CENTRAL ASIAN
JOURNAL OF
INNOVATIONS ON
TOURISM MANAGEMENT
AND FINANCE

https://cajitmf.centralasianstudies.org/index.php/CAJITMF
Volume: 07 Issue: 04 | October 2026 ISSN: 2660-454X

Article

Industrial Sub-Sectors Performance and Economic Development in Nigeria

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Abstract: *This study investigates the affiliation between industrial sub-sector performance and economic development in Nigeria from 1980 to 2025. The indicators used are manufacturing sector, mining and quarrying sector, construction sector and utility sector. The data were sourced from the Central Bank of Nigeria (CBN) Statistical bulletin. The study employed the Augmented Dickey Fuller (ADF) Unit root test, Johansson Co-integration tests, Error Correction Mechanism (ECM) model to ensure data stationarity and robust examination of short-run connections. Furthermore, the ECM (-1) results is -0.743865 or 74 % in absolute term and this indicates the speed of adjustment from the long run to its short run dynamics. The granger causality tests indicate that bi-directional associations exist among construction sector and human development index, manufacturing sector and human development index, mining and quarrying sector and human development index, construction and manufacturing sector in Nigeria. Again, uni-directional associations exit among manufacturing sector and mining and quarrying sector, manufacturing sector and construction sector, mining and quarrying sector and manufacturing sector. Finally, non-directional relationship existed among utility sector and human development index, Utility sector and construction sector, manufacturing sector and utility sector and mining and quarrying and utility sector. The study concludes that manufacturing sector output, the mining and quarrying sector output, construction sector output and utility sector output significantly impacts on the economic development of the Nigeria. The study recommends steady electricity in the economy as it acts as a positive channel to improving the industrial sector performances in Nigeria.*

Keywords: *Economic Development, Construction Sector, Mining and Quarrying Sector, Manufacturing Sector, Utility Sector*

Citation: Suotor M & Wosu, C. Industrial Sub-Sectors Performance and Economic Development in Nigeria. Central Asian Journal of Innovations on Tourism Management and Finance 2026, 7(4), 94-103.

Received: 14th Dec 2025
Revised: 28th Jan 2026
Accepted: 11th Feb 2026
Published: 20th July 2026

1. Introduction

Historically, Nigeria's economy has heavily relied on the oil sector, which has resulted in a phenomenon known as the resource curse, where other sectors, particularly manufacturing and services, have stagnated [1]. Nigeria's industrial sub-sectors—comprising manufacturing, mining, and construction—show uneven performance and remain critical drivers of its economic development. While mining and construction have shown steady growth, the manufacturing sector has struggled with high production costs, relying on imported inputs and remaining highly concentrated, which has hampered job creation and broader

economic diversification [2]. However, recent policy efforts aimed at diversifying the economy and promoting industrialization have sparked renewed interest in the industrial sector's role in driving inclusive growth and sustainable development [3], [4], [5]. As the Nigerian government works to reduce dependency on oil and enhance economic resilience, understanding the dynamics of industrial sector performance becomes increasingly crucial. Nigeria has long recognized the importance of industrialization in driving economic growth and development [6], [7]. The industrial sector is expected to play a pivotal role in diversifying the economy, reducing dependence on oil, and creating employment opportunities [8], [9].

Despite its potential, Nigeria's industrial sector has underperformed, contributing to the country's economic challenges, including high unemployment, low economic diversification, and slow economic growth [10], [11]. The sector's poor performance is attributed to various factors, including inadequate infrastructure, inconsistent policies, lack of investment [12], and inefficient regulatory frameworks. These challenges have hindered the sector's ability to drive economic development, create jobs, and increase productivity [13]. The contribution of a robust industrial sector to output growth, employment generation, and ultimately, enhanced standards of living cannot be overemphasized [14], [15], [16]. The Nigerian industrial sector has been plagued by several impediments, which have resulted in sub-optimal performance, thereby making its contribution to gross domestic product (GDP) and employment generation remain far below potential. To unlock the huge potentials of the sector, several variables account for the growth of the industry, and they are discussed within the context of this study [17]. The market value of the products from the manufacturing sector sustains the value of the economy, and these products that drive the industrial sector are purely manufactured goods and services [18]. Similarly, manufacturing is the process or business of producing goods in factories with machines [19], [20].

In Nigeria, the index of manufacturing production, estimated at 108.1 (1990 =100), rose by 1.6% from the level in 2022, while the average capacity utilization of the manufacturing sector showed a marginal improvement, with a 1.1 percentage point increase to 57.9% in 2023 [9]. The improved performance in the cement sub-sector accounted for the growth in the manufacturing sector, including petroleum refining, sugar and confectionery, electronics and electrical components, and motor vehicle assembly. Afolabi and Laseinde [21] remarked that industrialization sets the condition to achieve sustainable economic growth in all economies. It can also be stated that the dynamic benefits of the manufacturing sector are activating economic transformation in this modern-day economy, which is directly responsible for speeding up investment capital in the agricultural sector and the overall economy [22], [23]. Industrialization without proper and constant electricity is like a skeletal framework without fresh blood, which is improper for moving or work [24]. Whereas, for any meaningful industrialization process to take place in any economy, electricity supply and demand must remain uncompromising elements of the process, as blood and flesh are very meaningful to the human body for life to exist. Electric power consumption was used in the study, and it measures the production of power plants and combined heat and power plants, less transmission, distribution, and transformation losses, and own use by heat and power plants [25].

Endogenous Growth Theory

This theory was established by Romer [26] and it's an important component of the theory of development of developing countries. This theory assumes that sustained growth is determined by the production process. One of the most important drivers of this theory is the lack of response by the neo-classical theory about the reason for the different rates of economic growth among countries that have the same technological level. Modern theory also assumes increasing marginal returns on the size of production factors through the role of external

effects on human capital investment, which will generate improvement in productivity. Growth depends on savings and investment in human capital on the one hand, as well as investment in research and development on the other. In addition, it is argued that the free market leads to less than optimal level of capital accumulation in human capital and research and development. Therefore, the government may improve efficiency of resource allocation through investment in human capital, and encouraging private investment in high-tech industries.

1.1. Empirical Literature Reviewed

Umoinyang and Dimoji [27] study examined the relationship between industrial sector performance and economic development in Nigeria. Using a vector autoregression (VAR) model and annual data from 1980 to 2022, findings reveal a positive and significant relationship between industrial sector performance and economic development, indicating that improvements in industrial sector performance are associated with increased economic development. The results showed that industrial output, manufacturing capacity utilization, and industrial employment are important factors of economic growth in Nigeria. The study also found that sound macroeconomic policies, such as maintaining low inflation and interest rates, are important for promoting economic growth and stability. Findings of the study have important implications for policymakers and stakeholders seeking to promote industrial sector performance and economic development in Nigeria. The study recommended policies that promote industrial growth, improve manufacturing capacity utilization, and foster a business-friendly environment. By implementing these policies, Nigeria can promote industrial sector performance and economic development, leading to improved economic outcomes and a better standard of living for its citizens.

Okuneye [28] examines the nexus between industrial sector performance and economic growth in Nigeria from 1981 to 2016. Time series data sourced from Central Bank of Nigeria (CBN) Statistical Bulletin was utilized by study. Ordinary Least Square (OLS) method of analysis was adopted to evaluate the empirical model within the framework of the classical linear regression model. The result of the empirical findings revealed that industrial sector performance proxied by industrial output exerts a significant positive effect on economic growth in Nigeria at 1% level of significance. Besides, while economic growth is positively influenced by inflation rate, interest rate does not exhibit any significant effect on growth in Nigeria. The results of the pairwise granger causality tests indicate that the causality between economic growth and industrial output, inflation rate and economic growth as well as industrial output and inflation rate in Nigeria is uni-directional. On the contrary, there seems to be no causality between interest rate and economic growth, interest rate and industrial output as well as inflation rate and interest rate in Nigeria. Therefore, there is need for government to initiate and pursue policies that will stimulate private sector-driven industrialization in Nigeria. Besides, the stringent conditions attached to loan accessibility by most of the financial institutions in Nigeria in terms of the high interest rate should be reviewed as this will induce investment and ultimately enhance improvement in economic growth.

Florence and Otto [29] examines the nexus between industrialization and economic growth in Nigeria. The specific purpose of the study is to analyze the effects of manufacturing output, mining, electricity supply, construction, water/sewage/waste management, and labor force participation on Nigeria's real gross domestic product growth rate. This study adopts an expost facto research design. The period covered spans from 1990 to 2024. Data were collected as annual time series secondary data from the Central Bank of Nigeria (CBN) statistical bulletin (various years), World Development Indicators, and World Energy Statistics from the International Energy Agency. The data were analyzed using the Error Correction Model. Additional tests conducted include unit root, cointegration, and autocorrelation tests. The research employs an econometric

approach. The results reveal that manufacturing, mining, electricity supply, construction, and water/sewage/waste management had a negative effect on economic growth in Nigeria in the short run. However, only the effects of manufacturing, electricity, construction, and waste management on the Nigerian economy were statistically significant. In conclusion, industrialization has a negative effect on Nigeria's economic growth. Nigeria's industrialization efforts have not yielded the expected positive effects on the economy, leading to declining outputs in manufacturing, mining, electricity supply, construction, and water/sewage/waste management sectors. When electricity supply and distribution to the industrial sector are adequately enhanced, coupled with increased productive capacity, Nigeria's economy will be on the path to long-term growth.

Odusanya, Toriola and Odunayo [30] study examined the relationship between labour productivity and agricultural development in Sub-Saharan Africa (SSA) from 1991 to 2021. The study is based cross-sectional data covering the period 1991-2021 on nine (9) SSA countries sourced from the World Bank Development Indicator (WDI) database. The result of the Panel Dynamic Least Squares (POLS) estimation technique utilised revealed that population growth (β = 0.0203, t-value = 2.092, & Prob. = 0.0398) exerts a significant positive effect on agricultural development while both industrial output (β = -0.8698, t-value = -2.1225, & Prob. = 0.0371) and services productivity (-1.2667, t-value = -2.6510, & Prob. = 0.0098) exert a significant negative effect at 5% level of significance. Although, the effect of labour productivity on agricultural development is negative (β = -0.2335, t-value = -0.949, Prob. = 0.3455), it is not statistically significant. Thus, the low productivity in industrial sector and the structural shift in favour of services posed adverse effect on agricultural productivity in SSA. This underscores the need to maximise the potentials of the population growth through policy options including rural infrastructural development, price supports, crop insurance and tax incentives to stabilize income and make the sector attractive to the labour force.

2. Materials and Methods

2.1. Research Design and Data

The study adopted an ex post facto research design based on annual time series data covering the period 1980 to 2025. The data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin [9]. The dependent variable is the human development index (HDI), while the disaggregated industrial sub-sector variables, namely the manufacturing sector, mining and quarrying sector, construction sector and utility sector, serve as the independent variables.

2.2. Model Specification

From the theoretical and empirical literature reviewed, the study specifies a model in which human development index is the dependent variable while disaggregated industrial sectors variables such as manufacturing, mining and quarrying and construction are the independent variables [31].

The mathematical model is specified as:

$$HDI = f(CTN, MAN, MNQ, UTY)$$

where HDI = human development index, CTN = construction sector, MAN = manufacturing sector, MNQ = mining and quarrying sector and UTY = utility sector.

And the econometric form is:

$$HDI_t = \alpha_0 + \alpha_1 CTN_t + \alpha_2 MAN_t + \alpha_3 MNQ_t + \alpha_4 UTY_t + \mu_t$$

Where: HDI = human development index at time 't', CTN = construction sector at time 't', MAN = manufacturing sector at time 't', MNQ = mining and quarrying sector at time 't', UTY = utility sector at time 't', μ_t = error term, α_0 = intercept, and $\alpha_1 - \alpha_4$ are parameter estimates.

2.3. Method of Data Analysis

The study conducted unit root test [32] and bounds co-integration tests as well as error correction mechanism (ECM) model which formed the basis for the data analysis. The data for the study spanned from 1980-2025.

3. Results and Discussion

3.1. Unit Root Test

Table 1: Unit Root Test

Variables	ADF Statistics (Levels)	5% Critical Value (Levels)	ADF Statistics (First Diff.)	5% Critical Value (First Diff.)	Order of Integration	P-value
HDI	-1.033125	-3.526609	-8.325436	-3.516634	1(1)	0.0000
CTN	-3.254682	-3.526609	-8.254311	-3.544352	1(1)	0.0000
UTY	-2.437862	-3.520787	-6.684532	-3.565342	1(1)	0.0000
MAN	-2.342765	-3.513075	-7.083462	-3.524352	1(1)	0.0000
MNQ	-3.345323	-3.518090	-6.594523	-3.523165	1(1)	0.0000

Source: Author's computation from E-Views 2025. Level of significance at 5%

This study employs the Augmented Dickey-Fuller (ADF) unit root test to check the order of integration of the variables and the results are presented above in Table 1. The result of Augmented Dickey-Fuller (ADF) test revealed that the variables are integrated of order 1(1) series. The ADF result discovered that all variables are stationary at the first difference 1(1). This condition makes the Error Correction Mechanism (ECM) test approach to co-integration possible for investigating the long-run relationship among these variables.

3.2. Co-integration Test

Table 2A: Co-integration Test: Trace Statistic

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.729611	114.2803	95.75366	0.0015
At most 1*	0.382785	66.73306	69.81889	0.0021
At most 2	0.263158	35.50139	47.85613	0.4218
At most 3	0.245151	22.06458	29.79707	0.2949
At most 4	0.189103	9.690158	15.49471	0.3053
At most 5	0.010561	0.467134	3.841465	0.4943

Source: Author Computation from E-Views 2025. Level of significance at 5%

Table 2B: Co-integration Test: Max-Eigen

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.729611	57.54725	40.07757	0.0002
At most 1*	0.382785	21.23166	33.87687	0.6667
At most 2	0.263158	33.43681	27.58434	0.0024
At most 3	0.245151	12.37442	21.13162	0.5112
At most 4	0.189103	9.223024	14.26460	0.2681
At most 5	0.010561	0.467134	3.841465	0.4943

Source: Author Computation from E-Views 2025. Level of significance at 5%

From the Johansen co-integration test results, the trace statistic indicates 2 co-integrating equations while the Max-Eigen statistic indicates 2 co-integrating equation. The result therefore displays that there exists long-run (equilibrium) relationship amongst the variables of the model. This subsequently enables the error correction test (ECM) justification for a short run equilibrium dynamics within the periods under review, 1980-2025.

3.3. Short-Run (Parsimonious ECM) Result

Table 3: Parsimonious ECM Result

Variable	Coefficient	Std. Error	t-Statistics	Prob
C	-0.557435	0.575643	-4.574539	0.0067
D(IDQ)	-0.543765	0.075463	-3.658745	0.0005
D(IDQ(-1)	-0.557754	0.054632	-4.657453	0.0576
D(CTN)	-0.754872	0.055476	-4.769076	0.0054
D(CTN(-2))	-0.635432	0.037654	-2.677543	0.0665
D(MAN(-1)	-0.558643	0.065467	-3.774532	0.0054
D(MAN(-2))	-0.587450	0.057634	-2.606745	0.0555
D(MNQ)	-0.765643	0.065477	-4.876654	0.0686
D(MNQ(-1)	-0.675394	0.088545	-2.659876	0.0878
D(IUTY)	-0.634289	0.047454	-4.654379	0.0767
D(IUTY((-1)	-0.554376	0.030876	-3.688458	0.0576
ECM (-1)	-0.643865	0.053420	-3.606743	0.0046
Adj R^2 = 0.743378	F-stat = 4.885966	DW = 1.656311		

Source: Author's computation from E-Views 2025. Level of significance at 5%

The coefficient estimate for the Error Correction term, ECM (-1) has a negative value of -0.643865 and is significant statistically (-3.688458) at 0.0046 Prob level of significance suggesting that the model will reach long-run equilibrium at a rate of -3% every year. This means that a yearly adjustment speed of 3 percent may fix the errors from the previous year. The R^2 value of 0.743378 or 74 % explains the total variation in the model. The model is outstanding since the F-statistic (4.885966) is significant at the 5% level of significance. Without serial correlation, the model would not work, according to the Durbin-Watson statistics of 1.656311, which is close to 2.

Estimated Short-Run Result

The short-run result showed that industrial sector output in the current period has negative impact on economic development alongside its lagged values in the period one but all have statistically significant impact on human development index. ii. Construction sector output in the current period and its value lagged two periods have negative relationships with human development index but they are both statistically significant impact. iii) Mining and quarrying sector output in the current period and its lagged values in periods one have negative links but both have statistically significant impact on human development index. iv. Mining and quarrying sector output in period one and its lagged values in periods two have negative links but both have statistically significant impact on human development index. v. Similarly, utility sector output in the current period and its period one have a negative relationship but both have statistically significant impact on human development index.

3.4. Long-Run Result

Table 4: Estimated Long-Run Result

Source: Author's computation from E-Views 2025. Level of significance at 5%

The long-run result indicated that all the components or sub-sectors of the industrial sector turned up with the expected positive sign. This shows that there is a positive relationship among each of the components of the industrial sector and human development index in Nigeria. Furthermore, based on t-values, construction sector output, manufacturing sector output, mining and quarrying sector and utility sector output are all statistically significant at 5 % level of significance in the long-run.

3.5. Granger Causality Test

Table 5: Granger Causality Test

Null Hypothesis	Obs	F. Stat	Prob.
CTN does not Granger Cause HDI	14	1.51798	0.2318
HDI does not Granger Cause CTN		0.04432	0.9567
IFR does not Granger Cause HDI	14	0.25418	0.7768
HDI does not Granger Cause UTY		0.84829	0.4359
MAN does not Granger Cause HDI	14	2.39875	0.1041
HDI does not Granger Cause MAN		0.08253	0.9209
MQG does not Granger Cause HDI	44	1.83901	0.1725
HDI does not Granger Cause MQG		0.34305	0.7117
UTY does not Granger Cause CTN	44	0.49221	0.6150
CTN does not Granger Cause UTY		0.21543	0.8071
MAN does not Granger Cause CTN	44	0.25529	0.7760
CTN does not Granger Cause MAN		2.53304	0.0924
MQG does not Granger Cause CTN	44	3.76761	0.0319
CTN does not Granger Cause MQG		3.56664	0.0378
MQG does not Granger Cause UTY	44	0.18217	0.8342
UTY does not Granger Cause MQG		0.31295	0.7331
MQG does not Granger Cause MAN	44	2.96216	0.0634
MAN does not Granger Cause MQG		4.90039	0.0126

Source: Author Computation from E-Views 2025. Level of significance at 5%

From estimated result, manufacturing sector, construction sector, mining and quarrying sector all had a bi-directional relationship with human development index in Nigeria. On the other hand, there is uni-directional link exits among mining and quarrying sector with construction sector, mining and quarrying with manufacturing sector in Nigeria from 1980-2025. Finally, non-directional relationship existed amongst utility sector and human development index, utility sector and construction sector, manufacturing sector and utility sector, mining and quarrying and utility sector output in Nigeria.

3.6. Stability Test Result

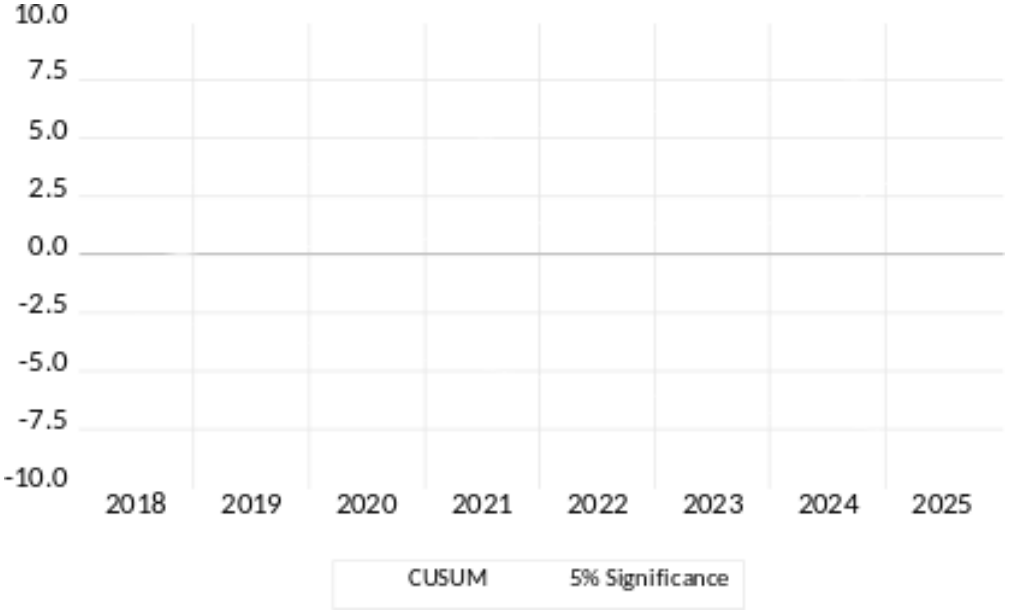

Figure 1: CUSUM Stability Test at 5% Level of Significance

The stability of the estimated model was examined using the Cumulative Sum of Recursive Residuals (CUSUM) test. As shown in Figure 1, the CUSUM line lies within the 5% critical bounds throughout the period, indicating that the parameters of the estimated model are stable over the study period.

The long-run estimates presented in Table 4 show that construction sector output, manufacturing sector output, mining and quarrying sector output and

utility sector output all carry positive coefficients and are statistically significant at the 5% level, implying that improvements in the performance of the industrial sub-sectors translate into higher levels of human development in Nigeria. This finding is consistent with Umoinyang and Dimoji [27], who reported a positive and significant relationship between industrial sector performance and economic development in Nigeria, and with Okuneye [28], who found that industrial output exerts a significant positive effect on economic growth. The result also lends empirical support to the Endogenous Growth Theory [26], which holds that sustained growth is generated within the production process through investment in human capital and productive capacity.

In the short run, however, the parsimonious ECM results in Table 3 indicate that the industrial sub-sector variables exert negative effects on the human development index, even though the error correction term is negative and statistically significant, confirming convergence towards long-run equilibrium. This short-run pattern mirrors the findings of Florence and Otto [29], who reported that manufacturing, mining, electricity supply, construction and waste management had negative short-run effects on economic growth in Nigeria, and reflects the structural constraints — inadequate infrastructure, epileptic electricity supply and high production costs — highlighted in the introduction [2], [24].

The Granger causality results further reveal bi-directional relationships between the human development index and the construction, manufacturing and mining and quarrying sectors, suggesting a mutually reinforcing interaction between industrial performance and economic development. By contrast, the absence of any causal relationship between the utility sector and the human development index underscores the weak contribution of power and utilities to development outcomes, a concern that echoes the negative effect of low industrial productivity reported for Sub-Saharan Africa by Odusanya, Toriola and Odunayo [30].

Taken together, the results demonstrate that the industrial sub-sectors are significant long-run drivers of economic development in Nigeria, but that their short-run contributions are constrained by structural bottlenecks, particularly unreliable electricity supply. This reinforces the position that steady electricity and improved productive capacity are necessary channels through which industrial sector performance can be transformed into sustained improvements in living standards [21], [24].

5. Conclusions

The study concludes that sectoral performance constitutes an important determinant of economic development in Nigeria, although the magnitude and significance of the effects differ across productive activities. The findings indicate that manufacturing output exerted a positive and statistically significant influence on economic development, confirming the sector's capacity to stimulate value addition, employment creation, industrial expansion, and income growth. Mining and quarrying output also contributed positively and significantly, demonstrating the continued importance of extractive activities to national production and development. Similarly, construction-sector output recorded a substantial positive contribution, reflecting the developmental role of infrastructure provision, capital formation, and related employment opportunities. In contrast, the utility sector produced a positive but statistically insignificant effect, suggesting that weaknesses in electricity, water, and other essential services may limit its contribution to broader economic performance. These results imply that Nigeria should prioritize policies that strengthen manufacturing competitiveness, promote responsible mineral development, sustain infrastructure investment, and improve the efficiency and reliability of utility services. Further research should employ disaggregated sectoral data, alternative indicators of development, and nonlinear or causality-based econometric techniques to determine how

institutional quality, technology, investment, energy availability, and policy reforms condition the long-run contribution of these sectors to inclusive and sustainable economic development.

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