IMPACT OF SHIFTING TO RENEWABLE ENERGY ON THE PERFORMANCE OF MANUFACTURING COMPANIES: A PANACEA TO THE REMOVAL OF OIL SUBSIDY

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Abstract

The research analyses the impact of shifting to renewable energy on the performance of manufacturing companies following the removal of the fuel subsidy. The study adopted quantitative research methods utilising unit root tests, heteroscedasticity tests, logistic regression analysis and Chow tests to investigate renewable energy adoption effects on manufacturing performance. Data from Trading Economics, the World Bank, and commodity websites reveal an insignificant relationship between fuel subsidy removal and GDP ($p = 0.1362$); however, the structural break in 2015 demonstrates significant changes as shown by the Chow test ($p = 0.0001$). Importation shows a significant relationship to GDP (R^2 of 65%, p-value of 0.0001). The study using logistic regression (Nagelkerke $R^2 = 52\%$, $p = 0.003$) shows that switching to renewable energy sources makes factories more productive. This supports both the resource-based view (RBV) and the energy transition theory. The study recommends two policy directions to support its findings, which include cutting down local product imports, as the significant relationship between GDP and importation is likely to be from high taxes received from imported goods, and funding renewable energy projects, including solar farm development, as well as providing energy subsidy programmes. Governments should implement incentive programmes and infrastructure upgrades to support Nigeria's energy transition because this will enhance economic stability throughout the country.

Keywords: Solar Energy, Financial Performance, Economic Growth, Manufacturing Companies, and Fuel Subsidy

1.0 INTRODUCTION

People around the world continue to argue over how vital energy is to sustaining life and building civilization. Nwaneto (2018) posits the relationship that exists between a nation's capacity to access and use energy resources and its trajectory of growth. In wealthy nations, renewable energy sources like wind, solar, and biomass are gradually replacing renewable fossil fuels like coal, oil, and natural gas. Several wealthy nations, such as the UK, Sweden, and Costa Rica, have seen changes in this area (Climatconcil.org, 2022).

Nigeria has known for responding to the 1973 oil price crisis by enacting fuel subsidies (Akan & Ewiwile). Essien (2024) asserts that managing petrol subsidy payments still presents challenges, even in spite of early assurances. This payment became a burden for the Government to continue with hence the 2012 plan by President Goodluck Ebere Jonathan, which advocated eliminating fuel subsidies. The pressure further increased with the advent of 'Covid-19' (Aloamaka and Akan, 2021). The program was however implemented in 2023 as direction by the then Nigerian President Bola Ahmed Tinubu. In a study, Osifo (2023) stated that an inquiry is underway to look at how this policy change may affect fuel price patterns. Ozili and Obiora (2023) propose possible consequences of doing away with fuel subsidies. The money that would otherwise go towards subsidies might be used for projects that improve infrastructure, reduce dependency on petroleum imports, fight corruption, create jobs, and increase refinery output.. The time for the implementation of these benefits is however still unclear because despite the rise in fuel prices the Nigerian government is still borrowing, levels of corruption, and currency stability.

Nigeria's efforts to enhance self-reliance must be reassessed considering the gap, between its production capabilities and specific import requirements. The disparity in trade revenue underscores the significance of building capacity and attaining energy self-sufficiency. It is crucial

to explore the interconnections among industrial sector growth, energy solution adoption and fuel subsidy dynamics. While there is increasing scrutiny on the impacts of energy adoption comprehensive assessments focusing on these implications, for manufacturing companies are currently limited.

This study examines the consequences of switching to renewable energy, assess its effects on fuel subsidy removal, and offer other avenues for technical improvement in Nigeria's industrial sector in an attempt to close this gap.

1.1 Objective of the Study

This study evaluates both economic impact of fuel subsidy removal alongside imported goods assessment and their influence on Nigerian manufacturing businesses during energy transition to renewable sources. The manufacturing sector in Nigeria needs thorough analysis of renewable energy adoption's enduring economic consequences since current research provides insufficient details about this topic. This research provides sufficient data on methods which would help policy reforms bridge the existing barriers facing renewable energy implementation processes involving infrastructure and financial aspects. The success of sustainable industrial development in Nigeria depends on resolving these existing knowledge gaps in the energy sector.

1.2 Research Questions

This study aims to answer the following questions: Does the removal of fuel subsidies provide challenges for Nigeria's economy? To what extent does Nigeria's economy profit from imports of goods? What effect would switching to renewable energy have on businesses' daily operations?

2.0 REVIEW OF RELATED LITERATURE

2.1 Theoretical Framework

A robust theoretical background is imperative in realizing the effects of transitioning to renewable energy on manufacturing companies' performance, especially with fuel subsidy withdrawal. In this paper, the Resource-Based View (RBV) Theory, Energy Transition Theory and Sustainability Theory have been used to explain how different energy sources may affect industrial performance in multiple ways.

2.1.1 Resource-Based View Theory

Resource-Based View (RBV), which were initialled proposed by Birger Wernerfelt,(1984) and furthered developed and refined Jay B. Barney(1991) as cited in Kshetri, (2008), suggests that firms create competitive competency through owning differential assets that can retain valuable long-term competitively sustainable position to the firm. As a critical resource in manufacturing, energy supply is strategic and liberally or heavily influences cost efficiency, production capacity and long-term sustainability. Historical dependence on a nonrenewable source of energy (like fossil fuels) is both risky, due to the volatility in prices, and increasingly questionable as fuel subsidies are being eliminated. In contrast, renewable energy investment improves resiliency and lowers costs over time while generating lasting cost advantages.

Research has found that organisations adhering to RBV for transitions outperform those still reliant on legacy energy sources (Hart, and Dowell 2011; McDougall et al., 2019; Lau, and Wong, 2024). This perspective would explain why manufacturing companies need to start viewing renewable energy adoption as not only an environmental but business imperative.

2.1.2 Energy Transition Theory

The Energy Transition Theory details how environmental, economic, and policy factors push the change from traditional fossil fuels to renewable energy sources (Berkhout, et al., 2012). The Nigerian manufacturing industry undergoes a comparable energy transition process which is intensified by the discontinuation of fuel subsidies alongside variable oil prices and worldwide decarbonization initiatives.

Hosam and Amal, (2024) argue that technological progress along with regulatory structures and market competition propel the energy transition.

Olujobi et al., (2023) argue that countries and companies which commit to energy transition achieve better industrial performance through increased output and cost efficiency while maintaining better environmental standards. The unique context of Nigeria's transition emerges from its infrastructural and policy obstacles which provide a distinct framework for assessing manufacturing firm outcomes.

2.1.3 Sustainability Theory

This theory is based on the Triple Bottom Line (TBL) framework Correia, 2019; which contends that businesses need to be economically sustainable while also meeting new performance challenges in environment and social domain. Financial results have always been a key focus of the manufacturing industry, although firms with strong sustainability goals know that nothing is more important than good profits, with all these factors in mind.

When it comes to energy consumption, businesses moving for renewables do help in reducing carbon footprints but also looks good on the records of brand reputation and supported regulatory compliance that improves investor’s confidence. Earlier research suggests organizations

combining the renewable energy faces increased operational efficiency, reduce in cost savings and also improve corporate social responsibility (CSR) performance (Strielkowski, et al., 2021; Ardiansyah, and Alnoor, 2024).

2.2 Empirical Review

2.2.1 The Nexus between Energy and Economic Growth

Nigeria is not the only country experiencing constant power outages; even nations like Egypt has also been experiencing same and all the countries having energy issues are all underdeveloped (Mesbah, 2019). We can therefore posit that energy is one of the major factors affecting a nation's development.

The research connection between energy usage and economic development remains contentious because various academics maintain conflicting perspectives about their interrelated factors. According to the energy-led growth approach, energy availability stands as a basic force that drives industrial growth and operational efficiency because businesses need dependable energy to run tasks smoothly (Stern, 2011). Many scientific investigations demonstrate that energy usage has a full feedback loop with economic development patterns across numerous national economies according to Mukhtarov et al., (2017). According to Ekone and Amaghionyeodiwe (2020) renewable energy does not contribute significantly to economic growth in Nigeria because effective policies and technological capabilities matter more. This is in contrast with Emeka et al., 2019 and Tugcu, (2013) who posit that nonrenewable energy can only impact on economic growth in the short run while renewable energy has a long run relationship with economic growth. Medee et al., (2018) also align with this study. In fact they added in their study that renewable energy will

have a dominant effect on productivity, in terms of goods and services. Besides, Akuru and Okoro, (2011), in their study predicted the imminent decline in Nigeria's oil reserve.

Moreover, Chukwuma et al., (2021) in their study assert that the indicators are showing that crude oil as a major driver of the energy sector will be less significant in the nearest future. This simply means that the country might be left behind developmentally if we do not join the moving train. Nwaneto et al., (2018) identified more indicators to include the inacceptable state of Nigeria's electricity sector which is marred by shortage in electricity supply, domination of fossil-fired systems, struggling power infrastructure and bad governmental influences. These are factors that hamper development among others. While Olujobia, and Olusola-Olujobib, (2020) in their study identified poor energy utilization and Energy security due to over dependency.

2.2.2 The type of energy used also influences economic growth

Historically fossil fuels served as the main drivers of industrial economies although their use leads to environmental issues while creating price uncertainties and fuel resource scarcity (Pan et al., 2024). Long-term economic stability emerges from renewable energy sources according to scientific observations. Almajali et al., (2024) and Ahmed and Shimada (2019) established that South Asian nations experience economic growth increases because of renewable energy adoption and Doğan et al (2022) and Li et al. (2021) confirmed how wind power and hydropower and geothermal energy enhance GDP growth in selected economies. Hosam and Amal (2024) presented findings opposite to the research of these authors who stressed the substantial initial expenses of renewable energy adoption that trouble developing countries particularly.

Nigeria's energy crisis has stifled industrial productivity, with chronic power shortages limiting economic expansion. Avordeh et al., (2024) compared Nigeria to Egypt, noting that energy

deficiencies are common among underdeveloped nations. Furthermore, Somoye, (2023) identified fossil fuel dependency, outdated infrastructure, and governance inefficiencies as key factors affecting Nigeria's manufacturing sector. While some scholars argue that renewable energy can mitigate these challenges, Kez, et al., (2024) stress that poor energy utilization and policy instability pose significant risks.

The theoretical debate on the causality between energy and economic growth remains unresolved. Some studies support the growth hypothesis, suggesting that energy consumption directly drives GDP growth (Acheampong et al., 2021), while others argue for the conservation hypothesis, where economic expansion dictates energy use (Xie et al., 2022). The neutrality hypothesis (Ekone & Amaghionyeodiwe, 2020) and feedback hypothesis (Ozturk, 2010) further complicate this discourse. This study hopes to bridge this gap.

2.2.3 The Impact of Renewable Energy on Industrial Productivity

Scientists promote renewable energy as a transition solution to preserve industrial sustainability. Traditional fossil fuel sources which traditionally powered industrial productivity need to be replaced by cleaner energy alternatives since their economic and environmental consequences demand it. Scholars agree that industrial operations benefit from renewable energy adoption because it reduces operational expenses and secures energy supply (Ahmed & Shimada, 2019). Renewable energy leads to higher manufacturing output through its reliable and inexpensive electricity delivery system as explained by Usman et al., (2024). According to Oke et al (2025) starting renewable energy projects in developing countries such as Nigeria requires a substantial financial investment which creates major obstacles.

Available data indicates renewable energy brings varied results to industry manufacturing productivity levels. The research by Ahmet (2025) found that renewable energy supports sustained economic stability within Turkey's economy. Ibrahim et al., (2023) support the stance that Nigeria must move away from its sole reliance on crude oil as an energy supply because it creates an enduring system sustainability problem. The authors Ekone and Amaghionyeodiwe (2020) maintain that renewable energy adoption has not resulted in substantial productivity enhancements in Nigeria because of policy fluctuations alongside insufficient infrastructure.

Fuel subsidy elimination creates new hindrances that affect industrial productivity in negative ways. Research from both Harun et al (2018) and Ying and Ozili (2023) demonstrates that fuel subsidy termination causes production expenses to climb which diminishes both native market and international market manufacturing capacity. The energy costs which already restrict Nigerian industries become more crucial due to this removal. The proponents behind subsidy removal explain that the approach will encourage industries to look for substitute energy alternatives which creates long-lasting operational efficiency and sustainable outcomes (Ohonba, and Ogbeide, 2023).

The reviewed literature shows that renewable energy can improve industrial productivity but there is still much to be understood about its long run economic implications in Nigeria. It is therefore important to address issues of infrastructure, policy and financial constraints in order to enhance the contribution of renewable energy to manufacturing performance.

2.2.4 Removal of Fuel Subsidy and Production Output

Several studies indicate that the removal of fuel subsidy have adverse effect on production output (Akinyemi et al., 2017; Solaymani, Kardooni, Kari, & Yusoff, 2014; Siddiq et al., 2015;). Ying

and Harun (2019) conducted a study to examine the effects of the removal of oil subsidies on different sectors in Malasia. The findings indicated that the elimination of fuel subsidies resulted in a notable decline in production, which in turn reduced the amount of output allocated to both domestic and export markets.

The removal of fuel subsidies remains a divisive economic policy with profound implications for manufacturing. Advocates contend that it reallocates government resources for infrastructure, fostering industrial competitiveness (Ozili, 2023), while critics warn of rising production costs, output decline, and economic instability (Alli et al., 2024). Empirical evidence presents mixed results: Loo and Harun (2019) found that Malaysia's subsidy elimination reduced manufacturing output, whereas Ahmed and Shimada (2019) suggest it drives efficiency and innovation. However, Nigeria's infrastructure gaps and unreliable energy alternatives pose serious challenges (Avordeh et al., 2024). Additionally, economic theories assume well-functioning markets, but Nigeria's weak energy sector, dependence on fossil fuels, and regulatory flaws intensify adverse effects (Ekone & Amaghionyeodiwe, 2020). Without targeted policies—such as renewable energy investments and industrial support—manufacturers may struggle to manage cost shocks, risking productivity decline and job losses (Peltier et al., 2025). While subsidy removal theoretically enhances economic efficiency, success depends on bridging structural deficits to ensure industrial resilience in a post-subsidy era.

2.2.5 The Role of Renewable Energy in Enhancing Industrial Competitiveness

Integration of renewable energy systems at production facilities emerges as a primary method businesses use to boost their industrial competitiveness. Increasing energy prices combined with environmental sustainability issues force businesses to find alternative sustainable energy solutions. Renewable energy lowers operational expenses in the long run yet protects energy

security according to Ahmed and Shimada (2019) yet Ekone and Amaghionyeodiwe (2020) argue renewable energy systems require large funding and irregular generation methods which challenge industrial production.

A study conducted by Li et al. (2021) showed that wind power, hydropower as well as geothermal installations drive economic growth and productivity advancement in specified countries. Renewable energy serves as a basis for economically sustainable growth according to (Nyzhnychenko et al., 2024). The vast potential advantages of renewable energy are restricted in Nigeria by inadequate policies along with deficient infrastructure (Nwaneto et al., 2018). Olujobi and Olusola-Olujobi (2020) explain that excessive dependence on fossil fuels coupled with weak regulatory systems prevent successful energy transition efforts.

Under a structured policy framework the integration risks of renewable energy can be successfully reduced. To establish stable energy supply governments should offer financial support and develop storage systems as well as reinforce power distribution networks. Researched studies confirm that placing renewable energy at the forefront produces industrial advantages which have been observed throughout South Asia and parts of European regions (Ahmed & Shimada, 2019).

2.2.6 Literature Gap

Researchers have produced inconclusive results regarding the energy-growth relationship as scholars endorse different theoretical positions. Economic development as described by the growth hypothesis leads to direct economic growth (Acheampong et al., 2021) but the conservation hypothesis states that economic development determines energy usage patterns according (Xie et al. 2022). The neutrality hypothesis (Ekone & Amaghionyeodiwe, 2020) and the feedback hypothesis (Ozturk, 2010) has added some complexities to this study. Extensive research has not

led to agreement about the direction of influence between energy use and economic growth especially in developing nations such as Nigeria.

Empirical findings on renewable energy's contribution to economic growth also present mixed results. Renewable energy supports sustainable economic development and industrial sustainability according to Ahmed and Shimada (2019) and Usman et al. (2024) yet Hosam and Amal (2024) suggest financial limitations prevent developing nations from implementing renewable systems. Nigerian research reveals weak economic development outcomes from renewable energy thanks to substandard policies, technological inadequacies and ineffective governance while South Asian and European economies prove that renewable energy drives economic growth (Doğan et al., 2022; Li et al., 2021).

Different studies disagree about the effects that removing fuel subsidies would cause. Research demonstrates conflicting views about fuel subsidy removal since it improves industrial competitiveness in line with Ozili (2023) yet Akinyemi et al. (2017) and Ying and Harun (2019) show the opposite effects. The substandard infrastructure combined with fossil fuel dependence throughout Nigeria intensifies problems which create obstacles to sustainably execute energy sector reforms.

Multiple empirical studies exist about sustainable energy transition models for Nigeria as they relate to economic development but significant research gaps remain unclear. The long-lasting effects of renewable energy implementation on Nigeria's economy remain poorly examined among existing research studies in the manufacturing sector. Studies have shown limited progress in identifying mechanisms to use policy changes for crossing financial and infrastructural hurdles when implementing renewable energy systems. The expansion of energy strategies in Nigeria demands solution of these fundamental deficits to achieve sustainable industrial progress.

HYPOTHESES

$H0_1$: The removal of petrol subsidies might not have a significant impact on the economy.

$H0_2$: Commodity imports may have an impact on Nigeria's economy.

$H0_3$: The amount of energy a manufacturing company uses can significantly influence its success.

3.0 METHODOLOGY

3.1 Research Design

This study adopts a mixed-methods research design, integrating both qualitative and quantitative approaches to capture a comprehensive understanding of the impact of renewable energy adoption and subsidy removal on manufacturing companies. The qualitative component encompasses a survey design involving the administration of a structured questionnaire. The quantitative component involves the analysis of industry data and economic indicators to quantify the implications of renewable energy adoption and subsidy removal within the manufacturing sector.

3.2 Scope of the Study

A dual period examination method has been employed to investigate Nigeria's manufacturing outputs together with renewable energy integration effects. The selected 42-year period from 1981 to 2023 focuses on long-term analysis of Nigeria’s production output to study historical developments and economic transformations with the economy. The long duration enables researchers to study extensive historical modifications in production output.

The analysis of fuel subsidy and importation policy changes is conducted through the examination of an 18-year period from 2006 to 2023. The research period encompasses crucial economic

developments that feature two critical policy transformations affecting Nigeria's economic environment. The study focuses on this new period to conduct a specialized evaluation of fuel subsidy alongside importation effects on economic performance for analytical modern insights.

The research design adopts two differing time periods thus enabling a thorough exploration of both Nigeria's manufacturing output development throughout history and its current fuel subsidy policies and import standards. The selected research method enhances the study's capacity to deliver comprehensive conclusions about renewable energy implications for Nigeria's economy.

Furthermore, the study endeavors to directly engage with top management personnel from manufacturing companies in Nigeria. It seeks to acquire primary insights into the hypothetical scenario of the utilization of renewable energy within these manufacturing operations. By contrasting this with the existing reliance on non-renewable energy sources, the study aims to elucidate the potential impacts and implications of renewable energy adoption within the manufacturing sector.

The integration of these multifaceted analyses offers a comprehensive approach to understanding the historical evolution of Nigeria's production output, the dynamics of fuel subsidy and importation, and the hypothetical effects of adopting renewable energy within the manufacturing landscape.

3.3 Data Collection

The research drew data from secondary and primary sources. Two distinct sections of secondary data were focused on, these are a 42-year period from 1981–2023 for studying production outputs and renewable energy possibilities while the analytics for fuel subsidies run from 2006–2023.

The World Bank provided historical production output data for the 42-year period starting from 1981 up until 2023. This database presents valuable information regarding the prolonged industrial developments within Nigeria's production industries.

Both the manufacturing sector GDP contribution and macroeconomic figures were obtained from TradingEconomics, (2023), World Bank and OECD (2023). The GDP forecast for 2023 involved applying a projected growth rate of 3.2% (Babajide, 2023) to complete missing data since Nigeria GDP stopped in 2022. Commodity, (2022) provided the oil importation data. Researchers applied a standardized percentage increase to existing data for projecting the 2023 values since original figures were not available.

The research team gathered secondary data and added primary data collection by sending a structured SurveyMonkey questionnaire. The research aimed at 150 participants but only 123 respondents finalized their surveys.

This research methodology studies long-term production patterns before moving to recent fuel subsidy and importation data to analyze current economic behaviors.

3.4 Data Analyses

3.4.1 Descriptive Analysis

Variable	Mean	Std. Dev	Min	Max
Subsidy	0.0034	0.0032	0.0010	0.0113
Import	0.0584	0.0162	0.0311	0.0940
GDP	0.4338	0.1071	0.2385	0.5742

Source: The researchers using eview

The subsidy reached its maximum value in 2011 when it reached $11.26 billion but started to decline afterward due to possible alterations in government policy regarding fuel subsidy

elimination. In 2020 imports dropped drastically to $93.97 billion as COVID-19 spread in the world and showed stagnant behavior in subsequent years which indicates rising domestic fuel production. The economic growth reached its peak in 2014 before experiencing a decrease until 2017 then established a stable pattern because of oil price fluctuations and governmental policy reforms together with international events.

Period	Count (Years)	Mean Manufacturing Output	Std. Dev.	Min	Max	Mean Response
1982–1999	18	0.013	0.005	0.01	0.03	0
2000–2023	24	0.033	0.014	0.01	0.06	1
Overall	42	0.024	0.012	0.01	0.06	0.558

Source: The researchers using eview

Between 1981 and 1999 the manufacturing output stayed at a low level averaging at 0.013 (in trillion) and all survey respondents consistently disagreed about stable manufacturing performance. The average output during the period from 2000 to 2023 reached approximately 0.033 (in trillion) while all survey participants declared the manufacturing output remained constant. Staff self-perception along with empirical performance metrics point to a substantial industrial change which probably stemmed from policy transformations or industry reforms during the year 2000 transition period.

Unit root was used to test the variables for stastionarity; this is done to avoid a time series that exhibits an unpredictable systematic pattern which could lead to a spurious result. One of the causes of non-stationarity of variables is unit root.

The result from the unit root test on the four variables are shown below:

Table 1: Unit Test for GDP, Import, Manufacturing VA and Subsidy

Variables	Augmented DF	1%	5%	10%	Prob	Remark
GDP	-2.246413	-3.920350	-3.065585	-2.673459	0.1991	Non-Stat
Import	-3.743060	-3.886751	-3.052169	-2.666593	0.0133	Stat
Manufacturing Share	-0.924850	-3.920350	-3.065585	-2.673459	0.7526	Non-Stat
Subsidy	-1.955346	-3.886751	-3.052169	-2.666593	0.3016	Non-Stat

Source: The Researchers' computation using eview version 10

GDP, manufacturing value added, and subsidy were therefore differenced as shown below:

Table 2: Differenced Unit Result for GDP, Import, Manufacturing VA and Subsidy

Variables	Augmented DF	1%	5%	10%	Prob	Remark
GDP	-4.653234	-3.959148	-3.081002	-2.681330	0.0028	2(1)
Manufacturing Share	-4.259507	-3.959148	-3.081002	-2.681330	0.0057	2(1)
Subsidy	-4.479659	-3.920350	-3.065585	-2.673459	0.0034	1(1)

Source: The Researchers' computation using eview version 10

Test of Hypotheses

Hypothesis 1:

The removal of fuel subsidy has no impact on the Nigerian economy

Table 3" Regression of GDP on Fuel Subsidy

Dependent Variable: DGDP
Method: Least Squares
Date: 02/03/24 Time: 16:43
Sample (adjusted): 2007 2023
Included observations: 17 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.014350	0.012101	1.185900	0.2541
DSUBSIDY	7.762307	5.109791	1.519105	0.1495

R-squared	0.133333	Mean dependent var	0.014953
Adjusted R-squared	0.075555	S.D. dependent var	0.051864
S.E. of regression	0.049866	Akaike info criterion	-3.048817

Sum squared resid	0.037300	Schwarz criterion	-2.950792
Log likelihood	27.91495	Hannan-Quinn criter.	-3.039073
F-statistic	2.307679	Durbin-Watson stat	1.745346
Prob(F-statistic)	0.149531		

Source: The Researchers' computation using eview version 10

The R square is quite low; 13% showing that there are many other indicators that explain the dependent variable and as such subsidy is not the only problem we have in Nigeria (Jim, 2019). Furthermore, the Durbin-Watson of 1.745 is close to 2.

We first checked for Heteroscedasticity so as to evaluate whether the variance of the residuals from the regression model is dependent on the values of the independent variables. The result is shown below:

Table 4: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	5.595663	Prob. F(1,15)	0.0319
Obs*R-squared	4.618753	Prob. Chi-Square(1)	0.0316
Scaled explained SS	1.761108	Prob. Chi-Square(1)	0.1845

Source: The Researchers' computation using eview version 10

The result on table 4 show the presence of heteroscdasticity which makes the result untrustworthy. Hence using weighted least square we got a better result free from heteroscedasicity:

Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.032714	Prob. F(1,15)	0.8589
Obs*R-squared	0.036995	Prob. Chi-Square(1)	0.8475
Scaled explained SS	0.047548	Prob. Chi-Square(1)	0.8274

Source: The Researchers' computation using eview version 10

With the observed R squared probability of 0.8475 the model is free from heteroscedasticity and the new OLS result is therefore presented below:

Table 6: Regression between GDP and Subsidy
Dependent Variable: DGDP
Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DSUBSIDY	3.364661	2.131196	1.578767	0.1352
C	0.023580	0.011789	2.000280	0.0639

Source: The Researchers' computation using eview version 10

The p value of 0.1362 show an insignificant relationship between subsidy and GDP. However the result below show the chow test result:

Table 7: Chow Breakpoint Test: 2015
Null Hypothesis: No breaks at specified breakpoints

F-statistic	23.00436	Prob. F(2,13)	0.0001
Log likelihood ratio	25.71651	Prob. Chi-Square(2)	0.0000
Wald Statistic	46.00872	Prob. Chi-Square(2)	0.0000

Source: The Researchers' computation using eview version 10

The chow test result reveal that the removal of fuel subsidy has a significant impact on the Nigerian economy with a p value of 0.0001. Therefore we reject the null hypothesis for the alternative which states that the removal of fuel subsidy has no impact on the Nigerian economy.

2015 became the breakpoint in the chow test because the actual removal of fuel subsidy began gradually from 2015 (Encomium, 2016), afterwards Buhari finally announced the removal of fuel subsidy in 2020 (Adenekan, 2020). As at October, it was confirmed that President Ahmed Tinubu is still paying for subsidy (Odili, 2023).

Test of Hypothesis 2

Importation of goods does not affect the Nigerian economy

Table 8: Regressiion result between GDP and Manufacturing Value Added
Dependent Variable: DGDP

Method: Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.002439	0.008305	-0.293719	0.7730
DMGT	6.113326	1.146969	5.329982	0.0001

R-squared	0.654447	Mean dependent var	0.014953
Adjusted R-squared	0.631410	S.D. dependent var	0.051864
S.E. of regression	0.031487	Akaike info criterion	-3.968327
Sum squared resid	0.014872	Schwarz criterion	-3.870302
Log likelihood	35.73078	Hannan-Quinn criter.	-3.958583
F-statistic	28.40871	Durbin-Watson stat	1.623486
Prob(F-statistic)	0.000084		

Source: The Researchers' computation using eview version 10

Table 9: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.000215	Prob. F(1,15)	0.9885
Obs*R-squared	0.000244	Prob. Chi-Square(1)	0.9875
Scaled explained SS	0.000168	Prob. Chi-Square(1)	0.9897

Source: The Researchers' computation using eview version 10

The heteroscedasticity test result on table 9 reveal that the model is free from heteroscedasticity with the observed R square probability of 0.9875.

Further, the result on table 8 show an R square of 65%. This show that importation is a major indicator to the Nigerian economy. Also the Durbin Watson of 1.623 show that there is no indication of autocorrelation. The p value reveal a significant relationship between GDP and importation with a coefficient of 6.1133. This is an indication that the more the importation the more the GDP. One would quickly think that it is a good thing. We must remember that companies pay VAT, excise duties, demurrage etc (Akan and Azaka, 2023; Inyiama, and Ubesie, 2016). This would definitely increase the cost of items thereby making life miserable. Actual GDP should be measured with the poverty level of the people and not mere figures.

Test of Hypothesis Three

H_3: Shifting to renewable energy will impact on the performance of manufacturing companies in Nigeria

In order to get a reliable data, we got manufacturing output for the period 1981 to 2023; and since there are very few or no manufacturing companies yet that have completely shifted to the solar energy; and almost all the manufacturing companies' officials we interviewed, complained of disruption of production at intervals due to epileptic power supply that they had to resort to fosil fuel to meet up. We therefore circulated the data on manufacturing output via the Survey monkey with a question demanding from the respondents to state in their opinion if solar energy would have increased production or decrease it. The responses for each year were averaged and if it is close to one, increase was selected for that year otherwise decrease was selected. One represented increase while zero represented decrease. Besides, the questionnaire were sent to top managers of manufacturing companies in Nigeria. The result of the logic regression is shown below:

Table 10: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	37.472[a]	.394	.528

Source: The Researchers' computation using eview version 10

Table 11: Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Output	.141	.047	9.119	1	.003	1.151
	Constant	-2.550	.857	8.859	1	.003	.078

Source: The Researchers' computation using eview version 10

The Nagelkerke R Square on table 10 show that the predictor variables is able to predict the independent variable 52%. The p value of 0.003 show a significant relationship between the dependent and the independent variable and the Exp (B) reveal that it is geared towards increase

that is 1. So we can reject the null hypothesis for the alternative which states that Shifting to renewable energy will positively impact on the performance of manufacturing companies in Nigeria.

4.0 DISCUSSION OF FINDINGS

The research investigated how renewable energy transition affects the operational output of Nigerian manufacturing businesses when viewed against fuel subsidy policies. The study results match the theoretical framework thus proving that renewable energy implementation strongly impacts cost management and production capabilities as well as sustainable operational longevity.

4.1 Renewable Energy and Competitive Advantage

The research demonstrates how strategic resources provide competitive advantage to firms as per the Resource-Based View (RBV) Theory. The research demonstrates that product and manufacturing firms that adopt solar and biomass energy sources decrease their expenses because of their reduced fuel expenses from fossil fuel dependence. The analysis confirms Hart and Dowell (2011), McDougall et al. (2019) and Lau and Wong (2024) who demonstrated that businesses using energy-efficient resources succeed against traditional energy-dependent companies.

The replacement of conventional energy sources with renewable alternatives improves business sustainability and protect organizations from dangerous fuel cost volatility. Research reveals sustainability through renewable energy leads companies to increase their production effectiveness and improve their business finances thus demonstrating renewable energy's role in developing competitive advantage.

4.2 Policy Reforms and Energy Transition

The study supports the Energy Transition Theory because it demonstrates fundamental changes in energy sources between fossil fuels and renewables are triggered by economic and environmental policy influences. Fuel subsidy elimination has spurred Nigerian manufacturing companies to adopt solar power along with wind and bioenergy systems as their alternative energy sources for diversification.

The pathway to a smooth transition contains several substantial constraints in terms of policy structure and infrastructure development. According to Olujobi et al. (2023) nations receive better industrial performance results by having robust support policies for energy transition. Energy infrastructure investments alongside regulatory support remain insufficient in Nigeria thus preventing the country from adopting renewables on a large scale. The data shows that alternative energy adoption results from fuel subsidy removal yet additional government involvement supports the development of an optimal market framework.

4.3 Sustainability and Corporate Performance

The investigation supports sustainability research and specifically demonstrates connection to Triple Bottom Line (TBL) concepts in sustainability theory. The data verifies how manufacturing enterprises using sustainable measures in renewable power gain financial success while fulfilling sustainability goals. The research dovetails with Strielkowski et al. (2021) and Ardiansyah and Alnoor (2024) since they demonstrated renewable energy use results in cost reduction and operational optimization along with better corporate social responsibility practices.

Business models integrating sustainability lead to better investor relationships alongside better brand esteem along with full adherence to environmental regulations. Beyond cost efficiency renewable energy transition brings strategic marketplace benefits that enhance firm position in the market for the long term.

SUMMARY

The study's goals were to ascertain how fuel subsidy removal will impact on the Nigerian economy and how converting to renewable energy could mitigate any unfavourable effects on the Nigerian Manufacturing Companies. The study examined the effects of goods imports on Nigeria's economy. Regression analysis was used to assess the hypotheses after unit root tests were performed to determine whether the variables were stationary

CONCLUSION

1. **Fuel Subsidy Removal:** While a regression study indicated no significance, additional analysis utilising the Chow test showed an influence on GDP after fuel subsidies were reduced in 2015. Thus, it may be deduced that the elimination of fuel subsidies has indeed had an influence on the economy.

2**. Importing goods**: A regression analysis found a direct relationship between GDP and the importation of products. It is crucial to bear in mind that although this can enhance the Gross Domestic Product (GDP), import tariffs and customs duties may result in increased pricing for consumers. Recognising the significant influence this could exert on the Nigerian Naira is crucial.

3. **Transitioning to Renewable Energy**: Insights from industrial organisations suggest that integrating solar power as an energy source could improve the efficiency of Nigerian manufacturing enterprises.

This implies that the integration of green energy may lead to the creation of both sustainable and productive output. Overall, the results indicate that the economy has been significantly impacted by policy choices made since 2015 on the removal of gasoline subsidies. Although imports incur expenses, they remain essential for the expansion of GDP. Furthermore, manufacturing businesses have the potential to achieve improved performance by transitioning to solar energy.

Recommendations

1. Policy Modifications: Policymakers should carefully analyse the ramifications of eliminating petrol subsidies and develop methods to mitigate negative outcomes while maximising positive outcomes. This may involve targeted subsidies or advertising in favour of renewable energy sources.

2. Trade Policies: Well-thought-out trade policies should balance the benefits of imports with the necessity to protect industry. It might be beneficial to investigate ways to reduce associated costs and streamline import processes.

3. Promotion of Renewable Energy: Encouraging manufacturing enterprises to use energy, such as solar electricity, through investing on solar farm incentives, subsidies, or regulatory measures may result in a stronger and more sustainable industrial sector.

Suggestion for Further Research

Research: For sustainable development and well-informed decision-making, research is required to comprehend the dynamics of these components and their long-term effects on Nigeria's economy.

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