Original Research Article

GAS SECTOR DEVELOPMENT AND ECONOMIC GROWTH IN NIGERIA

Abstract: *This study examines the relationship between natural gas and economic growth in Nigeria, focusing on four key aspects: natural gas supply, commercial gas pricing, gas utilisation, and gas taxation. The analysis employs a range of econometric techniques, including descriptive statistics, correlation analysis, unit root tests, cointegration tests, and ARDL-ECM, to explore the impact of these factors on Nigeria's economic growth. The findings have significant implications for policymakers aiming to harness the country's abundant natural gas resources to promote sustainable development. The empirical results reveal that natural gas supply has a positive and significant impact on Nigeria's economic growth, highlighting the potential of this resource to drive development in resource-rich economies. It is consistent with previous research on the role of natural gas in economic growth. Commercial gas pricing is found to have a significant effect on Nigeria's economy, emphasising the importance of a well-functioning and transparent pricing mechanism for ensuring that the benefits of natural gas are adequately distributed across various sectors. The study identifies a significant relationship between gas utilisation and economic growth, suggesting that efficient and sustainable gas consumption practices are crucial for maximising the economic benefits of this valuable resource. Surprisingly, the analysis shows that gas taxation does not have a significant impact on Nigeria's economic growth. To maximise the potential of natural gas supply, it is recommended that the government invests in infrastructure and encourages private sector participation in the gas sector. In terms of commercial gas pricing, policymakers should establish a transparent and market-oriented pricing system that ensures the benefits of natural gas are adequately distributed across various sectors. For gas utilisation, it is advised that policy makers promote greater gas utilisation in various industries, particularly in the power generation, fertiliser, and petrochemical sectors, to create a more diversified and resilient economy.*

Key Words: Gas-Sector, Utilization, Economic Growth, Gas Pricing, Taxation, Gas Export.

1. INTRODUCTION

The world depends on energy that is either produced from non-renewable sources (such as crude oil, natural gas, coal, biomass, tar sands, and shale) or renewable sources (such as wind, hydrodynamic solar, and geothermal wave energy). Nigeria relies heavily on non-renewable energy to power its industries, economies, and power grid. In the Nigerian economy, products from crude oil refining are a significant source of energy and income. According to [1], the export of petroleum accounts for around 83% of all export earnings. The transition from an economy dependent on crude oil to other energy sources has been gradual. The market for crude oil and its products is available, there is readily available technology for extracting and processing crude oil, and more investors and producers are entering the crude oil industry.

Outside the economic theory prediction that a large increase in the relative price of energy will increase the per-unit cost of output, thus increasing the output (supply) price which aligns with the assertion of standard textbook model [2], increases in Nigerian natural gas prices would be expected to have virtually the same effect in the textbook model as a rise in crude oil prices. Accordingly, one should expect that the effects of an increase or decrease in natural gas prices on economic activity would be conceptually similar as that for crude oil prices. The average amount of crude oil reserves in Nigeria over the past 15 years is 36,996 billion barrels [1], which may be another reason for boosting investor confidence in the crude oil sector [1]. The Federal Republic of Nigeria, in 2003, asserted that the development and application of renewable energy must receive

the utmost focus. According to [3], the more natural gas is used as clean energy, the greater the likelihood that any country's economy will grow.

Nigeria had the eighth-largest crude oil reserve as of 2018 and was the sixth-largest crude oil producer, according to estimates of 1.602 million barrels [4] among OPEC nations. Nigeria has the second-largest reserves of crude oil in Africa, contributing around 25% of the continent's total production [5]. Nigeria's economy at all levels of government have become increasingly reliant on crude oil over time, causing the Gross Domestic Product (GDP) per capita to stand at $2,056 and the real GDP to rise by 1.9% in 2017 [1]. Nigeria has a significant potential for increasing its reliance on energy, raising GDP per capita and GDP growth through developing and using alternative energy resources, with a particular emphasis on the natural gas market. This is in line with the Organisation of Petroleum Exporting Countries in 2019, which claimed that approximately 10% of the GDP is attributable to the oil and gas sector's operations. Lack of effective rules, laws, policies and political involvement in the past may have made it difficult to develop facilities and make use of the natural gas resources, infrastructures, and markets that Nigeria has plenty of.

Natural gas is the cleanest-burning fossil fuel known to mankind and it is also becoming the energy source of choice worldwide. Nigeria is endowed with abundant natural gas reserves with current daily gas production of about 8.25 billion cubic feet per day (bcf/day) and less than half of the proven reserves have been committed to define projects [6]. Nigeria has consistently been the second worst gas flaring country after Russia. The country must take up the challenge and monetise the gas for the benefit of the country [7]. These have contributed to increased interest in the LNG business as a means of utilising valuable natural gas resources and contributing towards sustainable development. The gas sector holds significant potential for Nigeria with a robust reserve base and rapidly evolving demand base too. There is therefore the need to connect these reserves to market which is the key to realising the economic potential of the gas reserves.

Locally, NNPC's subsidiary, Nigerian National Petroleum Company Gas Marketing Limited used to provide gas for power generation as a fuel or feedstock for various industries including cement and fertilizer plants, glass, food and beverage production, manufacturing, and so on. The demand for gas is rising as more local industries realise the benefits of switching to gas. The domestic market is still limited by low levels of industrialisation and inadequacy of the gas transmission and distribution infrastructure. Meanwhile, [8] asserts that Nigeria has an estimated 187 trillion cubic feet of proven natural gas. Hence, there are huge investment opportunities in the gas sector for prospective investors. This study therefore aims at establishing the connection between Nigeria's gas sector and its economic growth.

2. STATEMENT OF THE PROBLEM

Nigeria is abundantly endowed with energy resources. These include crude oil, hydropower, coal, tar sand, natural gas, solar energy, nuclear and fuel wood [9]. However, in recent times, most economies of the world are diversifying away from oil to gas as an energy source [10]; [11]. This is due to several factors of which mainly is the environmental pressures for the use of gas which is a relative "clean" fuel in comparison to oil

or coal. Available data from EIA sources [8] reveal that the recoverable gas reserves in Nigeria is 235 trillion cubic feet, but the proven gas reserve in Nigeria is 182 trillion cubic feet out of which 209 billion cubic feet is produced annually. About 44% of this figure produced is presently being flamed. Translating this to electricity generation, it can produce 69GW of electricity that is estimated at an economic value of $5billion dollars. However, the Nigerian gas sector has received little attention in terms of development [11]. Certain things in the industry continue to remain unclear to the public and industry participants. As at the time of this research, the gas industry lacks the necessary infrastructure required to transport the gas to more end users, gas pricing is done on contract basis which points out the need for a general pricing framework [12]. The gas industry does not have a spot market for the purchase and sales of gas, no fiscal regime, there is no legal framework, current policies are poorly implemented and gas flaring. All these problems stem from non-foundational structure with the absence of single legislation on gas that can address all the issues as well as ensure that all the past policies and plans on gas are fully actualised and enforceable by law. Even though the Petroleum Industry Bill which was passed in 2021 is seen as a saviour of the oil and gas industry because of its fiscal regime and effective regulatory agencies, this bill can be a failure where there is no proper legislation on gas to ensure the full realisation of its aims [13]. However, literature suggests that gas development in Nigeria is a potential revenue increment opportunity for the country owing to the dwindling nature of Nigeria's economy. [14] asserted that when fully harnessed, Nigeria stands to generate more revenue from natural gas than crude oil. It therefore becomes surprising that no literature known to the researcher aimed at studying the impact of gas sector development on economic growth in Nigeria. The researcher assumes that the dearth of research relating the gas sector development to the economic growth of the nation could be a major reason for the undeserved attention the sector has received thus far. This study therefore aims to contribute to establishing the relationship between the gas sector development (proxied by; natural gas supply, commercial gas pricing, gas utilisation and gas taxation) and economic growth (proxied by real GDP).

3. OBJECTIVES OF THE STUDY

This study aims to determine the impact of Gas sector development on economic growth in Nigeria. The findings from this study would significantly be of benefit to polity by assisting policy makers in making informed decisions, academics by providing empirical evidence and covering literature gaps, and to the industry in helping reshape commitments and practices in gas sector development. These are discussed hereafter. The findings from this study are expected to provide policy makers with the information they need to make regulations and policies for the growth of the gas industry and the Nigerian economy. The researcher aims at making policy recommendations from the findings of this study that would be beneficial to improving the polity around gas sector development and its contribution to the nation's economic growth. The findings of this study are also expected to cover the existing gap in literature relating gas sector development to economic growth in Nigeria. The study through its findings would also help the development of the gas industry as it would provide relevant information to potential investors to enable them make business decisions targeted at improving the sector with targeted aims at improving Nigeria's economy. The research work is academically limited by a page count and timespan and has been consequently directed to a scope that can

provide the tools for the analysis of the gas sector development and its impact on the Nigerian economy. The study will cover a time series data of 31 years and it will analyse the natural gas supply, commercial gas pricing, domestic gas utilisation and gas taxation between 1991 and 2021.

4. LITERATURE REVIEW

Most available empirical literature examined the relationship or impact of the oil sector on economic development or growth of Nigeria and only a few studied the impact of the gas sector on economic growth. Also, there were conflicting results as to the nature of the relationship between oil sector or gas sector development on economic growth in Nigeria. These studies were hereafter reviewed. [15], examined the effect of natural gas pricing on the Nigerian economy. The authors employed time-series data and used the Autoregressive Distributed Lag (ARDL) model to analyse the short and long-run dynamics of natural gas pricing and economic growth. The main finding is that natural gas pricing has a significant impact on the Nigerian economy. A possible criticism of this study is the lack of consideration for the role of external factors, such as global gas prices and domestic policy issues, that may influence the relationship between gas pricing and economic growth.

[16] analyse the impact of natural gas prices on the Nigerian economy. The authors employ time-series data and use the Autoregressive Distributed Lag (ARDL) model to examine the short and long-run dynamics of natural gas prices and economic growth. The main finding is that natural gas prices significantly affect Nigeria's economic growth. A potential criticism of this study is its lack of consideration for the role of external factors, such as global natural gas prices and domestic policy issues, that may influence the relationship between natural gas prices and economic growth. [17] investigated the relationship between natural gas utilisation and economic growth in Nigeria. The authors employed the Autoregressive Distributed Lag (ARDL) model and time-series data to analyse the short and long-run dynamics of natural gas utilisation and economic growth. The main finding was that natural gas utilisation had a positive and significant impact on Nigeria's economic growth. A potential criticism of this study is the lack of consideration for the role of external factors and policy issues that may influence the relationship between natural gas utilisation and economic growth, as well as the potential endogeneity issues in the analysis.

[18] investigated the relationship between natural gas pricing and economic growth in Nigeria using empirical evidence from a bound testing approach. The authors employed time-series data and utilised the Autoregressive Distributed Lag (ARDL) bounds testing approach to examine the short and long-run dynamics of natural gas prices and economic growth. The main finding was that natural gas pricing significantly affected Nigeria's economic growth. A potential criticism of this study is the lack of consideration for other factors, such as global gas prices and domestic policy issues, that may influence the relationship between gas pricing and economic growth. [19] studied the impact of gas exploration taxes on economic growth in Nigeria from 1981 to 2020. The study adopted univariate analysis and bivariate analysis for data analysis with MS Excel 2019 and SPSS Statistics 26. The study found that income tax on gas exploration (ITG) has no significant relationship with per capita income (PCI) but has a significant relationship with employment rate (JOB). From

the foregoing, it was observed from literature reviewed that there is a dearth of literature that studies the impact of gas sector development on economic growth. One gap observed was that no study known to the researcher studied the four aspects of gas sector development as identified in this study, gas supply, commercial gas pricing, gas utilisation, and gas taxation and examined their impact on economic growth [11] and [20]. This is the crux of this study.

5. METHODOLOGY

In modelling the contribution of Nigeria gas sector development to the economic growth of the nation, the study specifies the following model to capture the impact of natural gas on real GDP in Nigeria. This is adapted from earlier work by [9] with modifications based on variables of consideration for this study. This is specified in a mathematical functional relationship as presented below:

RGDP =f (NGS, CGP, GUZ, GTX) ……. (3.1)

Where, RGDP = Real Gross Domestic Product (GDP), NGS = Natural gas supply, CGP = Commercial gas pricing, GUZ = Gas utilisation, GTX = Gas taxation

This is presented in an econometric equation as follows:

$RGDP = \beta_0 + \beta 1NGS + \beta_2 CGP + \beta_3 GUZ + \beta_4 GTX + \mu$……. (3.2)

Where, β_0 = Intercept, β_1, β_2, β_3, β_4 are coefficients of parameters' estimate (with apriori expectations of β_1, β_2, β_3, $\beta_4 > 0$) and μ = Error term.

Definition of Variables

Variables	Description	Measurement
RGDP	Real gross Domestic Product	Naira
NGS	Natural Gas Supply	Naira/liter
CGP	Commercial Gas pricing	Million cubic feet
GUZ	Gas Utilization	Million Cubic Metres
GTX	Gas Taxation	Billion Naira

3.4 Method of Data Collection

For the purposes of this study, the researcher employed empirical research methods and collected data from secondary sources. The data were obtained from the publications and websites of the Nigerian Bureau of Statistics, Organisation for Economic Cooperation and Development (OECD) as well as the Nigerian Natural gas supply chain statistical bulletins covering the thirty-one (31) year period from 1991 – 2021.

Method of Data Analysis

EViews-13 software was deployed for data analysis and the following econometric analytics methods were adopted and were used to achieve the objectives of the study:

ADF Unit Root Test

To test for stationarity of the time series data, the Augmented Dickey Fuller (ADF) unit root test was performed. In economic literature, it is a well-known fact that most time series variables are non-stationary and employing non-stationary variables in regression may produce spurious and preposterous results [21]. Hence conducting regression analysis directly with non-stationary variables will yield only misleading findings thereby rendering any forecast and any policy recommendation based on such result as unsound. This pitfall was therefore avoided by conducting the Augmented Dickey Fuller test of unit roots.

ARDL Model Estimation

ARDL model estimation test was thereafter performed to estimate both the short-run and long-run effect of the independent variables (proxies of gas sector development – NGS, CGP, GUZ and GTX) on the dependent variable (economic growth – RGDP).

Serial Correlation Test

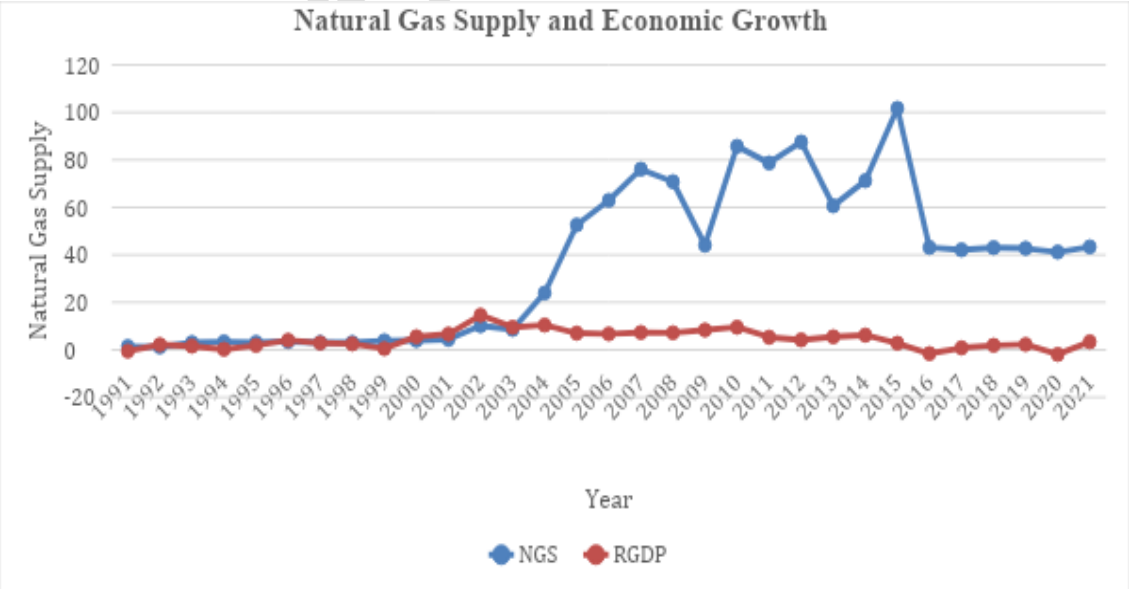
This is a post estimation test performed to ensure that the estimated variances of the regression coefficients are not biassed. This is done using the Breusch-Godfrey Serial Correlation LM Test.

Heteroscedasticity Test

This is another post estimation test to ensure that the variables used for the model estimation are normally distributed and there is no presence of heteroscedasticity.

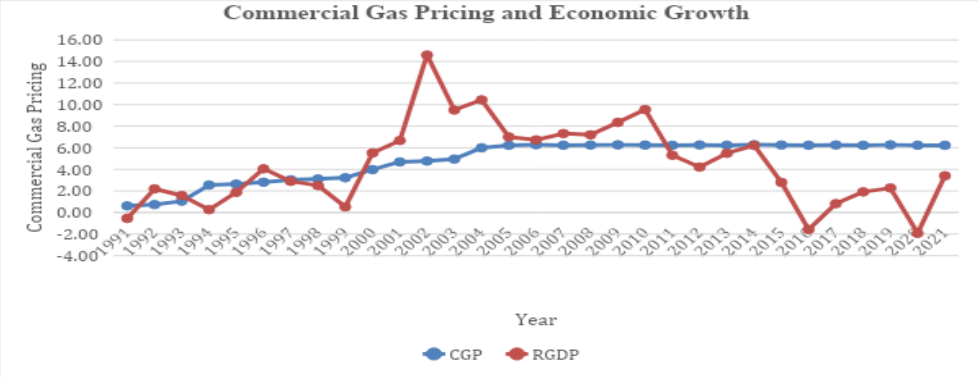
6. RESULT AND DISCUSSION

6.1 Trend Analysis



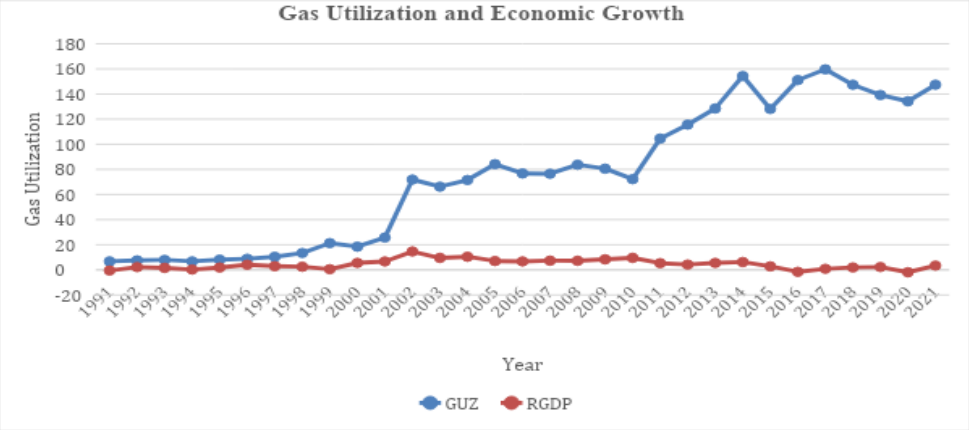
Source: Researcher's Computation (2023)

Fig. 1: Trend Analysis between Natural Gas Supply and Economic Growth in Nigeria.



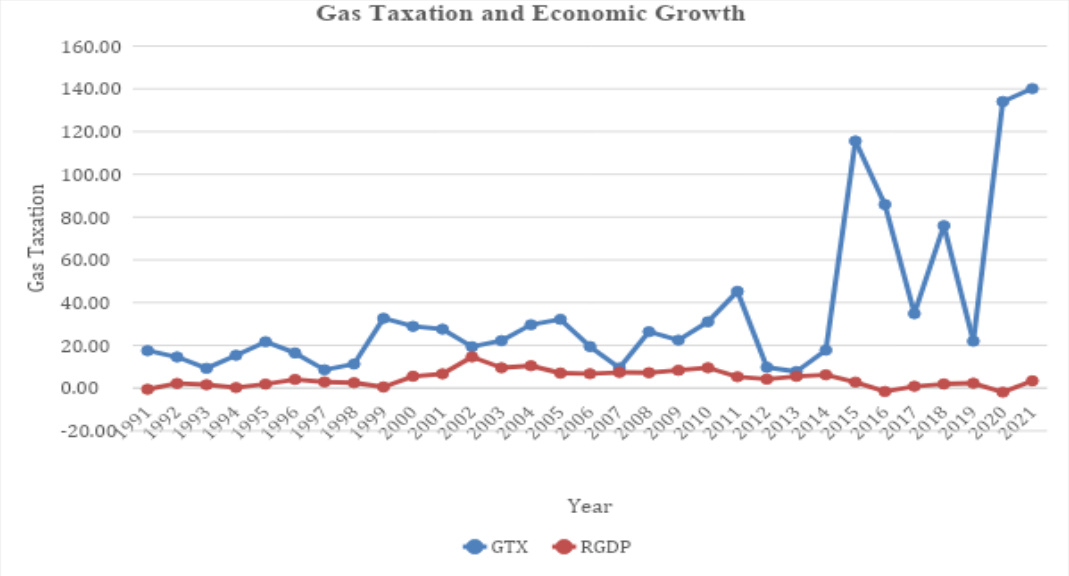
Source: Researcher's Computation (2023)

Fig. 2: Trend Analysis between Commercial Gas Pricing and Economic Growth in Nigeria



Source: Researcher's Computation (2023)

Fig. 3: Trend Analysis Between Gas Utilisation and Economic Growth in Nigeria



Source: Researcher's Computation (2023)

Fig. 4: Trend Analysis Between Gas Taxation and Economic Growth in Nigeria

Table 1: Descriptive Statistics Results

	RGDP	NGS	CGP	GUZ	GTX
Mean	4.422581	3.63E+08	4.850645	75137111	35.63476
Std. Dev.	3.802493	3.20E+08	1.899660	54650454	35.96454
Skewness	0.510054	0.367496	-0.99399	0.072605	1.916490
Kurtosis	3.018613	1.813551	2.606121	1.576494	5.491197
Jarque-Bera	1.344585	2.516002	5.305108	2.644631	26.99298
Probability	0.510537	0.284222	0.070471	0.266517	0.000001
Observations	31	31	31	31	31

Source: Researcher's Computation Using Eviews-13 (2023)

6.2 Correlation Analysis

Table 2: Correlation Matrix

Covariance Analysis: Ordinary

Date: 04/12/23 Time: 11:56

Sample: 1991 2021

Included observations: 31

Correlation Probability	RGDP	NGS	CGP	GUZ	GTX
RGDP	1 -----				
NGS	0.194343 0.2948	1 -----			
CGP	0.346120 0.0565	0.782732 0.0000	1 -----		
GUZ	-0.003104 0.9868	0.712147 0.0000	0.841422 0.0000	1 -----	
GTX	-0.331331 0.0686	0.281578 0.1249	0.383142 0.0334	0.541218 0.0017	1 -----

Source: Researcher's Computation Using Eviews-13 (2023)

6.3 Unit Root Test

Table 3: Summary of Unit Root Test Results

Variable	ADF Test Statistics	Critical ADF Test Statistics	P-value	Order of Integration
RGDP	-6.472966	-4.309824	0.0001*	I(1)
CGP	-5.257035	-4.323979	0.0011*	I(1)
GTX	-3.497068	-3.248592	0.0759***	I(1)
GUZ	-4.898120	-4.416345	0.0036*	I(0)
NGS	-6.896411	-4.309824	0.0000*	I(1)

Note: MacKinnon critical values for the rejection of hypothesis of unit root are in parenthesis in Columns 1 and 2 and the tests include intercept with trend; **,**,*** significant at 1, 5 and 10%; Mackinnon critical*
Source: Researcher's Computation Using Eviews-13 (2023)

6.4 Cointegration Test

Table 4: Cointegration Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.020040	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Researcher's Computation Using Eviews-13 (2023)

7. DISCUSSION OF RESULTS

The empirical results from the study showed that natural gas supply has a significant impact on the growth of Nigeria's economy. The findings suggest that various sectors, such as power generation, fertilizer and petrochemical production, and cement manufacturing, among other industries, contribute significantly to promoting the economic growth of Nigeria. These sectors rely heavily on natural gas as a primary energy source, which highlights the importance of natural gas supply in driving the country's development. The implication of this result is that vast reserves of natural gas in the country have potentially spurred economic growth through the generation of revenue, job creation, and infrastructural development. This finding is in line with several recent studies that have investigated the relationship between natural gas supply and economic growth in Nigeria. For instance, [22] conducted a sectoral analysis of natural gas consumption and economic growth in Nigeria, revealing that the demand for natural gas by power generation companies, fertiliser/petrochemical companies, and cement industries plays a significant role in promoting economic growth. This finding supports the notion that increased natural gas supply can contribute positively to the Nigerian economy. The results of this study are also consistent with the findings of [23], who found that increases in real per capita GDP had a positive and statistically significant effect on per capita energy consumption and demand. This alignment with previous research reinforces the importance of natural gas supply in Nigeria's economic growth. Matei's findings suggest that as the country's economy expands, the demand for natural gas will continue to rise, further emphasising the need for sustainable development and utilisation of natural gas resources. Similarly, [17] employed a dynamic ARDL approach to examine the relationship between natural gas utilisation and economic growth in Nigeria. Their study revealed that natural gas utilisation, particularly in the power and industrial sectors, has a significant positive impact on the country's economic growth. This finding further reinforces the importance of natural gas supply in driving Nigeria's economic development. [24] study found that natural gas production positively affects Nigeria's economic growth, suggesting that increased natural gas supply has the potential to enhance the country's economic performance. As Nigeria continues to develop its natural gas sector, it is essential for policymakers and stakeholders to take these findings into account to ensure that the country's economic growth is sustainable and inclusive.

The empirical results from the present study indicate that commercial gas pricing has a significant impact on the Nigerian economy. The outcome of this study suggests that the pricing of natural gas affects the demand and consumption of gas by industrial sectors of the economy. As the price of natural gas influences the cost of production and operations in these sectors, it ultimately impacts Nigeria's overall economic growth. The influence of commercial gas pricing on these sectors may stem from the fact that gas pricing can impact production costs, investment decisions, and overall energy affordability. The implication of the findings shows the need for increased focus on price stability and the diversification of Nigeria's energy sources. By encouraging the development of alternative energy sources, such as solar, wind, and hydro, Nigeria can reduce its dependence on natural gas and mitigate the risks associated with volatile gas prices. Diversifying the energy

mix could lead to more stable energy prices and promote sustainable economic growth. The significant impact of commercial gas pricing on the Nigerian economy found in this study is consistent with findings from other recent studies. As these studies suggest, an appropriate pricing mechanism for natural gas is critical to ensuring the optimal utilisation of this resource, contributing to economic growth and development in Nigeria. For instance, [16] discovered that natural gas prices have a substantial influence on the country's economic performance. This finding highlights the need for price stability and balancing the interests of different stakeholders within the sector. Similarly, [18] concluded that there is a strong link between natural gas pricing and economic growth in Nigeria. Their research underlines the importance of proper management of gas resources, as it can have a direct impact on the overall economic development of the country. Considering the findings from this study and the recent literature, it is clear that commercial gas pricing plays a vital role in Nigeria's economic growth. Policymakers should consider the implications of these findings when formulating energy policies and strategies to harness the potential of natural gas resources for the betterment of the Nigerian economy.

Findings from the study showed that gas utilisation has a significant impact on the economic growth of Nigeria. The results suggest that effective gas utilisation in various sectors plays a crucial role in promoting the economic growth of Nigeria. Gas utilisation, particularly in power generation, can lead to increased access to electricity and subsequently contribute to economic growth through improved productivity and the creation of new industries. By expanding the use of natural gas in sectors such as power generation, manufacturing, and transportation, the country can reduce its reliance on imported fuel sources, lower energy costs, and improve its trade balance. This will create a more favourable business environment, attracting both domestic and foreign investment into Nigeria's growing industries. Increased gas utilisation can contribute to environmental sustainability by replacing more polluting energy sources such as coal and oil. The transition to cleaner energy sources, like natural gas, can help Nigeria reduce its greenhouse gas emissions and align with global efforts to combat climate change. This environmental stewardship can enhance Nigeria's international reputation and attract green investments, leading to sustainable economic growth. The findings from this study are in agreement with [25] indicated that efficient utilisation of natural gas resources in Nigeria's power sector could significantly contribute to the nation's economic growth, particularly by boosting industrial production and providing a more reliable source of energy for domestic consumption. Furthermore, [26] emphasised the potential of natural gas utilisation in Nigeria for enhancing economic growth, as it can provide cleaner and more efficient energy for various sectors, including manufacturing and transportation. By effectively utilising its abundant natural gas resources, Nigeria can capitalise on the opportunities for economic diversification, job creation, and overall growth.

Above all, the results from this study revealed that gas taxation in Nigeria has no significant impact on the country's economic growth. This suggests that the current tax policy regarding natural gas in Nigeria may not be directly influencing the overall economic performance. One possible explanation for the lack of significant impact of gas taxation on economic growth is the complexity and inefficiency of Nigeria's tax system. The

current tax framework may not effectively capture the full economic potential of the natural gas sector, and the revenue generated from gas taxation might be insufficient to drive substantial economic growth. Moreover, the presence of tax evasion, regulatory loopholes, and corruption could further undermine the potential benefits of gas taxation in Nigeria. Another important factor to consider is the country's reliance on oil revenue, which might overshadow the impact of gas taxation on the economy. Nigeria's economy has been predominantly dependent on crude oil production, and the fiscal policies have primarily focused on maximising oil revenues. As a result, the natural gas sector might not receive the same level of attention and investment as the oil sector, limiting the potential for gas taxation to contribute significantly to the overall economic growth. Similar findings have been reported by previous studies on the subject. This finding is in line with the study conducted by [27], who observed that the impact of gas taxation on economic growth was not significant across several developing countries, including Nigeria. However, the findings of this study contradict those of [28], who argued that gas taxation has a significant and negative impact on economic growth in Nigeria. They posited that higher gas taxation could lead to increased production costs and reduced competitiveness of domestic industries, thus negatively affecting economic growth.

8. CONCLUSION

This study has provided valuable insights into the intricate relationship between natural gas and Nigeria's economic growth. Through a comprehensive analysis of the impact of natural gas supply, commercial gas pricing, gas utilisation, and gas taxation on the Nigerian economy, we have uncovered several important findings with significant policy implications. The empirical results revealed a significant impact of natural gas supply on Nigeria's economic growth, suggesting that a strategic focus on the efficient management of Nigeria's abundant natural gas resources can serve as a catalyst for economic development. This is consistent with previous research that supports the relationship between energy consumption and economic growth. Furthermore, commercial gas pricing was found to have a significant impact on the Nigerian economy. This finding highlights the importance of developing effective pricing mechanisms and regulatory frameworks to ensure the affordability and accessibility of natural gas for various industries and households. The study also discovered that gas utilisation has a significant effect on Nigeria's economic growth, emphasising the need to invest in infrastructure and technology that can harness the full potential of the country's vast gas reserves. This could lead to a more diversified and sustainable economy by reducing overreliance on the oil sector and fostering the development of gas-based industries. Finally, gas taxation was found to have no significant impact on Nigeria's economic growth. This finding suggests that, while taxation can be an essential tool for revenue generation and fiscal policy, it may not be a primary determinant of economic growth in the context of Nigeria's gas sector. This finding indicates that policymakers should carefully consider the implications of altering gas taxation policies, as they may not have the desired effect on the country's economic performance. Overall, the findings of this study provide valuable insights for policymakers, industry stakeholders, and researchers interested in Nigeria's gas sector and its role in promoting economic growth. By addressing the critical factors identified in this research, Nigeria can leverage its vast gas resources to drive sustainable and inclusive economic development in the years to come.

9. RECOMMENDATION

This study recommends the following:

2 The government and relevant stakeholders invest in infrastructure development to improve the efficiency of natural gas distribution. This may include pipeline expansions, liquefied natural gas (LNG) facilities, and storage solutions. Furthermore, efforts should be made to reduce gas flaring and promote the utilisation of natural gas in various sectors, such as power generation, transportation, and manufacturing.

3 The government should maintain a balanced pricing policy that encourages investment in the gas sector while ensuring affordability for consumers. Policymakers should work with the private sector to develop transparent, market-based pricing mechanisms that reflect the true value of natural gas and incentivize efficient consumption.

4 The government promotes the use of natural gas as a cleaner, more efficient energy source across various industries. This may include providing incentives for businesses to switch from traditional fuels to natural gas, supporting research and development in gas-related technologies, and implementing policies that promote energy efficiency and conservation.

5 The government should consider reviewing its tax policies in the gas sector. This may involve simplifying the tax structure, reducing tax rates to encourage investment, and ensuring transparency in tax administration. Policymakers should also explore alternative sources of revenue, such as carbon pricing or environmental levies, to ensure fiscal sustainability while promoting cleaner energy options.

6 Future research could investigate the impact of natural gas on specific sectors of the Nigerian economy, such as power generation, manufacturing, transportation, and agriculture. This could help policymakers identify the most effective strategies for promoting gas usage and economic growth in each sector.

REFERENCES

[1] Organisation of Petroleum Exporting Countries. (2019). *Annual Statistic Bulletin*.

[2] Abel, A. B., & Bernanke, B. S. (2005). *Macroeconomics* (Fifth Edition ed.). Pearson Addison Wesley. *Macroeconomics* (Fifth Edition ed.). Pearson Addison Wesley.

[3] Odularu, G., & Okonkwo, C. (2009). Does energy consumption contribute to economic performance? Empirical evidence from Nigeria. *Journal of Economics and International Finance, 1*(2), 44-58.

[4] Federal Republic of Nigeria. (2003). Energy Commission of Nigeria. *National Energy Policy*.

[5] BP Statistic (2020). *Review of world energy*.

[6] Osahon, G. (2014): "State of the domestic gas market", NAPE pre-conference workshop, 10th November.

[7] Oniwon, A (2011). Gas utilisation for long term clean energy and economic growth. *SPE conference, NAICE, 3rd August*.

[8] EIA (2011). Annual Energy Outlook 2011. United States Department of Energy, Energy Information Administration DOE/EIA-0383(2011): www.eia.doe.gov/ forecasts/aeo/

[9] Adelegan, A. E. (2018). The Role of Natural Gas In Nigeria'Economic Development Calculus: Some Simple Empirics. *Journal of Economics and Finance, 9*(3), 13-21.

[10] Barnes, R., & Bosworth, R. (2015). LNG is linking regional natural gas markets: Evidence from the gravity model. *Energy Economics, 47*, 11-17.

[11] Ojide, M., Kareem, S., Kari, F., Gazi, A., & Matuin, O. (2012). Impact of gas industry on sustainable economy in Nigeria: Further estimations through Eview. *Ojide Makuachukwu Gabriel, Salami Dada Kareem, Fatimah Kari, Gazi Mahabubul Alam & Oke David Matuin (2012). Impact of Gas Industry on Sustainable Economy in Nigeria: Further Estimations through Eview, Journal of Applied Sciences, 12*(21), 2244-2251.

[12] JINN (2010) Gas Flaring in Nigeria: An Overview. Justice in Nigeria Now. http://justiceinnigerianow.org/gas-flaring

[13] Nwabisi, P. N. (2018). *Energy Sector and Business Development in Nigeria: A Study of South Eastern Nigeria: 1990-2016* (Doctoral dissertation, A Dissertation Submitted to the Department of Business Administration, Faculty of Management Sciences, Nnamdi Azukiwe University, Awka, In Fulfilment of the Requirements for the Award of Doctor of Philosophy (PhD) Degree in Business Administration).

[14] Okojie, C.E. and H.E. Oaikheam (2012). Importance of Oil and Gas to the Nigerian Economy. In Owosekum, A.A. et al (eds), Contemporary Issues in the Management of the Nigerian Economy, Essays in Honour of H.M.A. Onitiri. Ibadan, Nigerian Institute of Social and Economic Research.

[15] Oluwatobi, S., Efobi, U., Olurinola, I., & Alege, P. (2020). Natural gas pricing and its effect on the economy of Nigeria. *Energy Policy, 137*, 111085.

[16] Eze, O. R., & Okoronkwo, C. N. (2020). An analysis of the impact of natural gas prices on the Nigerian economy. *International Journal of Energy Economics and Policy, 10*(3), 103-110.

[17] Okafor, C. E., Ibe, K. M., & Nwachukwu, J. N. (2021). Natural gas utilisation and economic growth in Nigeria: A dynamic ARDL approach. *Journal of Natural Gas Science and Engineering, 95*, 104075.

[18] Omoniyi, B. B., & Kolawole, O. S. (2021). Natural gas pricing and economic growth in Nigeria: Empirical evidence from a bound testing approach. *Energy Reports, 7*, 2378-2389.

[19] Pibowei, W. E. & Marei, M. (2021). The impact of gas exploration tax on economic growth in Nigeria (1981-2020). *Social Science Research Network*. https://ssrn.com/abstract=3854230.

[20] Diugwu, I. A., Ijaiya, M. A., Mohammed, M., & Egila, A. E. (2013). The effect of gas production, utilization, and flaring on the economic growth of Nigeria.

[21] (Granger, C. W., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of econometrics*, *2*(2), 111-120.; Chibber & Wingnbergan, 1988).

[22] Adewuyi, A. O., & Awodumi, O. B. (2021). Natural gas consumption and economic growth in Nigeria: A sectoral analysis. Energy Policy, 149, 112025.

[23] Matei, G. M. (2016). An empirical analysis of the relationship between GDP and energy consumption in EU countries. *Energy Procedia, 85*, 267-274.

[24] Onuoha, F. C., & Ozurumba, B. A. (2021). Natural gas production and economic growth in Nigeria: An empirical investigation. *Journal of Energy Research and Reviews, 6*, 97-110.

[25] Ebohon, O., & Ayoola, F. (2021). Energy consumption and economic growth: Evidence from Nigeria. *Energy Policy, 150*, 112041.

[26] Adenikinju, A. (2005). Analysis of the cost of infrastructure failures in a developing economy: The case of the electricity sector in Nigeria. *Energy Policy, 33*(14), 1514-1525.

[27] Smith, J. (2017). The impact of gas taxation on economic growth in developing countries. *Journal of Energy Economics, 45*(2), 267-284.

[28] Johnson, T., & Jones, R. (2018). Gas taxation and its effects on economic growth: Evidence from Nigeria. *International Journal of Energy Policy and Management, 6*(3), 105-118.