# REVISITING THE NEXUS BETWEEN INDUSTRIAL SECTOR AND ECONOMIC GROWTH IN NIGERIA: A DISAGGREGATED APPROACH

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**Abstract.** The essence of this study was to delve into the industrial sector's influence in driving Nigeria's economic growth from 1981 to 2019. In doing so, the industrial sector was disaggregated into the mining and quarrying industry, construction industry, and manufacturing industry. The study utilized the ordinary least squares (OLS) and autoregressive distributed lag (ARDL) approaches. The OLS result indicated that all the selected three components of the industrial sector (manufacturing, construction, mining and quarrying) exerted a positive and significant effect on economic growth in Nigeria. From the estimates, a unit per cent increase in construction industry output, manufacturing industry output, and mining and quarrying industry output increased economic growth by 0.2745%, 0.2930% and 0.4723%, respectively; pointing out the fact that the mining and quarrying industry has been the industrial sector component that mostly drives the growth of the Nigerian economy compared to the other two sub-components. With the unit root test reporting a mixed order of integration in the variables (at levels and first difference), we proceed to the test for cointegration. The ARDL bounds test reported evidence of a long-run equilibrium relationship, while the error correction model reflected that 20.88% of the short-run distortions in economic growth are corrected annually for the restoration of long-run equilibrium to be achieved. The paper recommended that harmonizing industrial policies cum adequate infrastructural development is desirable to drive the industrial sector, which is observed to be a driver of growth in Nigeria.

**Keywords:** economic growth; industrial sector; manufacturing; construction; mining and quarrying.

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## 1. INTRODUCTION

In an emerging economy like Nigeria, industries are critical because the "marginal revenue product of labour in the industrial sector is larger than the marginal revenue product of labour in the agricultural sector" (Bolaky, 2011). Based on this, shifting labour from the agricultural to the industrial sectors raises the marginal product of labour in the agricultural sector while increasing the overall revenue and production of society, so contributing to economic growth (Lewis, 1954). Consequently, industrialisation is an excellent policy choice for achieving long-term economic growth in Nigeria (Kida and Angahar, 2020).

As industrialization is the foundation of economic growth, the course of economic development typically begins with it after the pre-conditions for take-off has been established (Rostow, 1959). Development activities necessitate a purposefully systemized plan, and in the same manner that industrialization is a result of national planning, the efforts are typically deliberate in that they aim at particular macroeconomic goals, beginning with economic growth (Nwogo and Orji, 2019). As pointed out by Nwogo and Orji (2019), manufacturing is associated with industrialization, and it is the practice of increasing a country's capacity to turn raw materials and other inputs into finished items for further production or eventual consumption.

The push towards industrialisation started in the course of the pre-colonial epoch. In the post-independence epoch of the 1960s, the government's "import substitution strategy" gained popularity, and during the "civil war" of the 1970s, significant amounts of foreign earnings streamed in from crude oil exports, providing an outlet for direct government investments in industrial enterprises (Nwogo and Orji, 2019). The "import substitution strategy" was followed by the indigenization policy program, which attempted to give Nigerians complete ownership of many of the country's businesses. Other government measures and incentives have been used, such as export promotion, tax relief, tariff reductions, loan assistance, and so on. On account of these efforts, industries such as crude petroleum and natural gas accounted for a considerable portion of foreign exchange earnings and nationally generated income (Nwogo and Orji, 2019).

Industrialization is clearly the engine of economic growth in any nation, particularly in less developed economies, and it is only feasible with a determined industrialization program. Before independence, and during the first two decades after, the Nigerian economy's overall production was heavily weighted toward agriculture. With the growing interest in petroleum as a result of its relative importance on the global stage, the tide began to turn. Labour and material investment shifted away from agriculture and into industry, notably crude petroleum and natural gas. Manufacturing of cement, as well as mining and quarrying, began to acquire significance.

Industrialization has continued to exercise an important role in economic growth in a variety of ways: It leads to a rise in export products and services production. The development of the crude petroleum and natural gas components of the Nigerian economy has resulted in significant foreign exchange flow into Nigeria through the export of crude oil and natural gas. This ability to earn foreign currency stems from export-led industrialization, in which the government implements deliberate policies that encourage the production of goods and services primarily for export. It saves lost foreign exchange and improves the balance of payments. This is because it minimizes the importation of final goods, which depletes the economy's foreign exchange reserves. The import-substitution drive ensures that specific commodities are imported as little as possible or its importation is completely eliminated (Nwogo and Orji, 2019).

The fastest movement by which a nation may attain sustained economic growth and development is not the degree

of its endowed material resources, nor the enormous human resources, but rather "technical innovation, enterprise development, and industrial capacity" (Bennet, *et al.*, 2015). For example, despite its petite natural resources cum the challenges posed by persistent inflation in the 1920s, Germany has skilfully exploited the industrial sector and risen to become the largest economy in Europe and the fourth largest in the world (Kayode, Teriba, 1977). In today's world, "the manufacturing sector is considered as a foundation for establishing a country's economic efficiency" (Amakom, 2012).

Still, following the sighting of crude oil in Nigeria in the late 1950s, the country shifted away from its foremost developing industrial production base and positioned a heavy emphasis on crude oil production (Englama, *et al.*, 2010); this not only jeopardized the country's economic activities, but also exacerbated the country's level of unemployment. Nigeria, Africa's giant, has long been recognized as a country endowed with immense people and material resources. However, the underutilization of these potentials has exacerbated prevalent poverty, a low standard of living at the individual level, and rising unemployment in the nation on account of the country's constant mono-economic practice and blatant desertion of other areas of the economy for example agriculture, tourism, mining, and manufacturing (Bennet, *et al.*, 2015).

The Nigerian industrial sector has witnessed series of volatility in its output level over the years. In Table 1A we display the total industrial output and GDP along with the sub-sectors of mining and quarrying, manufacturing, and construction industry. For purpose of clarification, the industrial sector also consists of the utilities (electricity, gas, steam & air conditioner; and water supply, sewage, waste management). But our concern will be on the earlier identified three sub-sectors.

Table 1A

**Industrial sector output and GDP, 1981 - 2019**

| Year | Mining and Quarrying Industry Output (₦' Billion) | Manufacturing Industry Output (₦' Billion) | Construction Industry Output (₦' Billion) | Total Industrial Output (₦' Billion) | GDP at Current Basic Prices (₦' Billion) |
|---|---|---|---|---|---|
| 1981 | 13.12 | 26.89 | 11.04 | 54.13 | 144.83 |
| 1982 | 9.13 | 29.09 | 9.90 | 51.38 | 154.98 |
| 1983 | 8.00 | 31.13 | 8.98 | 52.45 | 163.00 |
| 1984 | 9.89 | 27.12 | 7.59 | 48.59 | 170.38 |
| 1985 | 14.00 | 37.14 | 6.10 | 60.90 | 192.27 |
| 1986 | 12.43 | 38.65 | 7.64 | 62.63 | 202.44 |
| 1987 | 22.29 | 43.22 | 8.66 | 78.35 | 249.44 |
| 1988 | 22.56 | 63.52 | 9.82 | 100.83 | 320.33 |
| 1989 | 49.83 | 72.90 | 15.34 | 144.69 | 419.20 |
| 1990 | 63.69 | 84.27 | 17.32 | 172.72 | 499.68 |
| 1991 | 76.78 | 110.60 | 19.51 | 215.11 | 596.04 |
| 1992 | 149.81 | 153.47 | 24.32 | 336.94 | 909.80 |
| 1993 | 144.69 | 221.23 | 31.92 | 409.59 | 1,259.07 |
| 1994 | 132.90 | 354.66 | 41.10 | 541.45 | 1,762.81 |
| 1995 | 448.11 | 414.13 | 54.87 | 931.10 | 2,895.20 |
| 1996 | 675.58 | 477.95 | 63.86 | 1,232.15 | 3,779.13 |
| 1997 | 624.63 | 546.71 | 74.74 | 1,261.36 | 4,111.64 |
| 1998 | 433.20 | 620.20 | 99.03 | 1,168.07 | 4,588.99 |

| | | | | | |
|---|---|---|---|---|---|
| 1999 | 600.46 | 713.82 | 109.57 | 1,440.31 | 5,307.36 |
| 2000 | 1,274.48 | 826.03 | 121.82 | 2,239.63 | 6,897.48 |
| 2001 | 975.78 | 989.11 | 162.18 | 2,182.62 | 8,134.14 |
| 2002 | 1,051.29 | 1,127.23 | 191.01 | 2,432.60 | 11,332.25 |
| 2003 | 1,598.74 | 1,304.07 | 234.47 | 3,211.19 | 13,301.56 |
| 2004 | 2,476.23 | 1,516.05 | 311.85 | 4,391.70 | 17,321.30 |
| 2005 | 3,301.43 | 1,778.73 | 414.76 | 5,591.36 | 22,269.98 |
| 2006 | 4,075.35 | 2,082.49 | 551.63 | 6,843.07 | 28,662.47 |
| 2007 | 4,398.96 | 2,401.19 | 733.67 | 7,679.74 | 32,995.38 |
| 2008 | 5,310.95 | 2,761.55 | 975.78 | 9,216.17 | 39,157.88 |
| 2009 | 4,343.06 | 3,170.82 | 1,297.79 | 9,008.26 | 44,285.56 |
| 2010 | 8,454.55 | 3,578.64 | 1,570.97 | 13,826.43 | 54,612.26 |
| 2011 | 11,098.98 | 4,527.45 | 1,905.57 | 17,853.11 | 62,980.40 |
| 2012 | 11,386.52 | 5,588.82 | 2,188.72 | 19,587.72 | 71,713.94 |
| 2013 | 10,380.97 | 7,233.32 | 2,676.28 | 20,853.85 | 80,092.56 |
| 2014 | 9,716.76 | 8,685.43 | 3,188.82 | 22,213.01 | 89,043.62 |
| 2015 | 6,100.01 | 8,973.77 | 3,472.26 | 19,188.58 | 94,144.96 |
| 2016 | 5,469.55 | 8,903.24 | 3,606.56 | 18,641.17 | 101,489.49 |
| 2017 | 10,481.97 | 10,044.48 | 4,281.78 | 25,639.90 | 113,711.63 |
| 2018 | 13,648.66 | 12,455.53 | 6,031.06 | 33,218.33 | 127,736.83 |
| 2019 | 12,769.42 | 16,781.06 | 8,996.90 | 39,879.69 | 144,210.49 |

Source: CBN (2019)

Table 1A indicates that the output of the industrial sector has been growing significantly from the 1980s to 2019 though with some form of fluctuations. For instance, the output of the industrial sector declined from ₦2,239.63 billion in 2000 to ₦2,182.62 billion in 2001. Similar trend was observed between 2008 and 2009 where the sector's output declined from ₦9,216.17 billion in 2008 to a record low of ₦9,008.26 billion in 2009. A further decline was witnessed within 2014 and 2017 where the output declined from ₦22,213.01 billion in 2014 to ₦19,188.58 billion in 2015 and a further decline to ₦18,641.17 billion in 2017. Thereafter, the sector has been recording increasing output to a tune of ₦39,879.69 billion as at 2019 (CBN, 2019). In the same period, the GDP at current basic prices has been recording continuous increase over the study period. This could not give a clear cut picture of the behaviour of the variables given that allowance are not being made for depreciation.

Similarly, the GDP at current basic prices maintained a rising trend over the years. It increased from ₦144.83 billion 1981 to a tune of ₦499.68 billion in 1990 representing an average of ₦263.52 billion within the period. From 1991 to 2000, the average GDP grow significant to ₦3,210.75 billion; this was further increased to an average of ₦27,207.28 billion within 2001 and 2010. This further increased to ₦79,595.10 billion between 2011 and 2015. A further significant increase was recorded between 2016 and 2019 where it averaged ₦121,787.11 billion. These figures could be misleading as they are not being adjusted for inflation. This prompts the use of real GDP.

Using the value of real GDP (GDP at 2010 Constant Basic Prices), the value of the industrial sector output and GDP can be presented in Table 1B where we still maintain the three core sub-sectors of the industrial sector. In that way, we can reflect on the real contribution of the sector to economic growth.

Table 1B

**Real Industrial sector output and GDP, 1981 – 2019**

| Year | Mining and Quarrying (₦' Billion) | Manufacturing Output (₦' Billion) | Construction Output (₦' Billion) | Total Industrial Output (₦' Billion) | Real GDP (₦' Billion) | Industrial Sector Contribution to GDP (%) |
|---|---|---|---|---|---|---|
| 1981 | 5,044.55 | 1,558.70 | 851.56 | 7,473.21 | 15,258.00 | 48.98 |
| 1982 | 4,507.93 | 1,764.89 | 679.20 | 6,969.20 | 14,985.08 | 46.51 |
| 1983 | 4,096.99 | 1,167.89 | 598.78 | 5,885.93 | 13,849.73 | 42.50 |
| 1984 | 4,602.27 | 1,018.91 | 488.14 | 6,128.64 | 13,779.26 | 44.48 |
| 1985 | 4,962.81 | 1,416.79 | 336.27 | 6,731.37 | 14,953.91 | 45.01 |
| 1986 | 4,860.75 | 1,373.66 | 335.76 | 6,583.69 | 15,237.99 | 43.21 |
| 1987 | 4,737.23 | 1,398.10 | 367.00 | 6,516.76 | 15,263.93 | 42.69 |
| 1988 | 4,856.73 | 1,618.25 | 404.40 | 6,895.26 | 16,215.37 | 42.52 |
| 1989 | 5,435.67 | 1,665.09 | 421.21 | 7,539.23 | 17,294.68 | 43.59 |
| 1990 | 6,860.85 | 1,670.73 | 442.27 | 8,993.23 | 19,305.63 | 46.58 |
| 1991 | 6,265.30 | 1,829.34 | 459.97 | 8,574.51 | 19,199.06 | 44.66 |
| 1992 | 6,411.86 | 1,758.61 | 477.90 | 8,669.83 | 19,620.19 | 44.19 |
| 1993 | 6,415.38 | 1,706.70 | 501.80 | 8,646.60 | 19,927.99 | 43.39 |
| 1994 | 6,246.67 | 1,670.72 | 516.85 | 8,457.85 | 19,979.12 | 42.33 |
| 1995 | 6,393.05 | 1,592.49 | 530.81 | 8,539.99 | 20,353.20 | 41.96 |
| 1996 | 6,850.37 | 1,599.94 | 537.18 | 9,011.44 | 21,177.92 | 42.55 |
| 1997 | 6,952.09 | 1,609.83 | 571.56 | 9,157.62 | 21,789.10 | 42.03 |
| 1998 | 7,103.38 | 1,412.44 | 605.85 | 9,145.49 | 22,332.87 | 40.95 |
| 1999 | 6,572.89 | 1,459.02 | 628.87 | 8,685.22 | 22,449.41 | 38.69 |
| 2000 | 7,302.99 | 1,505.66 | 654.03 | 9,487.86 | 23,688.28 | 40.05 |
| 2001 | 7,685.37 | 1,666.49 | 732.51 | 10,192.30 | 25,267.54 | 40.34 |
| 2002 | 7,247.86 | 1,813.81 | 764.33 | 9,947.84 | 28,957.71 | 34.35 |
| 2003 | 8,975.81 | 1,918.09 | 831.21 | 11,866.08 | 31,709.45 | 37.42 |
| 2004 | 9,275.14 | 2,143.45 | 774.86 | 12,357.10 | 35,020.55 | 35.29 |
| 2005 | 9,323.75 | 2,350.99 | 868.59 | 12,718.55 | 37,474.95 | 33.94 |
| 2006 | 8,907.47 | 2,574.29 | 981.45 | 12,648.21 | 39,995.50 | 31.62 |
| 2007 | 8,508.82 | 2,823.53 | 1,109.31 | 12,637.15 | 42,922.41 | 29.44 |
| 2008 | 7,989.19 | 3,079.04 | 1,254.30 | 12,527.11 | 46,012.52 | 27.23 |
| 2009 | 8,030.01 | 3,323.41 | 1,404.50 | 12,971.06 | 49,856.10 | 26.02 |
| 2010 | 8,454.55 | 3,578.64 | 1,570.97 | 13,826.43 | 54,612.26 | 25.32 |
| 2011 | 8,658.05 | 4,216.19 | 1,817.83 | 14,986.62 | 57,511.04 | 26.06 |
| 2012 | 8,244.39 | 4,783.66 | 1,989.46 | 15,350.45 | 59,929.89 | 25.61 |
| 2013 | 7,188.15 | 5,826.36 | 2,272.38 | 15,682.46 | 63,218.72 | 24.81 |
| 2014 | 7,107.03 | 6,684.22 | 2,568.46 | 16,742.15 | 67,152.79 | 24.93 |
| 2015 | 6,732.51 | 6,586.62 | 2,680.22 | 16,366.66 | 69,023.93 | 23.71 |
| 2016 | 5,759.82 | 6,302.23 | 2,520.85 | 14,918.15 | 67,931.24 | 21.96 |
| 2017 | 6,025.78 | 6,288.90 | 2,545.99 | 15,238.28 | 68,490.98 | 22.25 |
| 2018 | 6,092.48 | 6,420.59 | 2,605.29 | 15,523.43 | 69,799.94 | 22.24 |
| 2019 | 6,362.63 | 6,469.83 | 2,652.54 | 15,882.35 | 71,387.83 | 22.25 |

Source: CBN (2019)

It is worth noting that the value of the real industrial output has been showing series of fluctuations over the years. It declined from ₦7,473.21 billion in 1981 to ₦6,895.26 billion in 1988. The period 1989 to 1999 witnessed some improvements in the sector where its output averaged ₦8,788.18 billion. Similarly, the period 2000 to 2010 also experienced some improvement given an average of ₦11,925.43 billion in the industrial output. Further improvements were also observed within 2011 till 2019 given an average of ₦15,632.28 billion worth of industrial sector output.

The value of real GDP declined from ₦15,258.00 billion in 1981 to ₦13,779.26 billion in 1984 before progressing to a record high of ₦15,237.99 billion in 1986. Subsequently, the value of the real GDP has maintained a rising trend till 2015 where it amounted to ₦69,023.93 billion before declining to ₦67,931.24 billion in 2016. Later, there has been consistent increase in the value of real GDP till 2019 where a total of ₦71.387.83 billion was recorded.

A country is considered industrialized when at least one-quarter of its GDP is produced in the manufacturing sector of the industrial sector and a bigger proportion of its entire population is employed in the industrial sectors of the economy (Kida and Angahar, 2020). Given our statistics in Table 1B, the industrial sector contributed to about 48.98% to GDP in 1981 and this declined steadily to 43.21% in 1986. After the Structural Adjustment Programme (SAP), the Nigerian economy still experienced a declining industrial sector contribution to GDP. As at 1987, the percentage contribution was put at 42.69% which plunged further to 42.52% in 1988 before recording a mild progress to 43.59% in 1989. The declining trend continued thereafter to 40.34% in 2001. After 2001, the sector's contribution to GDP declined drastically to 31.62% in 2006 before plunging further to 25.32% in 2010. Further decline was observed throughout the period 2011 to 2019 where the contribution was put at 23.71%, 21.96%, and 22.25% for the year 2015, 2016, and 2019 respectively. Key point to note here is that the Nigerian economy was more industrialized in the 1980s and 1990s but such has declined drastically in the early 2000s till date.

Going over to the manufacturing sector, the manufacturing sector which is a crucial sub-sector of the industrial sector has been exhibiting series of fluctuations in its contribution to GDP over the years. The contribution declined from 33.06% in 1981 to 29.95% in 1988, averaging 31.52% within the same period. Similar trend prevailed within 1989 and 2001 where the highest percentage contribution of 35.54% was experienced in 1990 and a lowest contribution of 29.28% in 1999. An average of 31.83% was recorded within the specified period which is just a bit different from that of 1981 to 1988 by just 0.31%. A decline was observed within 2002 and 2014 where the highest contribution of 28.31% was recorded in 2003 and a minimum of 10.58% in 2014. An average of 18.96% was recorded within the period which is far behind that of 1989 to 2001 (31.83%) by 12.87% which is quite significant. The period 2015 to 2019 was marked with widespread low contribution of the manufacturing sector to a single-digit. It recorded a meagre 9.75% contribution in 2015 which declined steadily to 8.91% in 2019 averaging 8.93% within the specified period.

Figure 1 reflects the downward trends in the contribution of the industrial sector and the manufacturing sub-sector to the real GDP of Nigeria.

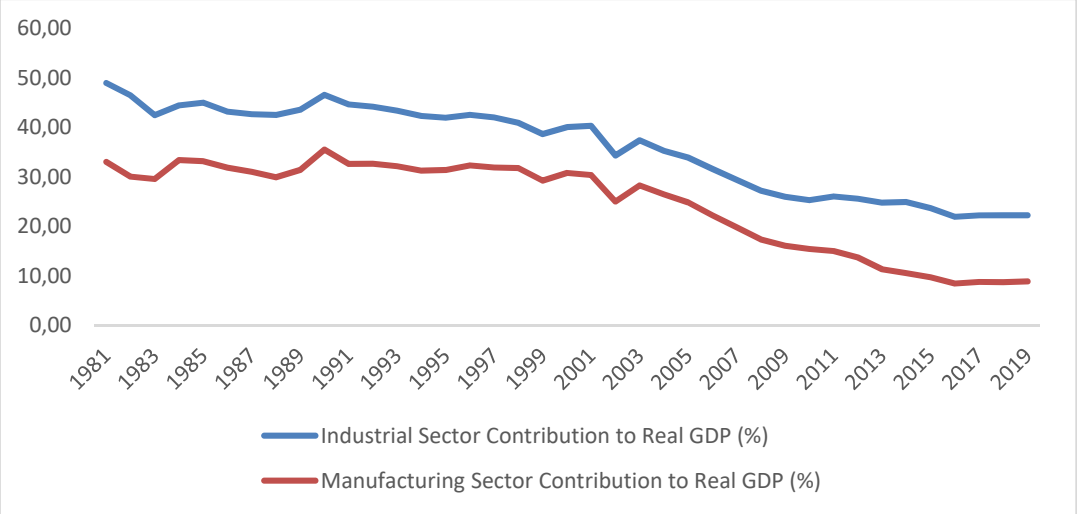


**Figure 1. Trend of industry and manufacturing contribution to GDP**

The government over the years has adopted diverse industrial policies which include the import substitution industrialization strategy, export promotion industrialization strategy, and foreign private investment led industrialization strategy (see Effiong, 2022). Yet, the industrial sector has exhibited declining trends in its contribution to the GDP of Nigeria. Given the trends in the industrial sector output and that of the manufacturing sector accompanied with the national output experienced so far, the following questions becomes pertinent:

I. Does the manufacturing industry have any significant influence on economic growth in Nigeria?
II. What is the effect of mining and quarrying industry on Nigeria economic growth?
III. Is there any significant influence of the construction industry on economic growth of Nigeria?
IV. Which of the industrial sector component exerts the greatest influence on economic growth in Nigeria?

The core objective of the study is to ascertain the influence of industrial sector in fostering economic growth in Nigeria from 1981 to 2019. Going specific, the objectives are to:

I. detect the influence of manufacturing industry on economic growth,
II. ascertain the effect of mining and quarrying industry on economic growth,
III. investigate in influence of construction industry on economic growth, and
IV. detect the industrial sector component that has the highest effect on economic growth in Nigeria.

## 2. REVIEW OF RELATED LITERATURE

### *2.1. Theoretical Literature Review*

The theoretical basis of the study follows the Rowtow (1959) stages of growth since the theory emphasizes on the role of modern industries in driving growth in an emerging economy at a certain stage of development.

Consistent with Rostow (1959), countries pass through five stages of growth – the traditional society, preconditions for take-off, the take-off stage, drive to maturity, and the age of high mass consumption. Such transitions are reflected in Figure 2 where each stage requires some form of dynamics in the economy before a movement to the next stage is guaranteed.

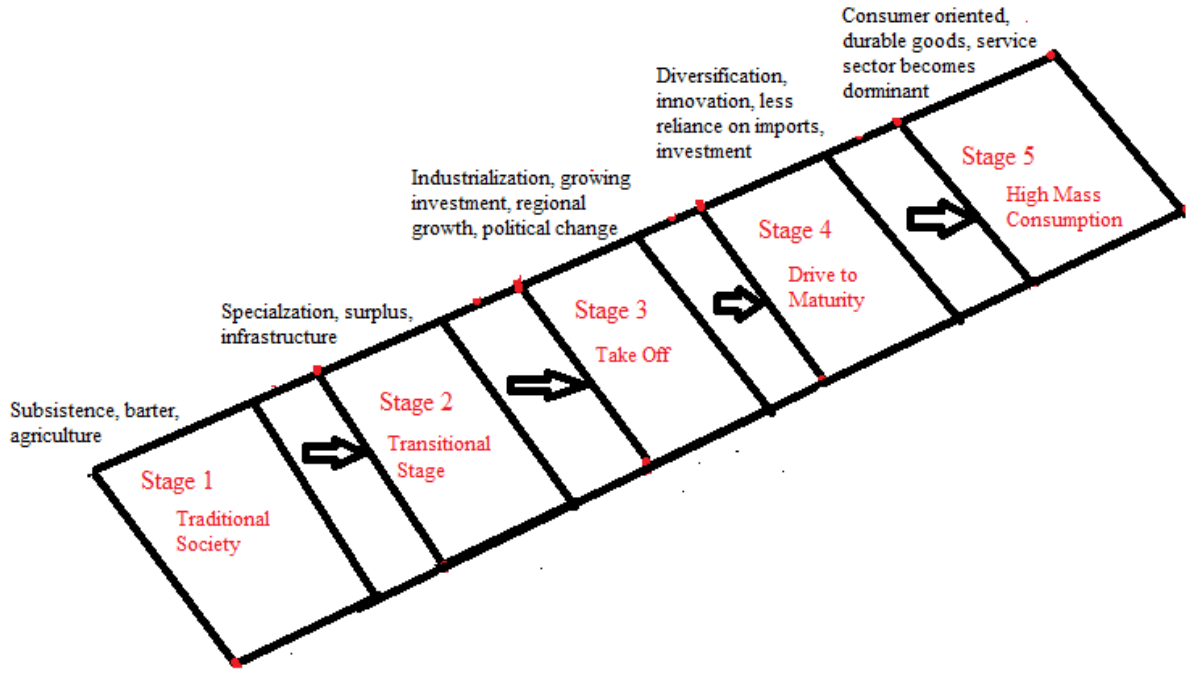


**Figure 2. Rostow's stages of economic growth**

*Stage I: The Traditional Society*

The first level of traditional society represents a primitive culture with little access to contemporary science and technology. In other words, it is a primitive society with a primitive attitude toward the physical world. As a result, Rostow characterizes a traditional civilization as "one whose structure is created within the constrained production function based on pre-Newtonian science and technology, as well as pre-Newtonian views toward the physical world" (Guru, no date). Rostow, on the other hand, does not consider this traditional culture to be wholly unchanging. In this stage of a society, output might be growing due to the extension of cultivable land or the discovery and spread of a new crop. However, the key aspect about this form of society is that there is a limit to the amount of production that can be achieved per person. "It followed from this productivity ceiling that food production absorbed 75 per cent or more of the working force and that a high proportion of income above minimum consumption levels was spent in non-productive or low productivity outlays" (Rostow, 1959). This limitation occurs due to lack of access to current science and technology. This sort of civilization devotes a substantial percentage of its resources to agriculture and is distinguished by a hierarchical social structure with minimal opportunity for vertical mobility. Rostow refers to the value system that prevails in such a society as "long-run fatalism" (Rostow, 1959).

*Stage II: The Pre-Conditions for Take-Off*

Pre-Conditions, also known as the Transitory Stage, is a century-long phase in which the preconditions for take-off are formed. Fundamental changes in society's attitudes toward science, risk-taking, and profit-making; the adaptability of the labour force; political sovereignty; the development of a centralized tax system and financial institutions; and the construction of certain economic and social infrastructure such as railways, ports, power generation, and educational institutions are all examples of these conditions (Guru, no date). As seen above, the foundations for economic transformation are created during this second stage of expansion. People begin to use contemporary science and technology to boost agricultural and industrial output. Furthermore, people's attitudes are changing as they begin to see the globe as a place with potential for future progress. A new class of

entrepreneurs forms in society, one that mobilizes funds and invests in new ventures while accepting risks and uncertainty. In terms of political organization, it is at this point that a functional centralised nation state emerges.

Technically, the prerequisites for long-term industrialisation have typically necessitated substantial transformation in three non-industrial areas (Rostow, 1959). First, there is a build-up of social overhead capital, particularly in transportation. This construction was required not just to create an economically viable national market and to allow natural resources to be profitably utilized, but also to allow the national government to rule effectively. Second, there will be a technological revolution in agriculture. During the preconditions, the factors at work produced both a general increase in population and a disproportionate increase in urban populations. Increased agricultural output has traditionally been seen as a crucial prerequisite for preventing the modernization process from being stifled. Third, an increase in imports financed by more efficient production and selling of some natural resources, as well as capital imports when available. Increased access to foreign exchange was required to allow the less developed region or nation to increase the supply of equipment and industrial raw materials that it could not previously supply, as well as to maintain the level of real income while social overhead capital with a long gestation period was being created. Framed by these three types of sectoral development, which generate both new markets and new inputs for industry, the originally limited enclaves of modern industrial activity could begin to spread, and subsequently maintain expansion, mostly through profit plough-back.

*Stage III: The Take-Off Stage*

The "Take-off" Stage is a critical time of two to three decades during which the economy modifies itself in such a way that economic development follows almost effortlessly. "The take-off" is defined as "the period during which the rate of investment rises to the point where real output per capita rises, and this initial increase is accompanied by radical changes in production techniques and income flow dispositions that perpetuate the new scale of investment and thus the rising trend in per capita output" (Rostow, 1959). As a result, the term "take-off" implies three things: first, the proportion of investment to national income must rise from 5% to 10% or more in order to outpace expected population growth; second, the period must be relatively short in order to exhibit the characteristics of an economic revolution; and third, it must culminate in self-sustaining and self-generating economic growth. As a result, during the take-off stage, the society is dominated by the desire to achieve economic growth in order to raise living standards. In both agriculture and industry, revolutionary developments occur, and production levels skyrocket. The urban population is growing, as is the urban labour force. Both the underlying structure of the economy as well as the social and political structures are transformed in a very short period of a decade or two in order to maintain a self-sustaining development rate. It is in this take-off stage that the role of the industrial sector in promoting growth is greatly important. Failure to achieve aggressive industrialization may not enable the economy to drive towards maturity.

*Stage IV: The Drive to Maturity*

When the economy matures and is capable of generating self-sustained growth, it enters the "Drive to Maturity" (Period of Self-Sustained Growth) stage of economic growth. Savings and investment rates are so high that economic expansion is virtually automatic. As the economy grows, the amount of capital per person increases. The economy's structure is changing at an accelerating rate. As diminishing returns set in, the original important industries that started the take-off slow down. However, a series of new rapidly-growing sectors with a new set of leading sectors keeps the average rate of growth constant. The proportion of the people engaged in agriculture and other rural pursuits decreases, and the country's

foreign trade structure changes dramatically. Here, the service sector gains dominance and become the leading driver of growth. the Nigerian situation is similar to this stage but what seems to be missing is the fact that the "take-off" stage was not fully achieved through aggressive industrialization. Thus, this stage seems to be problematic to Nigeria in that several cyclical fluctuations are experienced due to inadequate achievement of stage 3.

The organization and quality of the labour force alter as nations mature technologically. The share of the people engaged in agricultural and rural life is decreasing, while the number of semi-skilled and white-collar employees is increasing among the urban population. This emerging labour force is not only likely to organize itself more effectively in labour markets, but it is also likely to perceive that the industrial civilization of which it is a part can offer levels and types of consumption that were previously not regarded as a realistic possibility on a mass scale (Rostow, 1959). And the increase in real income per person is likely to make these new appetites more effective. Furthermore, the new working force, which is increasingly being born in cities rather than being transferred from the periphery of rural life, is likely to believe that it can exert influence on the political process in such a way that the government will provide greater social and economic security. Furthermore, the character of industrial leadership begins to shift. The take-off is frequently controlled by modest, innovative individuals who understand how productivity in their industry may be dramatically increased. Men take over in the drive to adulthood with more grandiose aspirations, a more intense feeling of size and power (Rostow, 1959).

*Stage V: The Age of High Mass Consumption*

In the "Stage of High Mass Consumption", a country's per capita income grows to the point that people's consumption baskets expand beyond food, clothes, and shelter to include goods of comfort and luxury on a large scale. Furthermore, as the economy progresses via industrialisation and urbanisation, people's ideals shift in favour of increased purchase of luxury and high-end lifestyles. New forms of industries that produce long-lasting consumer products emerge, satisfying the desire for increased consumption. These new businesses that produce long-lasting consumer goods will become the next economic development engines.

### *2.2. Empirical Literature Review*

Some empirical studies have been conducted to check on the potency of the industrial sector in driving growth. Banjoko, Iwuji and Bagshaw (2012) used performance indices including "*percentage contribution to GDP, index of manufactured products, percentage growth rate, manufacturing value added, employment growth rate, and percentage of capacity utilization*" to examine the performance of the Nigerian manufacturing sector from 1960 to 2012. Notwithstanding numerous policies and developmental ingenuities instigated by successive civilian and military administrations since independence, the Nigerian manufacturing sector has floundered in relation to its potentials owing to formidable challenges that the sector faces, like an "inauspicious business environment, fitful power supply, poor and crumbling physical infrastructures, multiple taxes, obsolete technology, and high interdependence" Banjoko *et al.* (2012).

Ubi, Lionel, and Eyo (2012) conducted more study on "monetary policy and industrialisation in a developing open economy: lessons from Nigeria". They used the ordinary least squares econometrics approach to regress industrial production on exchange rate, trade openness, interest rate, money supply, and balance of payment variables, all of which have a substantial influence on industrialization. The research did not look at the impact of industrialisation on economic growth as a gauge of Nigeria's desire for industrialization.

From 1973 through 2013, Bennett, Anyanwu, and Kalu (2015) studied the impact of industrial expansion on Nigeria's

economic growth. The dependent variable was GDP, while the independent variables were foreign direct investment, industrial production, total savings, and inflation. The model explains that industrial output has no statistically significant impact on economic growth, even if the sign derived from its à priori expectation is positive but not strong enough. It was suggested that the government and its agencies ensure political stability as well as the implementation of strategic policies that will create a level playing field for foreign investors and improve the establishment of industries, particularly manufacturing industries, in order to encourage industrialization.

In Nigeria, Aliyal and Odoh (2016) investigated the impact of industrialisation. The goal was to examine the link between Nigeria's GDP, agriculture, industry, and services sector. The Johansen co-integration testing method indicates that these three variables have a substantial long-run association. Agriculture, industry, and services all have a substantial positive link with GDP, according to the findings. The findings of the Causality test show a bidirectional causal link between GDP, agriculture, industry, and services. As a result, it is advised that it is critical to grow the agricultural sector in order to offer the necessary support to the industrial and service sectors. A plan like this is likely to promote a developing country's development and economic progress.

Jelilov, Enwerem, and Isik (2016) conducted research on the "impact of industrialization on economic growth", with a focus on the Nigerian experience from 2000 to 2013. As analytical approaches, the ordinary least squares (OLS) methodology and the F-test were applied. The study found that industrialisation has a long-term detrimental influence on Nigeria's economic growth. The findings of Effiong and Ekong (2021) aligns with this earlier finding where they observed a negative and significant effect of industrialization on growth.

Okezie, Nwosu, and Marcus (2017) centred their research on the influence of industrialisation in Nigeria's economic growth. The study, which spanned the years 1985 to 2015, looked at the immediate and long-term effects of industrialisation on economic growth. For this investigation, the Engle-Granger two-step co-integration techniques were used. The findings indicate that the agricultural sector, industrial sector, manufacturing sector, gross fixed capital, and labour force are important factors of economic growth in Nigeria in both the short and long run. As a consequence of the findings, the research advised that the government develop an enabling environment to attract investments in vital sectors of our industry.

Ndiaya and Lv (2018) probed the influence of industrialisation on economic growth by evaluating Senegalese manufacturing enterprises between 1960 and 2017. With the aim of estimating the model, the study used OLS approach. Consistent with the econometric examination, increasing industrial production will boost Senegal's economic development. As a result, there is a strong link between industrial development and Senegalese economic growth. Based on these results, numerous policy ingenuities were suggested with the aim of intensifying industrial production by augmenting overall productivity across all sectors and assure long-term growth.

Nwogo and Orji (2019) investigated the influence of industrialisation on the Nigerian economy's growth. The "ex-post facto research design" was chosen for the study because of its effectiveness in aiding the projection of future consequences based on previous events. The vector error correction and system equation estimation techniques were used to analyze the data. The study discovered that manufacturing sector production, crude petroleum and natural gas output, and solid mineral and mining output all had a positive and considerable influence on real gross domestic product, as well as a long-run link between the variables.

From 1981 to 2013, Kida and Angahar (2020) examined the influence of industrialization on Nigerian economic

growth, using GDP as the dependent variable and crude petroleum and natural gas, manufacturing, and solid minerals as independent variables. The Augmented Dickey-Fuller Unit Root test, Johansen Co-integration test, and Error Correction Method were used in the analysis. The findings reveal that crude oil and natural gas, manufacturing, and solid minerals all contribute considerably to economic growth. The report suggests that a favourable atmosphere be created in order for the industrial sector to function well.

Recently, Effiong and Ekong (2021) examined the influence of financial sector development in driving industrialization along with ascertaining the influence of industrialization on economic growth of Nigeria from 1981 to 2019. The ARDL approach of bounds test for cointegration and the error correction model were the analytical technique. The findings of the study were that financial sector development has been exerting a negative and significant effect on industrialization; and that the effect of industrialization on growth has been negative and substantial.

## 3. METHODOLOGY

### *3.1Model Specification*

Disaggregating the industrial sector output into sub-components according to the Central Bank of Nigeria's classification, the model for this study is specified as:

$$GDP = f(GFCF, LABR, MNQR, MANF, CONS, INFL, GEXP, TOPN) \quad (1)$$

Where:

GDP = gross domestic product at constant basic prices (a proxy for economic growth)

GFCF = gross fixed capital formation (a measure of capital)

LABR = labour force (a measure of labour)

INFL = inflation rate

GEXP = total government expenditure

TOPN = trade openness (measured as a ratio of total trade to gross domestic product)

MNQR = mining and quarrying

MANF = manufacturing

CONS = construction

Transforming Equation 1 into an estimable form and utilizing the double-log function, we then have Equation 2 as follows:

$$\log GDP = \beta_0 + \beta_1 \log GFCF + \beta_2 \log LABR + \beta_3 \log MNQR + \beta_4 \log MANF + \beta_5 \log CONS + \beta_6 INFL + \beta_7 \log GEXP + \beta_8 TOPN + \mu \quad (2)$$

Where log represents the natural logarithm; $\beta_0$ is the constant of the regression; $\beta_1$ to $\beta_8$ are the parameters to be estimated, and $\mu$ is the random error term.

The a priori expectation of the parameter estimates is that, $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, and $\beta_7$ are all expected to be positive ($> 0$); while $\beta_6$ and $\beta_8$ can either be positive or negative ($> 0$ or $< 0$).

### *3.2. Sources of Data*

The time series data is used in this study which spans from 1981 through 2019. The data sources were basically the Central Bank (2019) statistical bulletin and the World Bank (2019) database. The World Bank database provided data on gross fixed capital formation and labour force, while data on other variables were obtained from the Central Bank of Nigeria publication.

### *3.3. Analytical Technique*

This study follows the ordinary least squares (OLS) and autoregressive distributed lag (ARDL) approaches. The choice of the ARDL method is based on the unit root properties of the time series variables that were determined using the

augmented Dickey-Fuller and Philip-Peron test. Consequently, the test for cointegration is conducted based on the Bounds test, which prompts the use of the error correction mechanism. The model for the error correction mechanism is specified thus:

$$\Delta logGDP_t = \pi_0 + \sum_{i=0}^{p} \pi_1 \Delta logGDP_{t-i} + \sum_{i=0}^{q} \pi_2 \Delta logGFCF_{t-i} + \sum_{i=0}^{q} \pi_3 \Delta logLABR_{t-i} + \sum_{i=0}^{q} \pi_4 \Delta logMNQR_{t-i} + \sum_{i=0}^{q} \pi_5 \Delta logMANF_{t-i} + \sum_{i=0}^{q} \pi_6 \Delta logCONS_{t-i} + \sum_{i=0}^{q} \pi_7 \Delta INFL_{t-i} + \sum_{i=0}^{q} \pi_8 \Delta logGEXP_{t-i} + \sum_{i=0}^{q} \pi_{10} \Delta TOPN_{t-i} + \lambda ECM_{t-1} + \mu_{it} \quad (3)$$

Where p and q are respectively the optimal lag length for the dependent and explanatory variables selected based on Akaike Information Criterion (AIC); λ measures the speed of adjustment of the system to its long run equilibrium; and ECM is the error correction model. The coefficients of the error correction mechanism (λ) is expected to be negative, less than one, and statistically significant.

## *4. EMPIRICAL RESULTS*

### *4.1. Correlation Analysis*

The correlation analysis s done using the scatter diagram with a regression line fitted on it. The correlation coefficients are being superimposed on the scatter plots. This is reflected in Figure 3 where we merge the four panels together.

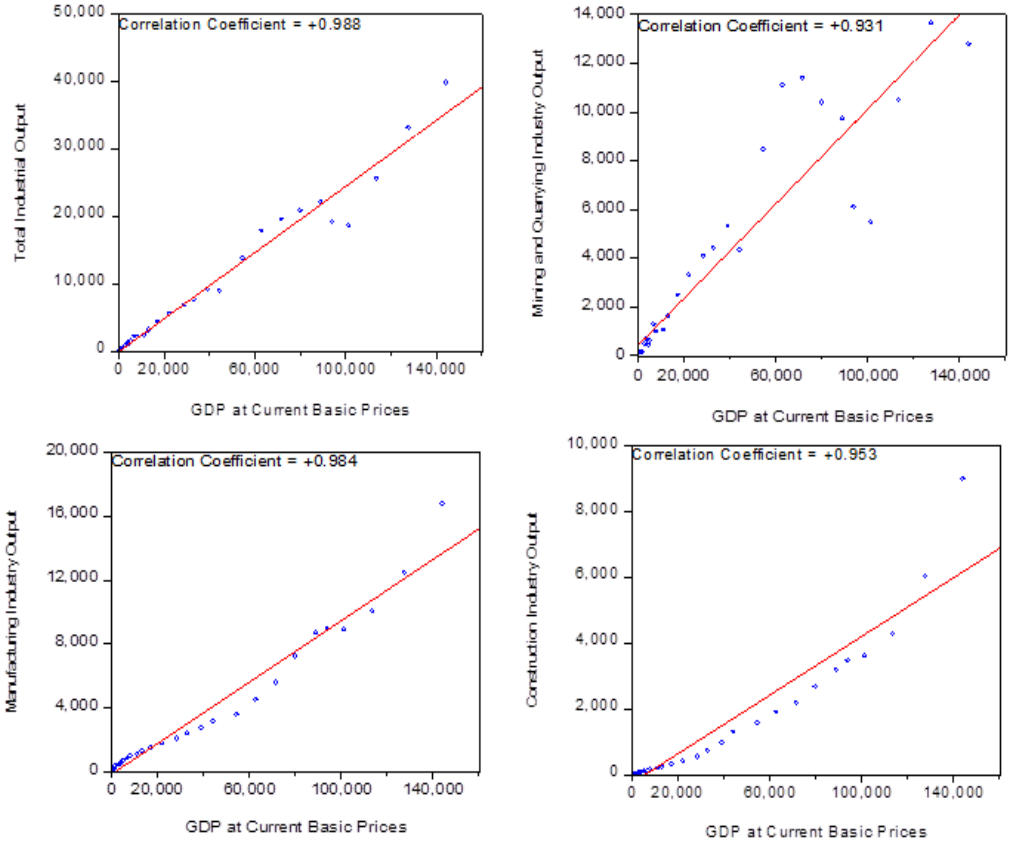


**Figure 3. Scatter Plots of GDP and the various industrial sector components**

From the scatter plots in Figure 3 where the regression lines are being fitted, it is observed that all the three industrial sector components cum the total industrial sector output behaves in a direct relationship with GDP. The scatter plots are quite close to the fitted regression lines indicating a strong correlation between the industrial sector and economic growth. For the total industrial sector output and GDP, the correlation coefficient is computed to be +0.988 indicating a strong positive association between the two variables. With respect to mining and quarry, the variable also exhibits a very strong positive association with GDP given its correlation coefficient of +0.931, indicating that the two variables move in the same direction.

For manufacturing industry output, the trend is the same where the plots concentrated closely to the fitted regression line. This gives a strong correlation coefficient of +0.984 reflecting that the two variables move closely in the same direction. Finally, the correlation between the construction industry and GDP is not as close as that of the other sectors identified earlier, though the scatter plots are still close to the fitted line. The positive correlation coefficient pf +0.953 reflects a strong positive association between the construction industry and GDP. Given that this sector exhibits a strong relationship with growth, whether they exert a significant influence will be subjected to further econometric analysis.

### *4.2 OLS Regression Analysis*

The OLS regression result is presented in Table 2 to reflect the effect of the various industrial sector components, controlled with other key variables, as they affect economic growth.

Table 2

**OLS Regression Result**

| Dependent Variable: LOGGDP | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Standard Error | t-Statistic | Probability |
| LOGGFCF | 0.1662 | 0.0555 | 2.9942 | 0.0055** |
| LOGLAB | 0.8490 | 0.2613 | 3.2495 | 0.0028** |
| LOGGEXP | -0.0263 | 0.0323 | -0.8125 | 0.4229 |
| TOPN | -0.0020 | 0.0009 | -2.1606 | 0.0388** |
| INF | -0.0004 | 0.0004 | -0.9138 | 0.3681 |
| LOGCONS | 0.2745 | 0.0522 | 5.2637 | 0.0000*** |
| LOGMANF | 0.2930 | 0.0445 | 6.5777 | 0.0000*** |
| LOGMNQR | 0.4723 | 0.0671 | 7.0371 | 0.0000*** |
| C | -8.9225 | 5.2361 | -1.7040 | 0.0987* |
| R-squared | 0.9969 | F-statistic | 1186.924 | |
| Adjusted R-squared | 0.9960 | Prob(F-statistic) | 0.0000*** | |
| Durbin-Watson stat | | 1.7424 | | |

*Note: *, ** and *** denotes significance at the 10%, 5% and 1% level respectively*

Source: Researcher Computation (2022)

The result of the estimated growth model, being presented in Table 2, portrays the importance of capital and labour in the growth process. This is in line with the traditional growth model that defines growth as a function of capital and labour. Both gross fixed capital formation (a proxy for capital) and labour force (a proxy for labour) are seen to exert a positive and significant effect on economic growth at the 5% level of significance given the p-value of 0.0055 and 0.0028 respectively. It follows from the coefficients that a unit percent increase/decrease in capital will lead to a 0.1662% increase/decrease in economic growth; while a unit percent

increase/decrease in labour will exert an 0.8490% increase/decrease in economic growth. This therefore points out the fact that for economic growth to be achieved, there must be adequate capital stock and quality labour force that can put scarce economic resources to efficient uses.

It is also observed from the result that trade openness exerts a negative and significant effect on economic growth of Nigeria at the 5% level of significance, given the p-value of 0.0388. The coefficient (-0.0020) portrays that a unit percent increase/decrease in trade openness will lead to a 0.0020% decrease/increase in economic growth in Nigeria. Both government expenditure and inflation rate are observed to generate a negative but insignificant effect on economic growth in Nigeria over the study period.

Since the estimated model was to ascertain the influence of the industrial sector on economic growth, the industrial sector was disaggregated into manufacturing, construction, and mining and quarrying. The three components are observed to exert a positive and significant effect on economic growth at the 1% level of significance, given the p-value of 0.0000. From the coefficient of construction (0.2745), a unit percent increase/decrease in construction will lead to a 0.2745% increase/decrease in economic growth. Similarly, a unit percent increase/decrease in manufacturing will lead to a 0.2930% increase/decrease in economic growth. Finally, a unit percentage increase/decrease in mining and quarrying will lead to a 0.4723% increase/decrease in economic growth. It can be observed that mining and quarrying is the greatest driver of economic growth within the industrial sector. This is because it is the basis in which the large chuck of the nation's revenue has been gotten from to drive other growth induced sectors in the economy. The findings affirm the findings of earlier studies like Okezie *et al.* (2017), Ndiaya and Lv (2018), and Nwogo and Orji (2019). This findings of the positive and significant effect of the industrial sector components in driving growth portrays the fact that the overall industrial sector has been potent in driving economic growth in Nigeria within the study period.

The r-squared (0.9969) indicates that 99.69% of the total variations in economic growth is explained by the variations in the explanatory variables that are captured in the model, while the remaining 0.31% is explained by other factors not captured in the model. This indicates a good fit of the regression model. The F-statistic (1186.924), which is statistically significant at the 1% level of significance (as captured by the p-value of 0.0000), indicates that the overall model is statistically significant in explaining the dependent variable. The Durbin-Watson statistic (1.7424) is approximately 2 and indicates that there is no serial correlation in the model. Further, the r-squared is less than the Durbin-Watson statistic which is an indication of absence of spurious regression.

Meanwhile, since we are dealing with time series variables, there is need to test for the existence of unit root in the variables so as to avoid making decision from spurious results. We therefore proceed to conduct the unit root test to ascertain the order of integration of the variables.

### *4.3. Unit Root Test*

The Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) unit root test result for the variables are presented in Table 3. In a situation where there is conflict between the order of integration reported by the ADF and PP approaches, the outcome of the PP test will supersede.

The stationarity of the variables is presented in Table 3. Apart from the disparity in the stationarity of GFCF – with the ADF reporting stationarity at first difference and PP reporting stationarity at levels, there is a conformity in the result of every other variables as they agree with the two tests. As such, GFCF is stationary at levels while other variables are stationary at first difference. We therefore have a scenario where the variables in the model are stationary at mixed order of levels and

first difference. This necessitates the test for long run relationship (i.e., a test for cointegration). Since our series are stationary at both level and first difference, the appropriate test is the ARDL Bounds test for levels relationship.

Table 3

**Unit Root Test Result**

| Augmented Dickey Fuller (ADF) | | | Philip-Peron (PP) | | |
|---|---|---|---|---|---|
| Variables | t-statistic at level | t-statistic at first Difference | t-statistic at level | t-statistic at first Difference | Order of Integration |
| INF | -2.9254 (0.0518)* | -5.6848 (0.0000)*** | -2.7839 (0.0701)* | -9.6897 (0.0000)*** | I(1) |
| logCONS | -0.2352 (0.9249) | -3.4871 (0.0140)** | 0.1812 (0.9678) | -3.4012 (0.0173)** | I(1) |
| logGDP | -0.0967 (0.9424) | -3.4340 (0.0160)** | 0.5610 (0.9867) | -3.3125 (0.0214)** | I(1) |
| logGEXP | -1.4211 (0.5615) | -3.9939 (0.0080)** | -1.0816 (0.7131) | -7.3237 (0.0000)*** | I(1) |
| logGFCF | -2.3463 (0.1637) | -5.0026 (0.0002)*** | -3.4804 (0.0141)** | ---------- | I(0) |
| logLAB | 3.0072 (1.000) | -2.2368 (0.1979) | 1.5215 (0.9991) | -3.2035 (0.0085)** | I(1) |
| logMANF | 0.3767 (0.9792) | -5.3236 (0.0001)*** | 0.4207 (0.9813) | -5.3567 (0.0001)*** | I(1) |
| logMNQR | -1.4787 (0.5334) | -5.6989 (0.0000)*** | -1.5082 (0.5187) | -5.6989 (0.0000)*** | I(1) |
| TOPN | -2.4360 (0.1390) | -8.0769 (0.0000)*** | -2.2617 (0.1891) | -9.1056 (0.0000)*** | I(1) |

*Note: ** and *** denotes significance at the 5% and 1% level respectively*

Source: Researcher Computation (2022)

### *4.4. Autoregressive Distributed Lag (ARDL) Bounds Test for Cointegration*

The test for long-run equilibrium relationship is conducted and the result is presented in Table 4. For cointegration to exists, the F-statistic must be statistically significant at the 5% level of significance. That is, the value of the F-statistic must lie outside the upper and lower bounds of the test.

Table 4

**ARDL Bounds Test Result**

| Null Hypothesis: No levels relationship | | | | |
|---|---|---|---|---|
| Test Statistic | Value | Significance | I(0) | I(1) |
| F-statistic | 4.1467 | 10% | 1.85 | 2.85 |
| k | 8 | 5% | 2.11 | 3.15 |
| | | 1% | 2.62 | 3.77 |

Source: Researcher Computation using Eviews 10.0

The F-statistic (4.1467) is greater than the 5% upper and lower critical bounds value. Therefore, we reject the null hypothesis of no levels and conclude that cointegration exists. Hence, there is a long run equilibrium relationship between industrialization and economic growth in Nigeria. The existence of long-run

equilibrium relationship in the two models propels us to proceed to estimate the error correction model for the respective models under the ARDL framework.

### 4.5. Autoregressive Distributed Lag (ARDL) Error Correction Model

The ARDL short run error correction regression is conducted to ascertain how the short-run disequilibrium is corrected so that equilibrium is achieved in the long-run. The result is presented in Table 5. The estimation follows ARDL(1,2,2,0,1,1,2,2,1). The numbers represented in the bracket represents the optimal lag length which is automatically selected under the Akaike Information Criterion (AIC).

Table 5

**ARDL Error Correction Regression Result**

| Dependent Variable: D(LOGGDP)<br>Selected Model: ARDL(1, 2, 2, 0, 1, 1, 2, 2, 1) | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Standard Error | t-Statistic | Probability |
| D(LOGGFCF) | 0.0353 | 0.0233 | 1.5149 | 0.1493 |
| D(LOGGFCF(-1)) | 0.0621 | 0.0230 | 2.6922 | 0.0160** |
| D(LOGLAB) | -1.0665 | 1.8833 | -0.5663 | 0.5790 |
| D(LOGLAB(-1)) | -4.6370 | 1.9789 | -2.3431 | 0.0324** |
| D(TOPN) | -0.0007 | 0.0003 | -2.5155 | 0.0229** |
| D(INF) | -0.0004 | 0.0001 | -2.3635 | 0.0311** |
| D(LOGCONS) | -0.0610 | 0.0442 | -1.3772 | 0.1874 |
| D(LOGCONS(-1)) | 0.1666 | 0.0380 | 4.3852 | 0.0005*** |
| D(LOGMANF) | 0.1271 | 0.0250 | 5.0758 | 0.0001*** |
| D(LOGMANF(-1)) | 0.0964 | 0.0293 | 3.2920 | 0.0046** |
| D(LOGMNQR) | 0.2709 | 0.0357 | 7.5861 | 0.0000*** |
| CointEq(-1)* | -0.2088 | 0.0360 | -5.7915 | 0.0000*** |
| R-squared | 0.9103 | Log likelihood | 110.557 | |
| Adjusted R-squared | 0.8709 | Durbin-Watson stat | 2.2348 | |

*Note: ** and *** denotes significance at the 5% and 1% level respectively*

Source: Researcher Computation using Eviews 10.0

In the short run, we observe that the industrial sector still plays a crucial role in the economic growth of the nation. Construction plays a negative but insignificant effect on economic growth in the short run; but its one-period lag exerts a positive and significant effect on economic growth. Therefore, the one-period lag of construction increases economic growth by 0.1666%. Also, manufacturing industry contributes positively to economic growth in a significant way. A unit percent increase/decrease in manufacturing will lead to a 0.1271% increase/decrease in economic growth in the short-run. Further, a one-period lag in manufacturing increases economic growth by 0.0964%. Mining and quarrying, as a component of the industrial sector, still exerts the greatest influence on economic growth. The sub-sector exerts a positive and significant effect on economic growth at the 1% level of significance. Thus, a unit percent increase/decrease in mining and quarrying will on the average leads to a 0.2709% increase/decrease in economic growth in the short-run.

The error correction term (-0.2088) is negative and statistically significant at the 1% level and is rightly signed (negative). It means that 20.88% of the short-run distortions in economic growth is corrected annually so that equilibrium can be restored in the long run. It therefore implies that it will take approximately five (5) years for equilibrium to be fully restored. The r-squared (0.9103) indicates that 91.03% of

the total short-run variations in economic growth is explained by the variations in the explanatory variables in the model, while the remaining 8.97% is caused by other variables not included in the model.

### *4.6. Post Diagnostic Test*

The post diagnostic test (normality test for residuals, serial correlation test, heteroscedasticity test, and specification test) was conducted, and the result is presented in Table 6.

Table 6

**Post Diagnostic Test Result**

| Test | Test Type | Test Statistic | Value | Probability |
|---|---|---|---|---|
| Normality Test | Histogram | Jarque-Bera | 1.6798 | 0.4318 |
| Serial Correlation LM Test | Breusch-Godfrey | F-statistic | 2.3325 | 0.1336 |
| Heteroscedasticity | Breusch-Pagan-Godfrey | F-statistic | 0.7116 | 0.7666 |
| Specification Test | Ramsey RESET | t-statistic<br>F-statistic | 1.0460<br>1.0941 | 0.3121<br>0.3121 |

Source: Researcher Computation

From the result, since none of the test are statistically significant, then we can accept the respective null hypothesis. Thus, our regression result is free from serial correlation, heteroscedasticity, specification error, and the error terms are normally distributed.

The stability of the parameter estimates is ascertained through the CUSUM test. The result is presented in Figure 4.

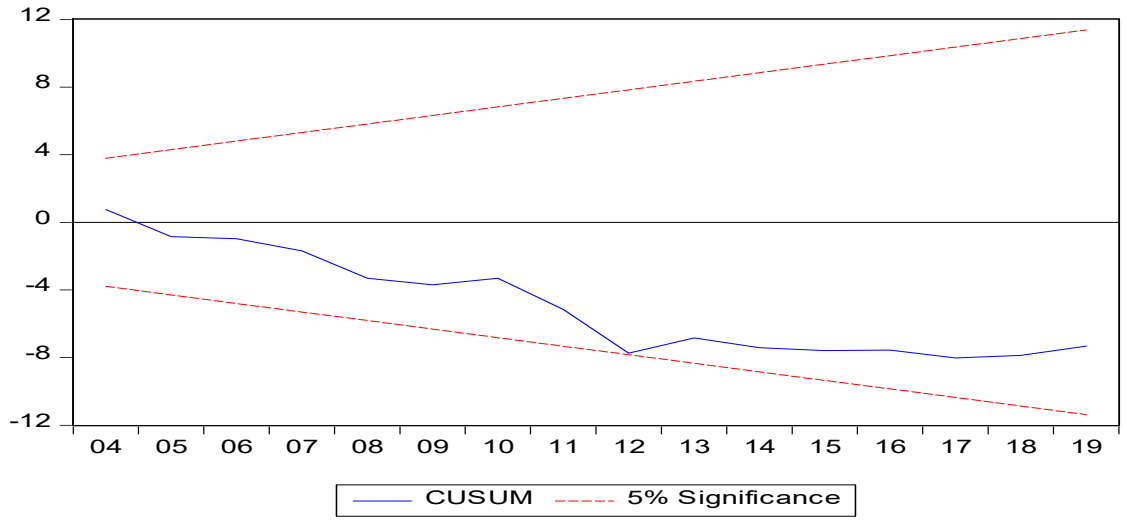


**Figure 4. Cumulative Sum Test for Stability**

Since the CUSUM line lies within the upper and lower 5% critical bounds value, the parameter estimates are stable and can be rightly used for inferences.

### *4.7. Discussion of Major Findings*

It is pertinent to note that the major findings of this study is that the industrial sector of the Nigerian economy has been promoting growth within the economy. Meanwhile, the sub-sector of the industrial sector that has been the top driver of growth has been the mining and quarrying industry. The fact that the industrial sector stimulates growth is linked with the catalytic role it plays in driving the growth in other sectors of the economy (Effiong and Ekong, 2021). As such, the spill over effect of the industrial sector to other sectors of the economy is significant in that it drives the activities in other sectors of

the economy such as agriculture and service industry. The mining and quarrying industry being pointed out as the top driver among the other two is a reflection of the role that the mining and quarrying sector has played on the economy over the years. for instance, the crude petroleum and other solid minerals extracted from the mining and quarrying industry has been the major source of export of Nigeria, making it a major source of foreign exchange earnings and the greatest contributor to the revenue of the government.

### *4.8 Answering the Research Questions*

Recall the research questions:

I. Does the manufacturing industry have any significant influence on economic growth in Nigeria?
II. What is the effect of mining and quarrying industry on Nigeria economic growth?
III. Is there any significant influence of the construction industry on economic growth of Nigeria?
IV. Which of the industrial sector component exerts the greatest influence on economic growth in Nigeria?

Findings of the study has revealed that the manufacturing industry has been influencing the economic growth of Nigeria positively and in a significant manner, accounting to about 0.2930% increase in growth if increased by one percent unit. Similarly, the mining and quarrying industry wielded a positive and significant effect on Nigeria economic growth by accounting for 0.4723% in economic growth if increased by one percent point. Then, the construction industry also influences economic growth significantly and in a positive manner via its 0.2745% increase in growth if increased by one percent point. Lastly, the industrial sector component that has the greatest influence on economic growth is the mining and quarrying industry given its coefficient of 0.4723 compared to manufacturing (0.2930) and construction industry (0.2745).

## 5. CONCLUSION AND RECOMMENDATIONS

The role of the industrial sector in fostering growth has earlier been investigated by scholars where conflicting results has been recorded in the literature. In this study, we have disaggregated the industrial sector into construction, manufacturing, and mining and quarrying and utilized the OLS and ARDL approaches in our estimation to check whether the industrial growth has been growth-inducing in Nigeria from 1981 to 2019. The findings of our study, based on the OLS estimates, indicates that the industrial sector of the Nigerian economy is a key driver of growth. It is observed that the three sectorial components generate a positive and significant effect on economic growth. The ARDL bounds test also indicated that there is a long-run relationship between economic growth and the industrial sector. With the error correction model, it is pointed out that 20.88% of the total distortions in economic growth in the model is corrected on a yearly basis.

The paper therefore conclude that the industrial sector has been potent in driving growth in Nigeria. It is therefore recommended that harmonizing industrial policies cum adequate infrastructural development is desirable to drive the industrial sector which is observed to be a driver of growth within the Nigerian economy.

Clearly, the recommendations are highlighted as follows:

Creating a favourable climate for the industrial sector to function well. This will ensure the provision of the required economic overheads (infrastructure) that will aid smooth running of industrial activities in the country.

The government should expand investment in solid minerals in order to stimulate mining activity in Nigeria. such stimulation will drive up the revenue of the nation which can be utilized to drive other growth-led sectors of the economy for overall economic progress.

Proper allocation and management of existing industries is also required to guarantee roper and beneficial linking effects on the economy. By harmonizing industrial policies and embarking on adequate funding of industrial enterprises through the Bank of Industry (BOI), the industrial sector will live up to its expectation as the drive of growth and economic prosperity.

Establishment of robust institutional frameworks to support the growth and development of the local industries. Economic and business policies along with fiscal actions should be geared towards encouraging entrepreneurs in the industrial sector to boost their production rather than frowning away from the sector. Such could be achieved in the form of subsidies and tax cut to encourage more investments and productivity.

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