	24.96339	Durbin-Watson stat	3.065609
Prob(F-statistic)	0.000142		

Null Hypothesis: D(GDP,2) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=1)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.313628	0.7777
Test critical values:	1% level	-7.006336	
	5% level	-4.773194	
	10% level	-3.877714	

Source: Software analysis result of the CCFF on GDP from eview 9.0, 2023

Interpretation of Regression Result

Test of Variable Significance

From the regression result, the probability value of CCFF is 0.0320 which is < 0.05. It means that marginal CCFF determines GDP in a good way. CCFF is a significant independent variable for our regression model.

The probability value of UNPR is 0.0312 which is < 0.05. It means that the cost of UNPR determines GDP in a good way. So UNPR is a significant independent variable for our regression model.

The probability values of POVR, INFR, and INTR are 0.3207, 0.0402, and 0.0302 respectively, which is < 0.05. It means that POVR, INFR, and INTR determine GDP in a good way. So POVR, INFR, and INTR are significant independent variables for our regression model.

Decision

According to the result of the regression result shown in Table 1, the variable (CCFF) has a positive influence on GDP. Prob(F-statistic) (0.000142 < 0.05). By interpretation, a 1%

increase in CCFF will increase the beta coefficient by 0.055884 on GDP. Other variables (UNPR, POVR, INFR, and INTR) have a negative influence on GDP. By interpretation, a 1% increase in UNPR will increase the beta-coefficient by 0.00356 on GDP, a 1% increase in POVR will decrease the beta-coefficient by 0.010560 on GDP, a 1% increase in INFR will decrease the beta-coefficient by 0.116231 on GDP, a 1% increase in INTR will decrease the beta-coefficient by 0.010356 on GDP.

Ho is rejected, since the Durbin-Watson stat value is 3.065609, implying that the CCFF data set has positive autocorrelation with GDP. Thus, we accept the alternative hypothesis (H_1) and conclude that climate change financing contributes positively to sustainable economic development in Nigeria, as represented by the Gross Domestic Product (GDP). The regression results show that climate change financing's effect on the GDP outweighs the negative effects of unemployment rates, poverty rates, inflation rates, and interest rates on the GDP. It therefore implied that climate change financing has potential benefits, such as reducing poverty and inequality, promoting economic growth, and creating employment opportunities. Climate change financing also has the potential to provide communities with the resources needed to adapt to the changing climate and improve their resilience. However, the research also revealed that the efficacy of climate change financing depends on proper management, governance, and coordination. The result shows that the constant (C) is positive implying that holding all other explanatory variables constant, GDP will increase by 3.226705. Other variables outside the model could serve to improve sustainable economic development notwithstanding the effect of unemployment, poverty, and inflation rates.

Test of Model Fitness

We determined the model fitness using the R-squared and Adjusted R-squared. From the regression result, it was observed that the model is a good one because the R-squared shows that the independent variables cumulatively explained 91.5825% of the independent variable, while the Adjusted R-squared showed 87.8738%. The more the R-squared and Adjusted R-squared, the more fit the model. The model fitness was also carried through Prob(F-statistic) which was found to be less than 0.05 ($0.000142 < 0.05$).

Conclusion

The main objective of this work is to examine the efficacy of climate change financing on sustainable economic development. Specifically, the researchers considered some factors, which could be related to climate change and influence sustainable development. The results of the present study showed that;

1. There was a positive and significant relationship between climate change financing and sustainable economic development in Nigeria. This indicates that the effective and efficient use of the climate change financing has a positive effect in attaining a sustainable economic development in Nigeria. This was consistent with the financing theory which showed that, financing activities helps in reducing poverty and inequality, promoting economic growth, and creating employment opportunities.

2. In addition, since sustainable economic development is a macroeconomic phenomenon, incorporating other macroeconomic variables needed by all communities such as unemployment rate reduction, poverty rate reduction, inflation rate reduction, and interest rate reduction which in turn improves sustainable economic development was deemed important to increase the benefits from the research findings. The findings shows that unemployment rate, poverty rate, inflation rate, and interest rate had a negative impact on sustainable economic development in Nigeria. This shows that increase in inflation rate and interest rate will led to increase in unemployment and poverty rate with reduction in economic development. However, if greater focus on improving the management, governance, and coordination of climate change financing projects is given, the negative influence of unemployment rate, poverty rate, inflation rate, and interest rate will be surmounted by the positive influence of climate change financing. This research therefore conclude climate change financing is a vital tool for sustainable economic development.

Recommendations

From ur findings, we, therefore, recommend that sustainable development can be enhanced if the following policy instrument is utilized.

1. A global policy framework to bring nations to commit to a transition that strengthens the international flow of climate change finance and sustainable economic development. The government should design a climate remediation fund to mobilize companies toward climate finance for societal needs. Tax exemption should be given to all environmental remediation projects.

2. Further significant research work is required to comprehend the achievement of climate change financing, in terms of its concrete gains in adaptation, mitigation, and economic development.

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