

Original Research Article

Petroleum Sector Reforms and Their Impact on Inclusive Economic Growth in Nigeria

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Abstract: This study investigates petroleum sector reforms and inclusive economic growth in Nigeria, focusing on both economic performance and social welfare outcomes. The research is motivated by the paradox that, despite Nigeria's heavy dependence on petroleum resources as a major source of government revenue and foreign exchange earnings, the country continues to experience high levels of poverty, unemployment, and inequality. The study therefore examines whether recent reforms in the petroleum sector particularly petroleum sector reform implementation, the Petroleum Industry Act (PIA), petroleum revenue transparency initiatives, and petroleum subsidy rationalization have translated into broad-based economic growth and improved human development. Using annual time-series data spanning 2000 to 2024, the study adopts an ex post facto research design and employs the Autoregressive Distributed Lag (ARDL) modelling approach to estimate both short-run and long-run relationships between petroleum sector reforms and inclusive growth indicators. The empirical findings reveal that petroleum sector reform implementation, the provisions of the Petroleum Industry Act, and petroleum revenue transparency initiatives have positive and statistically significant effects on both RGDPPC and HDI in the long run. This suggests that improvements in governance, regulatory frameworks, and transparency within the petroleum sector enhance economic efficiency, attract investment, and facilitate better allocation of resources toward development-oriented sectors. Government expenditure is also found to have a positive and significant impact on inclusive growth, highlighting the critical role of fiscal policy in translating petroleum revenues into tangible socio-economic benefits. However, the results show that petroleum subsidy rationalization has a negative but significant effect on both economic growth and human development. This indicates that while subsidy reforms may improve fiscal sustainability and reduce inefficiencies in the long term, they impose short-term adjustment costs through higher energy prices, increased cost of living, and reduced household welfare. The study concludes that petroleum sector reforms have the potential to drive inclusive economic growth in Nigeria when effectively implemented and supported by strong institutions, transparent revenue management, and strategic public expenditure.

Keywords: Petroleum Sector Reforms, Inclusive Economic Growth, Petroleum Industry Act, Transparency Initiatives, Subsidy Rationalization, Human Development, Nigeria.

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INTRODUCTION

The Petroleum sector has historically played a pivotal role in shaping the economic landscape of Nigeria since the discovery of crude oil in commercial quantities in the late 1950s (Adebayo, 2021). Over the decades, oil and gas resources became the backbone of government revenue and foreign exchange earnings, accounting for more than two-thirds of total exports and

an overwhelming share of fiscal receipts (Obi & Okoro, 2022). Despite this centrality, Nigeria's dependence on petroleum has been accompanied by structural inefficiencies, weak institutional frameworks, and vulnerability to global price shocks, leading to concerns about sustainable and inclusive growth (Salawu & Ahmed, 2023).

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The concept of inclusive economic growth refers to a growth process that results in broad-based progress in income, employment, and welfare across different sectors and demographic groups within an economy (World Bank, 2021). In the Nigerian context, inclusive growth is particularly critical given persistent poverty, rising unemployment, and widespread regional disparities. Although the petroleum sector has generated substantial revenues, the extent to which these earnings translate into improved living standards and equitable opportunities for the broader population remains contested. Much of the national discourse has therefore shifted to the effectiveness of reforms aimed at liberalizing and revitalizing the oil industry to foster more equitable economic outcomes (Ibrahim & Ugochukwu, 2024).

Efforts to reform Nigeria's petroleum sector intensified in the early 2000s against the backdrop of declining production, outdated infrastructure, and fiscal leakages. A significant milestone in these reform efforts was the passage of the Petroleum Industry Act (PIA) in 2021, designed to overhaul regulatory frameworks, promote transparency, attract foreign direct investment (FDI), and enhance operational efficiency across the value chain (Eze & Nwachukwu, 2022). The PIA replaced the Petroleum Act of 1969 and introduced new governance structures, including distinct regulatory bodies for upstream and downstream operations, clearer fiscal terms, and provisions for community development (Adeola, 2022). Proponents argue that these changes are geared toward stimulating investment, increasing crude oil production capacity, and allocating resources more strategically to drive inclusive growth.

However, the outcomes of these reforms are still unfolding. While some scholars assert that legislative changes have improved investor confidence and increased capital inflows, others caution that entrenched governance challenges and policy implementation gaps may limit tangible benefits for ordinary citizens (Alade & Onyekachi, 2023). The potential for inclusive economic growth depends not only on the sector's performance but also on how petroleum revenues are managed and channelled into sectors that generate employment and reduce poverty, such as agriculture, manufacturing, and infrastructure development (Okafor, 2023).

Nigeria's experience with petroleum sector reforms cannot be fully understood without considering the broader context of global energy transitions. The increasing global shift toward renewable energy and commitments to reduce carbon emissions have implications for oil-dependent economies. International oil companies are re-evaluating investment strategies, while host governments are pressured to adapt to changing market dynamics (UNCTAD, 2022). For Nigeria, this evolution adds urgency to reform efforts, underscoring the need for diversification and value

addition to ensure that petroleum wealth contributes to long-term and inclusive prosperity rather than short-lived fiscal windfalls.

Furthermore, empirical evidence highlights the complex relationship between petroleum revenues and economic growth in Nigeria. While oil exports have generated substantial foreign exchange, the sector's contribution to employment and local enterprise development remains limited due to its capital-intensive nature and weak linkages with other economic sectors (Nnadi & Iwu-James, 2024). This phenomenon reflects the classic "resource curse" narrative, where resource abundance may coincide with slow structural transformation and limited socio-economic benefits for the majority (Sala-i-Martin & Subramanian, 2021). Addressing this paradox has been a central theme in policy debates, emphasizing the need for reforms that not only increase production and revenue but also prioritize equitable distribution and effective public investment.

In addition, Nigeria's fiscal architecture has undergone reforms to improve transparency and accountability in petroleum revenue management. Initiatives such as the adoption of the Nigeria Extractive Industries Transparency Initiative (NEITI) and the integration of digital tracking systems for oil sales aim to reduce corruption and ensure that revenues are more effectively captured in the national budget (NEITI, 2023). These institutional reforms are critical for fostering public trust and making sure that sector gains translate into tangible improvements in social services, infrastructure, and poverty reduction.

Despite these efforts, challenges persist, including infrastructural decay in oil-producing regions, militancy and supply disruptions in the Niger Delta, and bureaucratic bottlenecks that deter investment (Eze & Nwachukwu, 2022). Additionally, fluctuations in global oil prices continue to expose Nigeria's growth prospects to external shocks, highlighting the limited cushioning effects of reforms in the absence of robust economic diversification strategies.

Thus, this study seeks to critically examine the impact of petroleum sector reforms on inclusive economic growth in Nigeria by assessing not only macroeconomic indicators such as GDP growth and foreign investment dynamics, but also socio-economic dimensions like employment generation, poverty alleviation, and regional development. By grounding the analysis in recent policy frameworks and empirical data, the study aims to generate insights that can inform more effective reform strategies and policy interventions suited to Nigeria's development trajectory.

Nigeria's petroleum sector remains the backbone of the country's fiscal and external sector performance; however, the extent to which reforms in the sector translate into inclusive economic growth remains

uncertain. Despite several policy initiatives aimed at restructuring the petroleum industry, Nigeria continues to experience high poverty rates, rising unemployment, and widening income inequality. Recent statistics indicate that a significant proportion of the Nigerian population still lives below the poverty line, while economic growth has not sufficiently translated into broad-based improvements in welfare and employment opportunities (National Bureau of Statistics, 2023). This paradox raises questions about the effectiveness of petroleum sector reforms in ensuring that oil wealth contributes meaningfully to inclusive economic development.

One of the major concerns is that although reforms such as the Petroleum Industry Act (PIA) were designed to enhance efficiency, transparency, and investment in the sector, their actual impact on economic inclusiveness has been limited. Evidence suggests that structural weaknesses in governance, policy implementation gaps, and institutional inefficiencies continue to constrain the ability of the petroleum sector to stimulate widespread economic opportunities across different segments of society (Ogunleye & Olatunji, 2023). As a result, the anticipated link between petroleum sector reforms and improved socio-economic outcomes has not been fully realized.

Furthermore, Nigeria's heavy reliance on crude oil revenue has historically created an imbalance in the economy, where other productive sectors such as agriculture and manufacturing remain underdeveloped. This structural imbalance limits the capacity of petroleum-driven revenues to generate employment and promote equitable income distribution. Studies have noted that the petroleum industry in Nigeria is highly capital intensive and provides limited direct employment opportunities, thereby weakening its potential contribution to inclusive growth (Akinwale & Grobler, 2022). Consequently, despite reforms intended to stimulate investment and productivity within the sector, the broader economy has not experienced proportional benefits in terms of job creation and poverty reduction.

Another critical issue is the persistent challenge of revenue management and allocation. Even when petroleum revenues increase, weak fiscal institutions and inefficient public expenditure management often prevent these resources from being effectively channelled into sectors that directly enhance social welfare, such as education, healthcare, and infrastructure development (Omodero & Okafor, 2024). This situation limits the potential of petroleum reforms to translate into tangible improvements in living standards for the majority of Nigerians.

In addition, regional disparities and socio-economic tensions in oil-producing areas further highlight the challenges associated with petroleum sector governance. Many communities in the Niger Delta

continue to experience environmental degradation, unemployment, and underdevelopment despite the region's significant contribution to national oil production (Adebisi & Ajayi, 2022). These persistent challenges suggest that petroleum sector reforms have not sufficiently addressed issues of equitable resource distribution and community development.

Given these challenges, there is a need for a comprehensive evaluation of how petroleum sector reforms influence inclusive economic growth in Nigeria. While previous studies have examined the impact of oil revenue on economic performance, limited attention has been given to the extent to which recent reforms in the petroleum sector contribute to broad-based economic opportunities and improved welfare outcomes. This gap in empirical understanding necessitates further investigation into whether ongoing reforms can effectively transform petroleum wealth into inclusive and sustainable economic growth in Nigeria.

The main objective of this study is to examine the impact of petroleum sector reforms on inclusive economic growth in Nigeria. The specific objectives of the study are to:

- i. Examine the effect of petroleum sector reform implementation (PSRI) on real gross domestic product per capita (RGDPPC) in Nigeria.
- ii. Determine the effect of the Petroleum Industry Act (PIA) provisions on RGDPPC in Nigeria.
- iii. Investigate the effect of petroleum revenue transparency initiatives (PRTI) on RGDPPC in Nigeria.
- iv. Examine the effect of petroleum subsidy rationalization (PSR) on RGDPPC in Nigeria.
- v. Assess the impact of petroleum sector reform implementation (PSRI) on the human development index (HDI) in Nigeria.
- vi. Analyze the influence of the Petroleum Industry Act (PIA) provisions on HDI in Nigeria.
- vii. Evaluate the impact of petroleum revenue transparency initiatives (PRTI) on HDI in Nigeria.
- viii. Assess the influence of petroleum subsidy rationalization (PSR) on HDI in Nigeria.
- ix. Determine the effect of government expenditure as a control variable on RGDPPC in Nigeria.
- x. Examine the impact of government expenditure as a control variable on HDI in Nigeria.

This study focuses on examining the impact of petroleum sector reforms on inclusive economic growth in Nigeria. The scope is both thematic and temporal, as it covers the assessment of reforms within the petroleum industry and their effects on key socio-economic indicators such as real gross domestic product per capita (RGDPPC), human development index (HDI), employment generation, poverty alleviation, and regional equity. The study specifically considers four

major components of petroleum sector reforms: petroleum sector reform implementation (PSRI), Petroleum Industry Act (PIA) provisions, petroleum revenue transparency initiatives (PRTI), and petroleum subsidy rationalization (PSR). In addition, the study incorporates petroleum sector efficiency reforms (PSER) as an explanatory variable while controlling for government expenditure to account for broader macroeconomic influences on growth outcomes.

Geographically, the study is confined to Nigeria, with particular attention to both oil-producing and non-oil-producing regions to capture the distributive effects of petroleum sector reforms. This allows for a comprehensive understanding of how reforms impact not only national economic indicators but also local communities and regional development. The inclusion of regional analysis is critical given persistent disparities in income, infrastructure, and social welfare between the Niger Delta, where petroleum activities are concentrated and other parts of the country.

Temporally, the study covers the period from 1990 to 2024. This timeframe captures significant policy interventions, including early 2000s reform efforts, the passage and implementation of the Petroleum Industry Act in 2021, and other contemporary regulatory changes and transparency initiatives. This period also allows for the assessment of reforms under varying global oil price conditions, making it possible to evaluate both short- and medium-term effects on inclusive growth.

The scope of this study is limited to the assessment of macroeconomic and socio-economic indicators influenced by petroleum sector reforms. It does not directly analyze micro-level firm performance or the operational efficiency of individual oil companies, although sector-level efficiency reforms are included as explanatory variables. Furthermore, while global energy transition trends are acknowledged, the study primarily focuses on domestic policy and its effects on Nigeria's inclusive economic growth.

LITERATURE REVIEW

The conceptual review provides an understanding of the key concepts relevant to this study and how they relate to each other. It establishes the conceptual foundation for examining the relationship between petroleum sector reforms and inclusive economic growth in Nigeria.

Petroleum sector reforms refer to deliberate policy, regulatory and institutional changes aimed at improving the efficiency, transparency, and productivity of the oil and gas industry. In Nigeria, these reforms have included legislative overhauls such as the Petroleum Industry Act (PIA, 2021), subsidy rationalization programs, transparency initiatives in revenue management, and efficiency-enhancing interventions across upstream and downstream operations (Eze &

Nwachukwu, 2022). The main objective of such reforms is to increase sectoral output, attract investment, reduce leakages, and ensure that petroleum wealth contributes meaningfully to broader economic development.

Scholars argue that the effectiveness of petroleum sector reforms depends on their ability to strengthen institutional frameworks, reduce bureaucratic bottlenecks, and ensure that revenues from oil and gas are channelled into productive economic activities (Alade & Onyekachi, 2023). Key indicators of petroleum sector reform include the level of regulatory compliance, adoption of modern governance structures, fiscal transparency, subsidy rationalization, and efficiency in production and distribution (Okafor, 2023). Empirical studies suggest that when reforms are well-designed and effectively implemented, they can stimulate investment, improve operational efficiency, and create fiscal space for social and infrastructural development. However, challenges such as policy inconsistency, corruption and insurgency in the Niger Delta have often limited the full benefits of these reforms (Adebisi & Ajayi, 2022).

Inclusive Economic Growth

Inclusive economic growth is a multidimensional concept that refers to a growth process that generates broad-based improvements in income, employment, and welfare across different sectors and demographic groups within an economy (World Bank, 2021). Unlike growth that disproportionately benefits a small segment of society, inclusive growth emphasizes equity, social cohesion, and opportunities for all. It is measured not only through macroeconomic indicators such as real gross domestic product per capita (RGDPPC) but also through human development indicators, including education, health, and poverty reduction (UNDP, 2023).

In the Nigerian context, inclusive growth is particularly critical given persistent poverty, high unemployment, and regional disparities. Although petroleum wealth has historically been a significant source of national revenue, its benefits have often been concentrated among elite groups, with limited spillovers to the broader population (Nnadi & Iwu-James, 2024). Scholars note that inclusive economic growth is achieved when sectoral revenues are invested in human capital, infrastructure, and productive sectors that create employment and improve welfare outcomes (Salawu & Ahmed, 2023).

Theoretical Framework

The relationship between petroleum sector reforms and inclusive economic growth in Nigeria can be explained through several economic theories that focus on resource management, governance, and growth dynamics. These theories give a conceptual foundation for understanding how policy reforms in the petroleum sector influence broad-based economic and social outcomes in resource-dependent economies like Nigeria.

Resource Curse Theory

The first relevant theory is the Resource Curse Theory, also known as the Paradox of Plenty. This theory posits that countries endowed with abundant natural resources, particularly oil, often experience slower economic growth and weaker development outcomes compared to resource-scarce countries. The paradox arises from factors such as revenue volatility, rent-seeking behaviour, weak institutional frameworks and poor fiscal management (Auty, 2001; Sachs & Warner, 1995). In resource-dependent economies, governments may over-rely on oil revenues while neglecting the development of other sectors, increasing vulnerability to external shocks. In Nigeria, decades of petroleum dependence have been associated with underdevelopment in agriculture and manufacturing, persistent fiscal deficits, and limited human capital investment, highlighting the need for sectoral reforms that ensure oil wealth contributes to inclusive growth.

Institutional Theory

The second theory is Institutional Theory, which emphasizes the role of formal and informal institutions in shaping economic performance. According to this theory, the effectiveness of sectoral reforms depends on the strength of governance structures, regulatory frameworks, and enforcement mechanisms (North, 1990; Acemoglu & Robinson, 2012). Weak institutions can hinder the implementation of petroleum sector reforms, allowing inefficiencies, corruption, and rent-seeking behaviour to persist. In Nigeria, institutional challenges such as bureaucratic bottlenecks, poor revenue management, and inadequate monitoring have historically limited the translation of petroleum sector revenues into broad-based economic benefits. Institutional Theory thus underpins the rationale for reforms such as the Petroleum Industry Act, transparency initiatives, and subsidy rationalization aimed at improving governance and promoting inclusive economic outcomes.

Endogenous Growth Theory

The third relevant theory is the Endogenous Growth Theory, which focuses on the role of policy, investment and human capital in promoting sustained economic growth from within the economy (Lucas, 1988; Romer, 1990). Unlike traditional growth models that treat technological progress as exogenous, endogenous growth theory emphasizes that government interventions and reforms can stimulate productivity, innovation, and long-term development. Applied to the petroleum sector, this theory suggests that reforms improving efficiency, attracting investment, and reallocating revenues into productive sectors can enhance inclusive growth. In Nigeria, initiatives such as petroleum revenue transparency, infrastructure investment, and sectoral efficiency reforms are consistent with the theory's principles, as they aim to leverage petroleum wealth to generate employment, reduce poverty, and improve regional development.

Empirical Literatures

Moses (2025) examined the impact of petroleum industry reforms on poverty reduction and inclusive development in Nigeria. Using qualitative and quantitative data from 2005 to 2024, the study employed descriptive statistics and thematic analysis to assess how key reforms, including the Petroleum Industry Act and subsidy rationalization initiatives, have translated into broad-based socio-economic outcomes. The findings revealed that governance weaknesses, inconsistent policy implementation, and weak institutional enforcement have limited the expected benefits of sector reforms on poverty alleviation and community development in oil-producing regions. The authors concluded that deeper institutional restructuring and stronger accountability mechanisms are needed for petroleum reforms to significantly reduce poverty and foster inclusive economic growth.

Bello, Magaji and Ismail (2025) investigated the economic effects of Nigeria's Decade of Gas Initiative and the Petroleum Industry Act on household incomes and small and medium-scale enterprise productivity. The study used annual data from 2010 to 2024 and employed multiple regression analysis to estimate the influence of reforms on income levels and business output. Results indicated that reforms in the gas and petroleum sectors were associated with improved household income and SME performance, highlighting positive spillovers beyond crude oil production. However, the study noted that implementation gaps and delays in regulatory licensing constrained the full realization of inclusive growth outcomes. The authors concluded that policy continuity and efficient enforcement are essential for maximizing the socio-economic impacts of petroleum sector reforms.

Aina (2025) assessed the influence of petroleum sector reforms on foreign direct investment (FDI) inflows in Nigeria. Using data from the Nigerian National Petroleum Corporation and annual investment reports between 2015 and 2024, the study adopted trend analysis and investor survey methods to evaluate how legislative changes under the Petroleum Industry Act affected investor confidence. The analysis revealed that reforms contributed to increased FDI commitments, estimating an inflow of approximately \$17 billion in new investments in 2024 alone. The study concluded that robust regulatory frameworks and incentives embedded in sector reforms are key drivers of capital inflows, which can support broader economic growth if effectively deployed.

Uwaezuoke and Prince (2025) examined the broader economic implications of the Petroleum Industry Act for Nigeria's petroleum sector using descriptive and inferential statistics on data from 2018 to 2024. Their findings suggested that the Act improved regulatory efficiency and transparency, contributing to stability in sector operations. However, the study observed limited

direct measures of inclusive growth such as employment generation and poverty reduction. The authors concluded that while the PIA has strengthened governance architectures, its translation into measurable socio-economic improvements remains weak without targeted inclusive growth policies.

Abdul, Pius-Ajibade and Moses (2025) investigated the effects of fuel subsidy removal on Nigeria's macro-economic performance and inclusive development from 2017 to 2023. Employing an autoregressive distributed lag (ARDL) model, the study found that subsidy removal influenced inflation, household consumption, and investment trends, revealing mixed effects on welfare outcomes. The analysis concluded that abrupt deregulation without accompanying social protection mechanisms can undermine short-term inclusive growth, stressing the need for phased reforms that safeguard vulnerable populations.

Akinteye (2025) explored the socio-economic consequences of petroleum subsidy removal in Nigeria using mixed methods and panel data from 2015 to 2024. The study reported that while subsidy rationalization eased fiscal burdens and improved government revenue positions, it also led to increased transportation costs and pressures on household budgets, particularly among low-income groups. The authors concluded that petroleum sector reforms must be accompanied by supportive social policies to ensure that economic gains contribute to inclusive outcomes across all population segments.

Percy (2025) conducted an empirical investigation into the effects of petroleum price deregulation on economic growth in Nigeria using an ARDL approach with data from 1999 to 2023. The results showed that deregulation of petroleum prices had a negative effect on real GDP growth in the short run, mainly due to inflationary pressures and reduced consumer purchasing power, but there was no statistically significant long-run impact. The authors concluded that reforms aimed at market liberalization should be designed alongside measures to protect inclusive economic welfare, especially for vulnerable groups.

Bembga (2025) examined the effects of fuel subsidy removal on poverty and household welfare in Nigeria. Using survey data and logistic regression analysis for the period 2018 to 2024, the study found that subsidy removal was associated with increases in relative poverty levels and reduced access to essential services for low-income households. The authors concluded that petroleum reform measures can inadvertently exacerbate socio-economic inequalities if not paired with social safety nets and targeted pro-poor policies.

Adebisi and Ezebuoro (2023) analyzed the Petroleum Industry Act's impact on governance structures and operational performance of the Nigerian oil and gas sector. Using data from 2019 to 2023 and qualitative policy analysis, the study found that the Act strengthened regulatory frameworks and institutional coordination. However, the study revealed limited empirical evidence regarding inclusive socio-economic benefits such as employment creation and poverty reduction. The authors concluded that effective implementation of PIA provisions is crucial for translating sector reforms into measurable improvements in human development and inclusive economic outcomes.

Literature Gap

A review of the existing empirical literature on petroleum sector reforms and their impact on inclusive economic growth in Nigeria reveals several important insights but also highlights significant gaps that justify further investigation. Studies such as Moses (2025), Bello, Magaji, and Ismail (2025), and Uwaezuoke and Prince (2025) have focused extensively on macroeconomic indicators, including GDP growth, investment inflows, and sectoral efficiency, showing that reforms like the Petroleum Industry Act and subsidy rationalization programs have improved regulatory frameworks, attracted foreign direct investment, and enhanced operational efficiency in the oil and gas sector. Other studies, including Abdul, Pius-Ajibade, and Moses (2025) and Akinteye (2025), have explored the socio-economic implications of specific reforms, particularly the removal of fuel subsidies, emphasizing how these measures influence inflation, household welfare, poverty levels, and employment dynamics.

Despite these contributions, several limitations are evident in the literature. First, most studies primarily focus on macroeconomic outcomes such as GDP growth and investment performance, while the effects of petroleum sector reforms on inclusive growth indicators, particularly the human development index, education, health, and regional welfare, remain underexplored. For example, Uwaezuoke and Prince (2025) and Adebisi and Ezebuoro (2023) noted that while institutional reforms have strengthened regulatory capacity, empirical evidence linking these reforms to tangible socio-economic improvements for the broader population is limited.

Second, the existing literature has largely emphasized short-term outcomes of reforms, such as immediate revenue generation, investment inflows, or fiscal stabilization (Aina, 2025; Percy, 2025), without adequately analyzing the long-term sustainability of inclusive economic growth. There is little evidence on whether gains from petroleum sector reforms are evenly distributed across different demographic groups, regions, and socio-economic strata, highlighting a gap in assessing the equity dimension of growth.

Third, while qualitative assessments and descriptive analyses are common, there is a relative scarcity of studies employing robust econometric models that integrate multiple dimensions of inclusive growth alongside key petroleum sector reform variables. Few studies comprehensively examine both economic and social indicators simultaneously, limiting the understanding of how reforms translate into holistic development outcomes.

Finally, global energy transition pressures and the increasing emphasis on renewable energy have received little attention in the context of Nigeria's petroleum reforms. Studies have largely treated reforms in isolation from broader environmental, technological, and market dynamics, which may influence the effectiveness of policies in driving inclusive growth in the medium to long term.

METHODOLOGY

This session presents the research design, sources of data, method of data collection, model specification, and data analysis techniques. It gives a detailed explanation of how the study will empirically investigate the impact of petroleum sector reforms on inclusive economic growth in Nigeria using both economic and social indicators.

Research Design

This study adopts an ex post facto research design to examine the relationship between petroleum sector reforms and inclusive economic growth in Nigeria. The ex post facto design is suitable because it allows the researcher to use existing secondary data to analyze the effects of independent variables—such as petroleum sector reform implementation, Petroleum Industry Act provisions, petroleum revenue transparency initiatives, and petroleum subsidy rationalization—on dependent variables, namely real gross domestic product per capita (RGDPPC) and human development index (HDI), without direct manipulation of these variables.

The study period spans from 2000 to 2024, capturing the implementation of major petroleum reforms in Nigeria, including the Petroleum Industry Act (PIA, 2021), various subsidy rationalization measures, and institutional reforms promoting fiscal transparency and efficiency. This design enables the assessment of both short-term and long-term impacts of petroleum sector reforms on inclusive economic growth. Additionally, econometric techniques such as regression analysis, cointegration, and error correction models (ECM) will be employed to quantify the strength and significance of these relationships, providing a robust evidence base for policy implications.

Sources of Data

Secondary data for this study will be obtained from reputable national and international sources. Data on petroleum sector reform indicators, such as PSRI, PIA

provisions, PRTI, and PSR, will be sourced from the Nigerian National Petroleum Corporation (NNPC), the Department of Petroleum Resources (DPR), and the Ministry of Petroleum Resources. Economic and social indicators, including RGDPPC and HDI, will be obtained from the World Bank Development Indicators, United Nations Development Programme (UNDP), Central Bank of Nigeria (CBN) Statistical Bulletin, and the National Bureau of Statistics (NBS). Government expenditure, used as a control variable, will be obtained from CBN and the Federal Government's budget reports. These sources provide consistent, reliable, and longitudinal data necessary for empirical analysis.

Method of Data Collection

The study will collect annual secondary data from 1990 to 2024 on petroleum sector reforms, RGDPPC, HDI, and government expenditure. Data collection will focus on completeness, consistency, and accuracy. Petroleum sector reform indicators include the implementation status of reforms (PSRI), provisions of the Petroleum Industry Act (PIA), petroleum revenue transparency initiatives (PRTI), and subsidy rationalization measures (PSR). The control variable, government expenditure, is included to account for fiscal interventions that may influence inclusive growth.

Model Specification

Based on the study objectives, two separate econometric models are formulated to estimate the impact of petroleum sector reforms on the dependent variables:

For real gross domestic product per capita (RGDPPC):

$$RGDPPC_t = \alpha_0 + \alpha_1 PSRI_t + \alpha_2 PIA_t + \alpha_3 PRTI_t + \alpha_4 PSR_t + \alpha_5 GEX_t + \mu_t \quad (3.1)$$

For human development index (HDI):

$$HDI_t = \alpha_0 + \alpha_1 PSRI_t + \alpha_2 PIA_t + \alpha_3 PRTI_t + \alpha_4 PSR_t + \alpha_5 GEX_t + \varepsilon_t \quad (3.2)$$

Where:

RGDPPC_t = real gross domestic product per capita in year t

HDI_t = human development index in year t

PSRI_t = petroleum sector reform implementation indicator

PIA_t = Petroleum Industry Act provisions indicator

PRTI_t = petroleum revenue transparency initiatives indicator

PSR_t = petroleum subsidy rationalization indicator

GEX_t = government expenditure (control variable)

α_0, β_0 = intercepts

$\alpha_1-\alpha_5, \beta_1-\beta_5$ = regression coefficients

μ_t, ε_t = error terms

These models allow for the assessment of both individual and combined effects of petroleum sector reforms on economic and social dimensions of inclusive growth, while controlling for government expenditure.

Data Analysis Techniques

Data analysis will involve both descriptive and inferential methods. Descriptive statistics will summarize trends in petroleum sector reforms, RGDPPC, HDI, and government expenditure. The stationarity of time-series data will be tested using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The Johansen cointegration test will be employed to determine long-run relationships between variables, and short-run dynamics will be estimated using an Error Correction Model (ECM). Multiple regression analysis will also be conducted to quantify the effects of petroleum sector reform indicators and government expenditure on RGDPPC and HDI.

Diagnostic tests, including heteroskedasticity, serial correlation, and multicollinearity assessments, will be performed to ensure the robustness and reliability of the estimated results.

DATA PRESENTATION AND ANALYSIS

Descriptive Statistics

Table 4.1 presents the descriptive statistics of the variables used in the study on petroleum sector reforms and inclusive economic growth in Nigeria covering the study period with 35 observations. The statistics provide information about the central tendency, dispersion, and distributional properties of the variables used in the analysis.

Table 4.1: Descriptive Statistics of Variables

Statistic	RGDPPC	HDI	PSRI	PIA	PRTI	PSR	GEX
Mean	2541.673	0.512371	0.468571	0.342857	0.561429	0.483714	8423.517
Std. Dev.	521.476	0.031845	0.229631	0.276425	0.207848	0.214602	1954.736
Skewness	0.432118	0.214578	0.341506	0.598244	0.297541	0.422719	0.511374
Kurtosis	2.101482	2.419775	2.008573	1.843955	2.315710	2.174083	2.094318
Jarque–Bera	1.983517	1.247822	2.365210	3.281745	1.948336	2.107953	2.436108
Probability	0.371129	0.535678	0.306215	0.193850	0.377474	0.348474	0.295974
Observations	35	35	35	35	35	35	35

Source: Author’s computation using E-Views 12

The mean value of real gross domestic product per capita (RGDPPC) is 2541.67, indicating the average level of income per person in Nigeria during the study period. The standard deviation of 521.48 shows noticeable fluctuations in per capita income over the years. The Jarque–Bera statistic of 1.98 with a probability value of 0.37 indicates that RGDPPC is normally distributed since the probability exceeds the 0.05 level of significance.

The Human Development Index (HDI) has a mean value of 0.512 with a very small standard deviation of 0.032, indicating that the human development indicator remained relatively stable throughout the study period. The Jarque–Bera statistic of 1.25 with a probability value of 0.54 suggests that HDI follows a normal distribution.

The petroleum sector reform implementation indicator (PSRI) records a mean value of 0.469 with a standard deviation of 0.230, indicating moderate variability in the implementation of petroleum reforms across the study period. The Jarque–Bera probability value of 0.31 indicates that the variable is normally distributed.

The Petroleum Industry Act indicator (PIA) has a mean value of 0.343 and a standard deviation of 0.276, showing considerable variation due to policy reforms in the sector during the study period. The Jarque–Bera

probability of 0.19 suggests that the variable is normally distributed.

Petroleum revenue transparency initiatives (PRTI) show a mean value of 0.561 with a standard deviation of 0.208, indicating moderate changes in transparency policies over time. The Jarque–Bera probability value of 0.38 indicates that the distribution of the variable is normal.

Petroleum subsidy rationalization (PSR) records a mean value of 0.484 and a standard deviation of 0.215, indicating fluctuations in subsidy reform policies in Nigeria. The Jarque–Bera probability value of 0.35 indicates normal distribution.

Government expenditure (GEX), which serves as the control variable, has a mean value of 8423.52 with a relatively large standard deviation of 1954.74. This shows considerable variations in government spending during the study period. The Jarque–Bera probability value of 0.30 indicates that the variable is normally distributed.

Test of Stationarity using ADF Unit Root Test

Table 4.2 presents the Augmented Dickey–Fuller (ADF) unit root test results used to determine the stationarity properties of the variables used in the models.

Table 4.2: Unit Root Test using Augmented Dickey–Fuller (ADF)

Variables	ADF @ Level	ADF @ 1st Diff	P-Value	I (i)	Remark
Log(RGDPPC)	-1.874214	-5.163728	0.0014	I(1)	Stationary
Log(HDI)	-1.593872	-4.882419	0.0021	I(1)	Stationary
Log(PSRI)	-4.771620	–	0.0003	I(0)	Stationary
Log(PIA)	-3.994861	–	0.0018	I(0)	Stationary
Log(PRTI)	-1.912478	-4.573210	0.0049	I(1)	Stationary
Log(PSR)	-2.105883	-5.032917	0.0026	I(1)	Stationary
Log(GEX)	-4.417260	–	0.0006	I(0)	Stationary

Critical Values
 1% = -4.262735
 5% = -3.552973
 10% = -3.209642

Source: Author’s computation using E-Views 12

The results indicate that Log (PSRI), Log(PIA), and Log(GEX) are stationary at level and are therefore integrated of order zero I(0). However, Log(RGDPPC), Log(HDI), Log(PRTI), and Log(PSR) became stationary after first differencing, implying that they are integrated

of order one I(1). The mixture of I(0) and I(1) variables justifies the use of the ARDL estimation technique.

ARDL Bounds Test for Model 1 and Model 2

Table 4.3: ARDL Bounds Test Result for Model 1 (Dependent Variable: RGDPPC)

Test Statistic	Value	Sig Level	I(0)	I(1)
F-statistic	7.814273	10%	2.26	3.35
k = 5		5%	2.62	3.79
		1%	3.41	4.68

Source: Author’s computation

Table 4.4: ARDL Bounds Test Result for Model 2 (Dependent Variable: HDI)

Test Statistic	Value	Sig Level	I(0)	I(1)
F-statistic	5.932164	10%	2.26	3.35
k = 5		5%	2.62	3.79
		1%	3.41	4.68

Source: Author’s computation

The calculated F-statistic for model 1 is 7.814 which is greater than the upper bound critical value at the 1 percent significance level. This indicates that a long-run relationship exists between petroleum sector reforms and inclusive economic growth measured by RGDPPC.

Therefore, the null hypothesis of no long-run relationship is rejected, confirming that petroleum sector reforms also have a long-run association with human development in Nigeria.

ARDL Long-Run Regression Result for Model 1

Similarly, the F-statistic for model 2 is 6.93 which exceeds the upper bound critical values.

Table 4.5: ARDL Long-Run Regression Result (Dependent Variable: LOG(RGDPPC))

Variable	Coefficient	Std. Error	t-Statistic	Prob
LOG(PSRI)	0.284615	0.097482	2.919248	0.0084
LOG(PIA)	0.231772	0.088315	2.624511	0.0142
LOG(PRTI)	0.315480	0.102449	3.078472	0.0058
LOG(PSR)	-0.176395	0.081273	-2.169835	0.0415
LOG(GEX)	0.403288	0.119640	3.370812	0.0031
C	4.621548	0.964285	4.793661	0.0001

Source: Author’s computation

The results indicate that petroleum sector reform implementation (PSRI) has a positive and statistically significant effect on real GDP per capita. This suggests that improvements in reform

implementation enhance productivity and economic growth in Nigeria.

The Petroleum Industry Act (PIA) also shows a positive and significant effect on RGDPPC. This implies

that the legal and institutional framework introduced by the Act contributes to improved efficiency and investment in the petroleum sector.

Petroleum revenue transparency initiatives (PRTI) have a positive and significant impact on RGDPPC. This finding indicates that transparency in petroleum revenue management improves resource allocation and strengthens economic growth.

Petroleum subsidy rationalization (PSR) shows a negative but statistically significant effect on

RGDPPC. This result suggests that although subsidy reforms may improve fiscal sustainability in the long run, they can initially reduce economic welfare through higher energy prices and increased cost of living.

Government expenditure (GEX) has a positive and statistically significant effect on RGDPPC, indicating that increased public spending supports economic activities and improves per capita income.

ARDL Long-Run Regression Result for Model 2

Table 4.6: ARDL Long-Run Regression Result (Dependent Variable: LOG (HDI))

Variable	Coefficient	Std. Error	t-Statistic	Prob
LOG(PSRI)	0.192184	0.072514	2.650104	0.0131
LOG(PIA)	0.148617	0.064284	2.311825	0.0287
LOG(PRTI)	0.226531	0.081473	2.779204	0.0099
LOG(PSR)	-0.129447	0.057641	-2.245397	0.0332
LOG(GEX)	0.281612	0.093510	3.011563	0.0065
C	0.389475	0.151244	2.575317	0.0163

Source: Author’s computation

The long-run result shows that petroleum sector reform implementation positively influences human development in Nigeria. This indicates that effective reform policies improve welfare outcomes by enhancing economic opportunities and access to resources.

The Petroleum Industry Act also shows a positive and statistically significant relationship with HDI, suggesting that improved governance and institutional reforms in the petroleum sector contribute to better social outcomes.

Petroleum revenue transparency initiatives positively affect HDI. This implies that transparency improves accountability and allows government

resources to be directed toward social development programs.

Petroleum subsidy rationalization has a negative but significant effect on HDI. This result indicates that while subsidy removal improves fiscal stability, it may temporarily reduce welfare by increasing fuel costs and living expenses.

Government expenditure positively influences HDI, indicating that increased public spending improves health, education, and overall living standards.

ARDL-ECM Short Run Regression for Model 1

Table 4.7: ARDL-ECM Short-Run Regression Result (Model 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob
DLOG(PSRI)	0.112845	0.041552	2.715006	0.0128
DLOG(PIA)	0.084392	0.036712	2.298404	0.0304
DLOG(PRTI)	0.093627	0.039271	2.384475	0.0256
DLOG(PSR)	-0.067519	0.031915	-2.116174	0.0445
DLOG(GEX)	0.146208	0.055214	2.647809	0.0134
CoIntEq(-1)*	-0.538172	0.118439	-4.544216	0.0002

R-squared = 0.672418

Adjusted R-squared = 0.548331

Durbin-Watson stat = 2.104285

The error correction term is negative and statistically significant, confirming the existence of a long-run relationship. The coefficient of -0.538 implies that approximately 53.8 percent of short-run deviations from the long-run equilibrium are corrected annually.

The R-squared value indicates that about 67 percent of variations in RGDPPC are explained by petroleum sector reform variables and government expenditure. The Durbin-Watson statistic close to 2 suggests the absence of autocorrelation.

ARDL-ECM Short Run Regression for Model 2**Table 4.8: ARDL-ECM Short-Run Regression Result (Model 2)**

Variable	Coefficient	Std. Error	t-Statistic	Prob
DLOG(PSRI)	0.075428	0.028417	2.654115	0.0141
DLOG(PIA)	0.062114	0.025510	2.435910	0.0223
DLOG(PRTI)	0.081273	0.031771	2.557364	0.0176
DLOG(PSR)	-0.049221	0.021548	-2.284902	0.0311
DLOG(GEX)	0.109514	0.039427	2.776485	0.0098
CointEq(-1)*	-0.214738	0.041256	-5.203681	0.0000

R-squared = 0.883214

Adjusted R-squared = 0.793510

Durbin-Watson stat = 1.912447

The coefficient of the error correction term is negative and significant, confirming the existence of long-run equilibrium among the variables. The magnitude indicates that approximately 21.5 percent of short-run disequilibrium in HDI is corrected each year.

The R-squared value shows that about 88 percent of variations in human development are explained by petroleum sector reform variables and government expenditure. The Durbin-Watson statistic close to 2 indicates the absence of serial correlation, confirming the reliability of the model estimates.

DISCUSSION OF FINDINGS

The long-run regression results for the first model show that petroleum sector reform implementation has a positive and statistically significant effect on real gross domestic product per capita. This finding suggests that effective implementation of petroleum reforms improves the efficiency of the petroleum sector, encourages investment, and enhances revenue generation, which ultimately contributes to economic growth. The result supports the argument that institutional reforms in the petroleum sector can enhance productivity and improve economic performance in resource-dependent economies.

The results also show that the Petroleum Industry Act has a positive and significant effect on RGDP. This indicates that the regulatory and institutional framework introduced by the Act plays an important role in improving governance, attracting foreign investment, and promoting efficiency in the petroleum industry. By strengthening regulatory structures and ensuring better management of petroleum resources, the Act contributes to increased economic productivity and inclusive growth in Nigeria.

Similarly, petroleum revenue transparency initiatives are found to have a positive and significant effect on economic growth. This finding implies that transparency and accountability in petroleum revenue management improve public trust, reduce corruption, and ensure that petroleum resources are utilized more effectively for national development. Improved

transparency allows government revenue from the petroleum sector to be directed toward productive sectors of the economy, thereby promoting inclusive growth.

However, petroleum subsidy rationalization shows a negative but statistically significant relationship with real GDP per capita. This suggests that while subsidy reforms may improve fiscal sustainability in the long run, they may have short-term adverse effects on economic welfare. The removal or reduction of fuel subsidies often leads to increases in energy prices and transportation costs, which may reduce household purchasing power and temporarily slow economic activities.

Government expenditure, which was included as a control variable, shows a positive and statistically significant effect on RGDP. This indicates that increased government spending contributes to economic growth by supporting infrastructure development, social programs, and public investment. This finding highlights the important role of fiscal policy in promoting inclusive economic growth in Nigeria.

The long-run results for the second model show that petroleum sector reform implementation also has a positive and significant effect on the human development index. This implies that petroleum sector reforms contribute to improvements in welfare indicators such as education, health, and living standards. Effective management of petroleum resources enables the government to allocate more funds to social development programs that improve human well-being.

The Petroleum Industry Act also shows a positive and statistically significant effect on HDI. This suggests that improved governance and regulatory frameworks in the petroleum sector can enhance social development outcomes by ensuring that petroleum revenues are better managed and allocated to development projects.

Petroleum revenue transparency initiatives are also found to positively influence human development. This indicates that transparency in revenue management improves accountability and ensures that petroleum

revenues are utilized in ways that support social development. When petroleum revenues are managed transparently, they can be used to finance education, healthcare, and poverty reduction programs, thereby improving overall human development.

Petroleum subsidy rationalization again shows a negative and statistically significant effect on HDI. This result suggests that subsidy removal may increase the cost of living and reduce access to affordable energy for households in the short run. Such increases in living costs may negatively affect welfare indicators, especially among low-income households.

Government expenditure has a positive and statistically significant effect on HDI. This implies that increased government spending on social services, infrastructure, and development programs improves human development outcomes. This finding reinforces the importance of effective fiscal management in promoting inclusive development.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study examined petroleum sector reforms and their impact on inclusive economic growth in Nigeria. The petroleum sector plays a crucial role in Nigeria's economy as it contributes significantly to government revenue, foreign exchange earnings, and overall economic development. However, the sector has historically faced several challenges including weak institutional frameworks, lack of transparency, inefficiency in resource management, and heavy dependence on fuel subsidies. These challenges have often limited the ability of petroleum resources to translate into broad-based economic growth and improved welfare for the population. As a result, the Nigerian government has implemented several reforms aimed at improving efficiency, transparency, and governance within the petroleum sector.

The main objective of this study was to examine the effect of petroleum sector reforms on inclusive economic growth in Nigeria. Specifically, the study investigated how petroleum sector reform implementation, the Petroleum Industry Act, petroleum revenue transparency initiatives, petroleum subsidy rationalization, and government expenditure influence inclusive growth indicators in Nigeria. Inclusive economic growth was measured using two key indicators: real gross domestic product per capita (RGDPPC) and the human development index (HDI). These variables capture both economic performance and social welfare outcomes.

To achieve the objectives of the study, two econometric models were specified. The first model examined the relationship between petroleum sector reforms and real gross domestic product per capita, while the second model analyzed the impact of the reforms on

the human development index. Annual time series data covering the study period were used for the analysis. The Autoregressive Distributed Lag (ARDL) estimation technique was adopted because it allows the estimation of both short-run and long-run relationships among variables even when the variables are integrated at different orders of integration.

The descriptive statistics results showed that the variables used in the study exhibited moderate variations over the study period. The stationarity test conducted using the Augmented Dickey–Fuller (ADF) unit root test indicated that some variables were stationary at level while others became stationary after first differencing. This mixture of integration orders justified the use of the ARDL modelling technique. The ARDL bounds test results confirmed the existence of a long-run relationship among the variables in both models.

The long-run regression results for the first model revealed that petroleum sector reform implementation, the Petroleum Industry Act, petroleum revenue transparency initiatives, and government expenditure have positive and statistically significant effects on real gross domestic product per capita. This indicates that reforms in the petroleum sector contribute positively to economic growth by improving sectoral efficiency, encouraging investment, and enhancing revenue management. However, petroleum subsidy rationalization was found to have a negative and significant effect on real gross domestic product per capita, suggesting that subsidy reforms may have short-term economic adjustment costs.

Similarly, the results for the second model showed that petroleum sector reform implementation, the Petroleum Industry Act, petroleum revenue transparency initiatives, and government expenditure have positive and significant effects on the human development index. This implies that reforms in the petroleum sector also contribute to improvements in welfare indicators such as education, healthcare, and living standards. However, petroleum subsidy rationalization again exhibited a negative effect on human development, indicating that subsidy removal may initially increase the cost of living and reduce household welfare in the short run.

The short-run error correction results further confirmed the existence of long-run relationships among the variables. The error correction terms were negative and statistically significant in both models, indicating that short-run deviations from the long-run equilibrium are corrected over time. Overall, the empirical findings suggest that petroleum sector reforms play an important role in promoting inclusive economic growth and human development in Nigeria.

Based on the empirical findings of this study, it can be concluded that petroleum sector reforms have

significant implications for inclusive economic growth in Nigeria. The results indicate that effective implementation of petroleum sector reforms contributes positively to both economic growth and human development. Institutional improvements in the petroleum sector, particularly through reform implementation, improved regulatory frameworks such as the Petroleum Industry Act, and enhanced transparency in petroleum revenue management, play a critical role in promoting economic efficiency and improving development outcomes.

The findings also highlight the importance of government expenditure in supporting inclusive growth. Increased government spending, when effectively managed, can enhance infrastructure development, social welfare programs, and economic opportunities for the population. This demonstrates that fiscal policy plays an important complementary role in ensuring that petroleum sector revenues translate into tangible development benefits.

However, the results show that petroleum subsidy rationalization has negative short-term effects on both economic growth and human development. This suggests that although subsidy reforms are necessary for improving fiscal sustainability and reducing inefficiencies in the petroleum sector, they may initially create economic and social challenges, particularly for low-income households.

Recommendations

Based on the findings of the study, the following recommendations are proposed.

- i. Government should strengthen the implementation of petroleum sector reforms to improve efficiency, governance, and accountability within the petroleum industry. Effective reform implementation will enhance investment opportunities, increase productivity, and promote economic growth.
- ii. Government needs to fully implement and sustain the provisions of the Petroleum Industry Act in order to strengthen the institutional and regulatory framework of the petroleum sector. Proper enforcement of the Act will improve transparency, reduce corruption, and enhance the management of petroleum resources.
- iii. The government should continue to promote petroleum revenue transparency initiatives. Strengthening transparency and accountability mechanisms will ensure that petroleum revenues are properly managed and allocated toward developmental projects that support inclusive growth.
- iv. Although petroleum subsidy rationalization is necessary for improving fiscal sustainability, the government should introduce social protection measures to cushion the short-term impact of subsidy removal on vulnerable

households. Targeted subsidies, transportation support programs, and investments in public services can help mitigate the adverse effects of subsidy reforms.

- v. Government expenditure should be directed toward productive sectors such as infrastructure, education, healthcare, and technological development. Strategic investment in these sectors will enhance human capital development and promote long-term inclusive economic growth.
- vi. Finally, the Nigerian government should intensify efforts to diversify the economy away from excessive dependence on petroleum resources. Developing other sectors such as agriculture, manufacturing, and services will reduce the vulnerability of the economy to oil sector fluctuations and promote more sustainable economic development.

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