International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2022, 12(3), 209-215.

An Econometric Analysis of Clean Energy Supply and Industrial Development in Nigeria: Implications for Sustainable Development

Timothy Ayomitunde Aderemi[1]*, Abidemi Alejo[2], Olufemi Samuel Omoyele[3], Olusegun Peter Olaoye[4], Wahid Damilola Olanipekun[5], Dominic Ezinwa Azuh[1]

[1]Department of Economics, Accounting and Finance, Bells University of Technology, Ota, Nigeria and Centre for Economic Policy and Development Research (CEPDeR), Covenant University, Ota, Nigeria, [2]Department of Economics and Development studies, Covenant University, Ota, Nigeria and Centre for Economic Policy and Development Research (CEPDeR), Covenant University, Ota, Nigeria, [3]Department of Business Administration and Marketing, Redeemer`s University, Ede, Osun State, Nigeria, [4]Academic Planning Unit and Centre for Economic Policy and Development Research (CEPDeR), Covenant University, Ota, Nigeria, [5]College of Management and Information Technology, American International University, West Africa, Gambia. *Email: aderemi.timothy@gmail.com

Received: 14 October 2021 **Accepted:** 15 April 2022 **DOI:** https://doi.org/10.32479/ijeep.13109

ABSTRACT

The continuous demand and usage of energy in large quantum for industrial purposes has motivated the global advocacy for energy sustainability (SDG-7). Against this backdrop, this study employed various econometric techniques to study the nexus between clean energy supply in Nigeria and industrial development between 1990 and 2019. This study sets to establish the nature of the relationship in the long run, direction of causality and the stochastic dynamic interaction between clean energy supply and industrial development in Nigeria. Consequently, the following findings emerged from this study; clean energy supply and manufacturing value added had a significant negative relationship. This implies that the contribution of clean energy supply is negatively significant to the manufacturing value added in the Country. Therefore, the supply of electricity production from hydroelectric sources had not led to industrial development in Nigeria. Further evidence indicates that no feedback relationship exists between clean energy supply and industrial development. Also, the stochastic dynamic interaction between clean energy supply and industrial development shows a shock to manufacturing value added determines the behavior of clean energy supply to a larger extent in one hand, whereas, variance decomposition of clean energy supply shows the similar effect on the behavior of industrial development on the other hand. In the light of the findings from this study, the following recommendations are made for the policymakers in Nigeria; in achieving the Sustainable Development Goal (SDG 7), clean energy supply could be explored for future industrial development in Nigeria, thought it currently lacks the capacity to drive the manufacturing sector of the economy. And as such, the Nigerian policymakers and other stakeholders should work hard to achieve sustainable supply of adequate electricity production from hydroelectric sources in the country.

Keywords: Clean Energy Supply, Industrial Development, SDG-7, Econometric Techniques
JEL Classifications: Q20, Q28, Q43

1. INTRODUCTION

The importance of industrialization cannot be undermined in nation building because it creates employment opportunities for human and material resources, revenues for the government, expansion of production possibility frontiers, foreign exchange earnings and improvement of general welfare in an economy (Okuneye, 2019; Aliya and Odoh, 2016; Amar, 2014; Ayeyemi, 2013, Anyanwu et al., 2015). The strategic role in which this sector plays in driving the economy has orchestrated the Nigerian government to embark on various industrialization strategies with focal point on promotion of exports, import substitution and employment of local resources.

However, one of the commodities that is extremely needed for industrial development in all countries of the world is energy (Nwokoye et al., 2017; Sambo et al., 2012). The continuous demand and usage of energy in large quantum for industrial purposes, which has implications for global warming and climate change has orchestrated the global advocacy for energy sustainability. As such, the Sustainable Development Goal (SDG7) advocates for the usage of energy from cleaner sources for both domestic and industrial purposes to ensure the sustainable use of energy in driving the global economy without negative spillovers on the environment (United Nations, 2015; Simsek and Simsek, 2013; WCED, 1987). In view of the above, the efficient usage of clean energy in driving economic activities across the globe has become a continuous and prominent conversation in the literature across in the recent times. See Silva, Soares and Pinho (2012), Pao et al. (2014), Al-mulali et al. (2014), Chirambo, (2018) and Aderemi et al. (2021). Meanwhile, a cursory look into past empirical studies in Nigeria shows that various past literature focuses on the connection between clean energy consumption and economic growth (Onabote et al., 2021; Akinwale and Ogundari, 2017; Maji, 2015; Oyedepo, 2014 Olugasa et al., 2014). Whereas, the impact of clean energy supplies to manufacturing industries, which constitutes the largest bulk of the country`s real sector has not been fully researched in the most recent time. Therefore, this study seeks to fill this knowledge gap in the literature created by lack of empirical evidence in this regard. It is against this backdrop that this study investigated the nexus between clean energy supply and industrial development in Nigeria. This work has been structured as thus; Section 2 presents the review of relevant literature. Similarly, section 3 accounts for data and methodology and section 4 contains discussion of findings and conclusion as well as policy implication of the paper.

2. LITERATURE REVIEW

Evidence is sparse on the relationship between clean energy supply and industrial development, this knowledge gap in the literature regarding clean energy supply and industrial development is the focus of this study, however various scholars have established the link between clean energy consumption and other macro-economic variables.

Chirambo (2016) argued that inability of countries in Africa to secure adequate investment constituted a major setback for the continent to access clean energy. Onabote et al. (2021) established a long run convergence among various sources of sustainable energy and economic growth in Nigeria. Mitic, Ivanovic and Zdravkovic (2017) utilized Dynamic Ordinary Least Squares (DOLS and Fully Modified OLS (FMOLS) techniques in assessing the linkage between carbon emissions and the growth of 17 emerging economies. Findings from the study shows that there is a long run equilibrium relationship between economic growth and carbon emissions in those economies. In another related study, Troster et al. (2018) used Granger causality approach and the Vector Error Correction Model (VECM) to examine the direction of causal relationship among consumption of renewable energy, oil prices and economic growth in the United States of America. Findings from the study confirmed bidirectional relationship among the pair of the variables of interest in the study. Also, it was discovered that it was only renewable energy out of the two energy sources that contributed a more significant impact in driving growth of the economy. Silva et al. (2012) utilized a Structural Vector Autoregressive (SVAR) technique in assessing how Carbon dioxide emission, renewable energy sources (RES), and economic growth were integrated in four nations between 1960 and 2004. The researchers asserted that use of renewable energy sources led to a fall in the emissions of CO_2 per capita.

Meanwhile, Chirambo (2018) explored a descriptive method of research to examine how numerous innovations targeting at improving the access of countries in the Sub-Sahara Africa to clean energy in a sustainable manner. The study enunciated the need for institutional regulator at a regional level to monitor how both climate change and clean energy progress respectively in order to take strategic steps towards the achievement of SGD 7. Adebosin et al. (2019) employed Ordinary Least Squares method to analyze the nexus between industrialization and economic growth from 1981 to 2016 in Nigeria. It was discovered from the study that the significant impact on economic growth experienced in the country is caused by industrialization.

However, Onakoya et al. (2013), examined the linkage between the Nigerian economic growth and energy consumption. Co-integration and Ordinary Least Squares techniques were applied to analyse the data from the country between 1975 and 2010. The authors submitted that the various variables of interest were co-integrated, and the impact of petroleum, energy consumption and electricity on economic growth was positive and significant in the country. In a related study, Jebli and Youssef (2014) investigated a feedback effect among these variables; economic growth and Carbon dioxide (CO_2) emission, combustible renewables and waste consumption in five Northern African countries between 1971 and 2008. The study revealed that CO_2 emission was the principal determinant of economic growth in the country. Meanwhile, Pao et al. (2014) explored South Korea, Mexico, Turkey and Indonesia by investigating how consumption of unclean energy, clean energy and economic growth were related in those four countries. The researchers opined that mitigating energy security issues and climate change requires the development of both renewable and nuclear sources of energy.

Consequently, Mario et al. (2016) assessed the patterns of industrialization, economic backwardness and the impact of European integration in catalyzing the development of industrialization. It was reported from the study that there was an evidence in Europe to support the emergence of some income convergence. Furthermore, Aboagye (2016) employed a panel analysis to estimate nexus between urbanization and industrialization in 36 SSA economies between 1980 and 2015. It was argued in the study that in the long run industrialization and urbanization caused an increase in intensity of energy in the selected Sub-Saharan Africa countries. Meanwhile, Anyanwu, Kalu and Alexanda (2015) examined how industrial development contributed to growth of the Nigerian economy from 1973 to 2013. The authors submitted that output from industries did not have a significant impact on the economic growth in the country. Hence, this an evidence that huge gap exists regarding the subject matter of this study.

3. METHODOLOGY AND DATA

The focus of this study is to examine the relationship between clean energy supply and industrial development in Nigeria. To achieve this aim, an ex-post facto research design was considered suitable because the principal objective of this study is to explore the viable link, and as well described how clean energy supply predicts variation in industrial development in Nigeria. Moreover, annual data extracted from the World Development Indicators was utilized for this study. The scope of the work is from 1990 to 2019. However, this scope was exclusively motivated by data availability.

3.1. Model Specification

Building the model for the estimation of the nexu between clean energy supply and industrial development in Nigeria requires some insights to be drawn from the works of Onabote et al. (2021), Osabohien et al. (2021) and Olaoye et al. (2020). Some modification was however done on the adapted model to suit the objective of this study. Therefore, the model is as enunciated;

$$IDV = f(CES) \quad (1)$$

Introduction of some control variables into equation (1) leads to equation (2)

$$IDV = f(CES, GCEX, FDI, PGR) \quad (2)$$

The classic Cobb-Douglas production function version of the equation above could also be stated as

$$IDF = CES^{\theta} GCEX^{\beta_2} FDI^{\Omega_3} PGR^{\Omega_4} \quad (3)$$

If the natural logarithm is introduced into equation (3), the following model is emerged;

$$IDV_t = \alpha + \theta_1 LogCES_t + \beta_2 LogGCEX_t + \Omega_3 FDI_t + \Omega_4 PGR_t + \mu_t \quad (4)$$

Where industrial development is denoted IDV and this is measured by manufacturing value added as percentage of GDP. CES represents clean energy supply which is proxied by supply of electricity production from hydroelectric sources. FDI is proxied by FDI inflows. GCEX denotes government capital expenditures. PGR is used to capture population growth rate and represents the error term. In addition, α, is intercept. θ_1, β_2, Ω_3 and Ω_4 represent the parameters. Log represents natural logarithm and t ranges between 1990 and 2019. It is expected that θ_1, β_2, Ω_3 and $\Omega_4 > 0$.

4. RESULTS AND DISCUSSION

In Table 1, we present the descriptive results of the estimated variables of interest in the model. These variables remain as follows; supply of electricity production from hydroelectric sources, FDI inflows, government capital expenditures and population growth rate. Firstly, supply of electricity production from hydroelectric sources in log form had its maximum value as 4.08 kilo-watt and minimum value of 3.30 kilo-watt respectively. The mean value of the variable is 3.82 kilo-watt which is greater than its standard deviation of 0.18. This implies that the variable is moderately from its mean between 1990 and 2019. Similarly, government capital expenditures in log form has a maximum and minimum values of 2.24 and –0.093 billion naira respectively. Its mean value of 1.16 is greater than its standard deviation of 0.83, which implies that the variable is moderately dispersed from the mean during the scope of the study. Furthermore, manufacturing value added as percentage of GDP has both maximum and minimum values of 20.9% and 6.5% simultaneously. The variable is equally spread moderately from its mean value because it has a mean value greater than the standard deviation.

Also, variables like population growth rate and FDI inflows exhibited similar feature like other variables discussed above.

The estimated results of stationary test of the variables of interest in this study is presented in Table 2. This test becomes important while employing time series data for empirical Table 2 shows the estimated results of stationary test of the relevant variables in this study. This test becomes important while employing time series data for empirical work because these series are usually trended in nature, which could orchestrate spurious results. This might consequently lead to inefficient policy implication of the study. And as such, the above results indicate that the variables in this paper are the mixture of I(0), I(1) and I(2) series. This implies that the order of variables integration is at level, first differencing and second differencing.

Table 3 presents the estimated report of The Johansen and Juselius (1990) cointegration test. This result confirms the presence of at most 4 Cointegration vectors among the relevant variables. The implication of this is that there is a long run equilibrium of clean energy supply and industrial development in Nigeria. Due to the fact that a long run equilibrium connection exists between clean energy supply and industrial development, Canonical Cointegrating Regression (CCR) was further estimated with a view to establishing the long run impact of clean energy supply on industrial development in Nigeria.

The Canonical Cointegrating Regression (CCR) showing the long run relationship between clean energy supply and industrial development in Nigeria is presented in Table 4. As shown in Table 4, clean energy supply, population growth rate and government capital expenditures do not follow the aprori expectation. In the same vein, the R-Squared of the estimated model is 0.88. This implies that PGR, LogCES, FDI and LogGCEX jointly explained about 88% of the systematic differences in industrial development. Therefore, the model employed for the estimation of data in this

Table 1: Annual data series - descriptive statistics

Descriptive Statistics	LogCES	LogGCEX	IDV	PGR	FDI
Mean	3.825398	1.160765	12.67290	2.609000	1.730667
Median	3.860619	1.498157	11.19200	2.605000	1.575000
Maximum	4.082609	2.245803	20.92700	2.720000	5.790000
Minimum	3.306887	–0.093212	6.553000	2.520000	0.500000
Std. Deviation	0.182394	0.832326	4.660987	0.072319	1.177985
Skewness	–0.810687	–0.154664	0.439744	0.152634	1.942353
Kurtosis	3.291858	1.445995	1.640073	1.510609	7.020928
Jargue-Bera	3.392543	3.138270	3.278627	2.889344	39.07350
Probability	0.183366	0.208225	0.194113	0.235823	0.000000
Sum	114.7619	34.82296	380.1870	78.27000	51.92000
Sum. Sq. Deviation	0.964754	20.09024	630.0192	0.151670	40.24179
Observation	30	30	30	30	30

Source: Authors 2021

Table 2: Unit root test

Variables	ADF test						Decision
	Level	Prob.	1st Dif.	Prob.	2nd Dif.	Prob.	
FDI	–2.967767	0.0338					I (0)
LogCES	–2.986225	0.0461					I (0)
LogGCEX	–2.967767	0.5598	–2.971853	0.0001			I (1)
IDV	–2.967767	0.7008	–2.976263	0.1785	–2.976263	0.0000	I (2)
PGR	–2.976263	0.0112					I (1)
Variables	**PP Test**						
	Level	**Prob.**	**1st Dif.**	**Prob.**	**2nd Dif.**	**Prob.**	
FDI	–2.967767	0.0281					I (0)
LogCES	–2.967767	0.0132					I (0)
LogGCEX	–2.967767	0.5598	–2.971853	0.0001			I (1)
IDV	–2.967767	0.6812	–2.971853	0.0009			I (1)
PGR	–2.967767	0.6620	–2.971853	0.4196	–2.976263	0.0002	I (2)

Source: Authors' 2021

Table 3: Johansen co-integration test (trace statistics) and (maximum Eigen value)

Hypothesized No. of CEs	Eigenvalue	Trace statistics	0.05 critical value	Prob.**
None*	0.736798	80.19761	69.81889	0.0059
At most 1*	0.547994	42.82231	47.85613	0.1369
At most 2*	0.343534	20.58863	29.79707	0.3838
At most 3*	0.209747	8.803861	15.49471	0.3838
At most 4*	0.075980	2.212592	3.841466	0.1369

Source: Authors` 2021

Table 4: Clean energy supply and industrial development in Nigeria

Dependent Variable: IDV			
Method: Canonical Cointegrating Regression (CCR)			
Regressors	**Coefficient**	**T-statistics**	**Prob. value**
PGR	−23.06082	−1.959804*	0.0617
LogCES	−11.79215	−4.099906***	0.0004
FDI	0.199621	0.540244	0.5940
LogGCEX	−1.250181	−0.933616	0.3598
R-squared	0.888416		

Source: Authors. ***Significant at1% **Significant at 5% *Significant at 10%

study is relatively good. Consequently, a negative relationship which is significant at 10% level of significance was established between population growth rate and manufacturing value added. A unit variation in population growth rate brings about 23% decrease in manufacturing value added in Nigeria. Similarly, clean energy supply and manufacturing value added had a negative significant relationship in Nigeria. This mean that a unit variation in clean energy supply leads to a fall in manufacturing value added by 0.11% in Nigeria. However, an insignificant relationship was established between FDI inflows and manufacturing value added. Also, there is a negative but insignificant relationship between government capital expenditure and manufacturing value added. By and large, clean energy supply added a significant decrease to manufacturing value added in Nigeria. This implies that supply of electricity production from hydroelectric sources had not led to industrial development in Nigeria in the past three decades. The reason for this result might be attributed to the incessant power outage in the country due to the unsustainability supply of electricity production from hydroelectric sources in the country (Table 5).

Even though a long run equilibrium relationship between clean energy supply and industrial development has been established in Table 3, further efforts were made by the researchers to determine the route of the causal relationship amongst the variables of interest. Estimated outcomes from the Granger causality technique show that there is no feedback relationship between clean energy supply and industrial development in Nigeria, however, a unidirectional causality runs from industrial development to government capital expenditure. Industrial development Granger causes FDI inflows likewise, clean energy supply Granger causes government capital expenditure. In the same vein, population growth rate Granger causes government capital expenditure. And finally, unidirectional causality flows from government capital expenditure to FDI (Figure 1).

The Granger Causality Test can only point out the direction of causality between any two variables within periods of analysis. Nevertheless, providing inferences regarding the variables of interest beyond the periods of analysis requires forecasting, in which Granger causality technique could not address. It is against this backdrop that this study employs the impulse responses over a 10-year period when one standard deviation positive innovation interacts with another variable. The outcomes of the Impulse Response Functions (IRFs) show that industrial development rose for the first three periods following a positive shock to itself. Then, it became stabilize to the end of the fourth period, before it rose again consistently to the end of the ten period. The response of this variable was due to its own shocks. Meanwhile, in response to industrial development shocks, clean energy supply witnessed a slump in the first period and became negative in the end of that period. However, there was rise in clean energy supply towards end of the second period before it fell slowly from the beginning of the third period till the end of the fourth period. Afterwards, it stabilized to the end of the tenth period. Furthermore, while responding to its own shocks, clean energy supply fell sharply in the first period. Meanwhile, it rose slowly in the second period to the fourth period, after which it continued to slump consistently to the end of the tenth period. However, the response of industrial development to clean energy supply shocks fell sharply in the negative direction in the first period. But, in the second period, there was a sharp rise in the variable reaching positive bar before it declined slowly and perpetually from third period to the end of the tenth period.

In summary, we could infer that industrial development has an important impact on the Nigerian economy because a shock to manufacturing value added is a strategic impetus that determines the level of clean energy supply in the country. Hence, industrial development could be considered a good policy towards raising the level of clean energy supply in general.

After generating the IRFs for industrial development, further effort was made to examine its Variance Decomposition (VD). The results from Table 6 indicate that the variation to industrial development is entirely due to its own shock because it exhibits 100% of industrial development fluctuation in the first period. Further observation shows that industrial development has a slight and continuous fall in its fluctuation from 99.9% in the second period to 99.6% in the tenth period. On the other hand, clean energy supply variance rose in the second period from 0.015 percent to 0.403 percent at the end of the tenth period.

From Table 7, the Variance Decomposition results of clean energy supply indicate that its variation was principally motivated by its own shock because it exhibits 92.9 percent of variation in clean energy supply and 7.12% variation in industrial development in the first period. However, the share of the variation caused by clean energy supply variance to clean energy supply started to decline sharply during the second period, and this remains to the end of the forecast. Conversely, the variation in industrial development rose sharply in the second period to 20%, and this sharp rise continued to 53.6% to the end of the forecast period.

Table 5: Pairwise granger causality test

Null hypothesis	F-statistic	Prob.	Decision	Causality
LogCES does not Granger Cause IDV	0.72326	0.4959	Accept	None
IDV does not Granger Cause LogCES	2.22032	0.1313	Accept	
LogGCEX does not Granger Cause IDV	0.82727	0.4498	Reject	
IDV does not Granger Cause LogGCEX	6.73046	0.0050	Accept	Unidirectional
PGR does not Granger Cause IDV	2.85247	0.0782	Reject	
IDV does not Granger Cause PGR	1.25288	0.3045	Reject	None
FDI does not Granger Cause IDV	0.22952	0.7967	Reject	
IDV does not Granger Cause FDI	3.57748	0.0444	Accept	Unidirectional
LogGCEX does not Granger Cause LogCES	1.08792	0.3536	Reject	
LogCES does not Granger Cause LogGCEX	4.88039	0.0171	Accept	Unidirectional
PGR does not Granger Cause LogCES	1.00155	0.3828	Reject	
LogCES does not Granger Cause PGR	0.26390	0.7703	Reject	None
FDI does not Granger Cause LogCES	0.43840	0.6503	Reject	
LogCES does not Granger Cause FDI	2.30119	0.1227	Reject	
PGR does not Granger Cause LogGCEX	8.67107	0.0016	Accept	Unidirectional
LogGCEX does not Granger Cause PGR	1.19643	0.3204	Reject	
FDI does not Granger Cause LogGCEX	0.62860	0.5423	Reject	
LogGCEX does not Granger Cause FDI	3.31306	0.0544	Accept	Unidirectional
FDI does not Granger Cause PGR	1.26468	0.3012	Reject	None
PGR does not Granger Cause FDI	0.17702	0.8389	Reject	

Source: Authors`2021

Table 6: Variance Decomposition (VD) of industrial development

Period	SE	IDV	CES
1	1.223998	100.0000	0.000000
2	1.957275	99.98432	0.015684
3	2.644096	99.68097	0.319032
4	3.179329	99.70716	0.292843
5	3.685882	99.70209	0.297906
6	4.137741	99.67101	0.328995
7	4.550034	99.64977	0.350227
8	4.933576	99.63311	0.366886
9	5.293431	99.61364	0.386364
10	5.632257	99.59640	0.403596

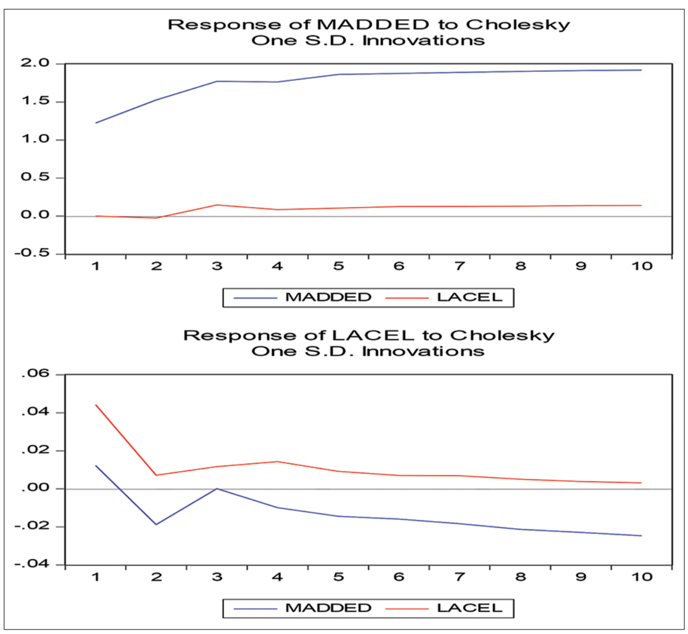
Source: Authors' 2021

Table 7: Variance Decomposition (VD) of Clean Energy Supply

Period	SE	IDV	CES
1	0.045931	7.123703	92.87630
2	0.050144	20.04116	79.95884
3	0.051492	19.00556	80.99444
4	0.054349	20.36080	79.63920
5	0.056984	24.96012	75.03988
6	0.059563	29.93055	70.06945
7	0.062696	35.52661	64.47339
8	0.066418	41.95942	58.04058
9	0.070370	47.98947	52.01053
10	0.074621	53.56872	46.43128

Source: Authors' 2021

Figure 1: Impulse response functions of manufacturing value added and clean energy supply



5. CONCLUSION AND RECOMMENDATIONS

This study employed various econometric techniques to examine the relationship between clean energy supply and industrial development in Nigeria over the period of 1990-2019. The paper sets to establish the nature of the long run relationship, the direction of causality and the stochastic dynamic interaction that exist between clean energy supply and industrial development. Consequently, the findings emanating from this study are stated as follows; there is a negative relationship between population growth rate and manufacturing value added which is significant at 10% level of significance. Clean energy supply and manufacturing value added had a significant negative relationship. This implies that clean energy supply added a significant decrease to manufacturing value added in the country. Therefore, supply of electricity production from hydroelectric sources had not led to industrial development in Nigeria in the past three decades. The reason for this result might be attributed the incessant power outage in the country due to the unsustainability supply of electricity production from hydroelectric sources in the country. Further proofs from the Granger causality technique shows that no feedback relationship exists between clean energy supply and industrial development in the county of study. Also, the stochastic dynamic interaction between clean energy supply and industrial development shows that industrial development has an important impact on the Nigerian economy because a shock to manufacturing value added determines the behavior of clean energy supply to a larger extent in one hand, whereas, variance decomposition of clean energy supply shows the similar effect on the behavior of industrial development on the other hand.

In the light of the above findings, this study makes the following recommendations for the Nigerian policymakers; in achieving the Sustainable Development Goal (SDG7), clean energy supply could be explored for future industrial development in Nigeria, thought it currently lacks the capacity to drive the manufacturing sector of the economy. And as such, the Nigerian policymakers and other stakeholders should work hard to achieve sustainable supply of adequate electricity production from hydroelectric sources in the country.

6. ACKNOWLEDGMENTS

Authors of this paper would like to recognize and appreciate the support of the Covenant University Centre for Research, Innovation, and Development (CUCRID) as well as financial supports in the course of this study are highly recognized. In the same vein, the authors of this paper affirm no conflict of interest with anyone.

REFERENCES

Aboagye, S. (2016), The implication of economic growth, industrialization and urbanization on energy intensity in Sub-Saharan Africa. Journal of Applied Economics and Business Research, 6(4), 297-311.

Adebosina, W.G., Toriolab, A.K. Salami, L.A., Ajayi, F.O., Yusuf, M. (2019), Industrialisation and economic growth in Nigeria (1981 to 2016). Hallmark University Journal of Management and Social Sciences, 1(1), 1-14.

Aderemi, T.A., Oyegoke, A.A., Wahid, D.O., Olaoye, O.P, Ayodeji, G.B., Azuh, D.E. (2021), Human capital development, energy consumption and crude oil exports in Nigeria: Implications for sustainable development. International Journal of Energy Economics and Policy, 11(4), 443-449.

Akinwale, Y.O., Ogundari, I.O. (2017), Exploration renewable energy resources for sustainable development in Nigeria: A study of the federal capital territory. International Journal of Energy Economics and Policy, 7(3), 240-246.

Aliya, Z.I., Odoh, J.C. (2016), Impact of industrialization in Nigeria. European Scientific Journal, 2(10), 1-11.

Al-mulali, U., Fereidouni, H.G., Lee, J.Y. (2014), Electricity consumption from renewable and non-renewable sources and economic growth: Evidence from Latin-American countries. Renewable and Sustainable Energy Reviews, 30, 290-298.

Amar, M.B. (2014), Does industrialization matter for economic growth? Evidence from African Economies, 8(2), 139-152.

Anyanwu, B.K., Kalu, U.N., Alexanda, O.U. (2015), The effect of industrial development on economic growth: An empirical evidence in Nigeria 1973-2013. European Journal of Business and Social Sciences, 4(2), 127-140.

Ayeyemi, B. (2013), The determinants of manufacturing sector growth in Sub-Saharan African countries. Research in Business and Economics Journal, 12(5), 20-29.

Chirambo, D. (2016), Addressing the renewable energy financing gap in Africa to promote universal energy access: Integrated renewable energy financing in Malawi. Renewable and Sustainable Energy Reviews, 62, 793-803.

Chirambo, D. (2018), Towards the achievement of SDG 7 in sub-Saharan Africa: Creating synergies between Power Africa, sustainable energy for All and climate finance in-order to achieve universal energy access before 2030. Renewable and Sustainable Energy Reviews, 94, 600-608.

Jebli, M.B., Youssef, S.B. (2014), Economic Growth, Combustible Renewables and Waste Consumption and Emissions in North Africa. Munich: Munich Personal RePEc Archive.

Maji, I.K. (2015), Does clean energy contribute to economic growth? Evidence from Nigeria. Energy Reports, 1, 145-150.

Mario, H., Amat, A., Šikić, L. (2016), Backwardness, Industrialisation and Economic Development in Europe, Working Paper 123.

Mitic, P., Ivanovic, O.M., Zdravkovic, A. (2017), A cointegration analysis of real GDP and CO2 emissions in transitional economies. Sustainability, 9, 1-18.

Okuneye, B.A. (2019), Industrial sector performance and economic growth in Nigeria. Fountain University Osogbo Journal of Management, 4(1), 15-30.

Olaoye, O.P., Aderemi, T.A, Nwagwu, C.J., Yvonne, J.O., Azuh, D.E. (2020), Energy consumption and foreign direct investment inflows in Nigeria: An empirical perspective. International Journal of Energy Economics and Policy, 10(2), 1-6.

Olugasa, T.T., Odesola, I.F., Oyewola, M.O. (2014), Energy production from biogas: A conceptual review for use in Nigeria. Renewable Sustainable Energy Reviews, 32, 770-776.

Onabote, A., Jolaade, A., Osabohien, R., Otobo, O., Ede, C., Okafor, V. (2021), Energy sustainability, Energy Financing and Economic Growth in Nigeria. International Journal of Energy Economics and Policy, 11(1), 433-439.

Onakoya, A.B., Onakoya, A.O., Jimi-Salami, O.A., Odedairo, B.O. (2013), Energy consumption and Nigerian economic growth: An emprical analysis. European Scientific Journal, 9(4), 25-40.

Osabohien, R., Aderemi, T.A., Akindele, D.B., Jolayemi, L.B. (2021), Carbon emissions and life expectancy in Nigeria. International Journal of Energy Economics and Policy, 11(1), 497-501.

Oyedepo, S.O. (2014), Towards achieving energy for sustainable development in Nigeria. Renewable Sustainable Energy Reviews, 34, 255-272.

Pao, H.T., Li, Y.Y., Fu, H.C. (2014), Clean energy, non-clean energy, and economic growth in the MIST countries. Energy Policy, 67, 932-942.

Sambo, A.S., Garba, B., Zarma, I.H. Gaji, M.M. (2012), Electricity generation and the present challenges in the Nigerian power sector. Journal of Energy and Power Engineering, 6(7), 1050-1059.

Silva, S., Soares, I., Pinho, C. (2012), The impact of renewable energy sources on economic growth and CO2 emissions-a SVAR approach. European Research Studies, 15, 133-144.

Simsek, H.A., Simsek, N. (2013), Recent incentives for renewable energy in Turkey. Energy Policy, 63, 521-530.

Troster, V., Shahbaz, M., Uddin, G.S. (2018), Renewable Energy, Oil Prices, and Economic Activity: A Granger-causality in Quantiles Analysis. Munich: Munich Personal RePEc Archive.

United Nations. (2015), Report on Sustainable Development Goals for the West Africa sub-Region. United States: United Nations Economic Commission for Africa, United Nations.

WCED. (1987), Our Common Future. World Commission on Environment and Development. World Commission on Environment and Development. Oxford: Oxford University Press.