



Global Trends in Financial Sector-Led Industrialization: How did Nigeria Fare?

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This study examined the influence of the financial sector on industrialization in Nigeria from 1981 to 2019. Specifically, the study examined the effect of financial sector development on industrialization; and also investigated the influence of industrialization on economic growth of Nigeria. Data were obtained from the Central Bank of Nigeria Statistical Bulletin and the World Development Indicators. The study utilized the Augmented Dickey-Fuller unit root test, Autoregressive Distributed Lag (ARDL) Bounds test for cointegration, and Error Correction Model. The unit root test reported that the variables were stationary at mixed order of levels $I(0)$, and first difference $I(1)$. This necessitated the use of the ARDL Bounds test for levels relationship. The result indicated that financial sector development exerted a negative and significant effect on industrialization in Nigeria; while a negative and significant effect of deindustrialization on economic growth was also observed. The ARDL Bounds test for cointegration validated the existence of a long-run equilibrium relationship between financial sector development and industrialization; and between industrialization and economic growth in Nigeria. The error correction model revealed that 56.98% of the short-run distortions in industrial productivity is corrected annually so that equilibrium is restored in the long-run; while 93.06% of the short-run distortions in economic growth is corrected annually. It was recommended that previous financial sector reforms should be consolidated to make the financial sector robust to support industrialization, which will propel growth in the Nigerian economy.

Keywords: *Industrialization; deindustrialization; reindustrialization; financial development; economic growth.*

1. INTRODUCTION

Industrialization has been lauded for its role in raising income and living standards through its

impact on long-term employment creation, capital accumulation, economies of scale, and technical advancements [1]. Furthermore, for any country to have effective economic development, the

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progress must be driven by industrialisation [2]. Thus, the quest for industrialization is believed to be paramount for a sustainable economy. This is because long-term economic development is linked to the ability to diversify domestic supply capacity, which includes developing new activities, improving domestic economic relations, and developing domestic technical capabilities [3]. This diversification process is also believed to be typically facilitated by the industrial and modern service sectors. In facilitating such activities, the financial sector of the economy has crucial roles to play. There is comprehensive literature on the process of diffusion amid financial development and economic growth. One of these diffusion conduits focuses on the driving role that financial development could play in a country's industrialization course via enhanced access to credit for industries [4]. Meanwhile, different countries/regions have experienced diverse trends in the industrialization process over the years. This has been viewed in respect to deindustrialization and reindustrialization.

Of late, literature developments have focused on the significance of reindustrialization. The earliest movement of reindustrialisation literature appeared in Europe and the United States in the 1980s [5]. The literature on reindustrialisation in Europe focused on the development of novel industries, practices, cum outputs, with a great primacy for the eco-friendly sector, too was linked to civil developments in Central and Eastern Europe (CEE). These reforms were linked to the depression and collapse of nationalised industries, which resulted in some deindustrialization. Following the 2008 economic recession, this topic has regained prominence.

As previously said, prior to the 2008 financial crisis, the prevailing view held was that deindustrialization was a necessary condition for sustainable economic growth. However, after the recession, this viewpoint has shifted, and a much stronger respect for the role of manufacturing has emerged. A growing number of economists and policymakers believe that 'reindustrialisation' is a critical mechanism for boosting economic development and improving living standards in 'post-crisis' Europe. As a result, the European Union's (E.U.) industrial strategy focused on growing manufacturing's share of GDP. This is particularly relevant for newly admitted CEE Union member states. The collapse of nationalized enterprise had triggered an eclectic

'deindustrialisation' trend in these countries, with services taking on a greater role and industry being pushed to the margins. In this progression, "post-socialist states have been transformed into service-dominated economies" [5]. While 'deindustrialisation' has remained halted in a few CEE countries (Czech Republic and Poland), deindustrialisation has resulted in major capital reallocation from the industrial to service sectors in countries such as Croatia. Because of this reallocation, Croatia's industrial output is smaller than it was before the transition.

The trend of financial liberalisation has transformed the global economic system over the past few decades. Despite the fact that recent theoretical models assume that the "financial sector is critical for economic growth, and thus for the growth of the manufacturing industry, there is no conclusive proof of an empirical relationship between financial sector growth and industrialization" [5]. Some authors discovered robust support for the growth-promoting hypothesis, while others discovered only slight or sundry proof of progressive growth. Gehringer [6] found resilient support for growth-augmenting financial liberalisation, while Rodrik [7] initiated merely a feeble growth impact. Furthermore, "the deleterious impact of financial globalisation has been seen in increased financial uncertainty" [7–8] and increased volatility in industrial activity [9]. Remodelling the banking system was the foremost critical step for financial growth in Central and Eastern European countries. International banks were permitted to access the market during the reform period beginning in the 1990s, and within a decade they controlled the majority of banks in most CEE countries. As a result, a tightly controlled market transformed into a very much dynamic one, driving growth to a certain degree [10].

If the *real income per capita* increases, so does the comparative demand for agronomic goods, while the comparative demand for industrial output at that point upsurges and then tumbles in support of services [5]. This is due to the higher levels of relative efficiency in the manufacturing sector, as well as systemic shifts in consumption habits at various stages of growth. Many economists have accepted the theory, which states that "deindustrialisation occurs with a higher rate of productivity growth in manufacturing compared to services, resulting in lower growth in labour employment in manufacturing relative to services, even though demand rises at similar pace" [11].

Rowthorn and Wells [11] defined this as “a positive form of deindustrialisation”. They conclude that “deindustrialisation may also arise as a negative phenomenon as a consequence of a systemic disequilibrium in the economy, that prevents a country from achieving its development potential or using its resources” [11]. It manifests itself in pitiable manufacturing efficiency, as well as a strike in manufacturing production and productivity [12]. To conclude, since the labour relieved is not engaged by the service industry, it would result in low overall economic efficiency, a reduction in productivity, and an increase in unemployment [5]. Rowthorn and Wells [11] described “trade-related deindustrialisation” as well. They resolved that countries with a manufacturing trade excess, on average, would commit extra capitals and labour to this sector than countries with shortages.

With Rowthorn’s previous clarification of deindustrialisation as “a function of higher productivity growth in manufacturing and the reallocation of labour from manufacturing to services”, [13] adds that it is triggered by “waning income elasticity for manufacturers and a new international division of labour” [5]. He introduced the concept of the “Dutch Disease”, referring to an extra pattern of *deindustrialisation* in situations where a nation uncovered substantial natural resources, established export service operations, mostly finance or tourism, or owing to economic policy modifications. Furthermore, [13] highlights an event of “reverse reindustrialisation, or a decrease in manufacturing jobs combined with a decrease in per capita income, which is common in countries of the former Soviet Union and Eastern Europe”.

Every country’s deindustrialization process is the outcome of a unique combination of constructive and destructive factors that have evolved over time. Many socioeconomic, financial, and structural variables may either help or impede the process of industrialization. The size of a nation, its natural resources, its human resources, the firmness of its government and institutions, and its capacity to enforce “fiscal, monetary, and exchange rate policies” all have an impact on long-term industrial growth. There is a scarcity of research literature that clarifies our view of “the role of the financial sector in the process of de(re)industrialization”. If the literature on the associations amid the financial sector and economic growth is considered, the shortcomings of current work may be addressed [14 – 17]. This literature has concentrated on the

activities of financial mediators in promoting trade and ensuring liquidity [18], as well as in diversifying risks [19].

The use of the financial sector as a driver of industrialization in many countries have yielded desirable results. In the period 1971 to 1990, countries who were regarded as ‘successful’ industrializers include Indonesia, Malaysia, Oman, Republic of Korea, Thailand, and Turkey. It is believed that their success was due to their aggressive move towards utilizing the financial sector to drive their industrial strategies [20]. The outcome of such drive has been amazing. For example, Indonesia recorded a growth rate of 13.5% in her manufacturing value added, while Malaysia recorded 11.0%. Similarly, Oman and Republic of Korea recorded a positive growth rate of 19.0% and 14.3% respectively, in their manufacturing value added. In the same period, Thailand and Turkey respectively recorded 10.1% and 6.5% growth rate in their manufacturing value added.

Within 1991 to 2014, Bangladesh, Cambodia, China, India, Laos, Myanmar, and Vietnam were included in the list of successful industrializers in the world. Their success has been recorded to emanate from massive investment in infrastructures and information technology, with a vibrant financial system. Within the stipulated period, Bangladesh recorded a growth rate of 7.7% in her manufacturing value added, while Cambodia recorded 12.6% growth rate. Similarly, China and India recorded a growth rate of 9.9% and 7.6% respectively, in their manufacturing value added. Meanwhile, Laos and Myanmar recorded a growth rate of 9.7% and 15.2% respectively. Vietnam recorded a growth rate of 10.4% within the same period. It is therefore necessary to look at how Nigeria fared in this financial sector-led industrialization.

Industrialization is considered as a momentous pointer of contemporary economic development and stability, but Nigeria’s industrial sector has experienced epochs of truncated productivity [21]. Industrialization is commonly claimed to be proficient in snowballing the rate of economic development and guaranteeing rapid systemic renovations of the economy. The vital role of the manufacturing sub-sector is based on the point that it serves as a driving force for development by lengthening the prolific and trade base of the economy, lowering joblessness and decreasing rural-urban migration along with assisting to minimize poverty.

Nigeria has struggled to achieve economic growth, despite ample natural and human capital. A number of strategies and transformations of the different governments to transform the manufacturing sector have been chiefly fruitless, as the sectoral contribution of the industrial sector to GDP has remained very poor and negligible. Evidence indicates that the contribution of industrial sector to at current basic prices in the 1980s averaged 32.36%. Meanwhile, the economy recorded an average of 31.897% in the 1990s. Between the period 2000 to 2010, the industrial sector contribution to GDP averaged 24.702%; while between 2011 to 2019, the ratio averaged 24.622%. Given these statistics, it is evident that the contribution of the industrial sector to GDP in Nigeria has been

waning drastically over the years, thus pointing to the fact that Nigeria is somewhat deindustrialising. This is reflected in the downward trend in index of industrialization, as captured by the manufacturing value added as a percentage of GDP in Fig. 1.

In comparison with the service sector of the economy, Nigeria has witnessed a tremendous increase in the contribution of the service sector to GDP. In the 1980s, the average contribution of the service sector to GDP was 50.21% and declined to 42.8% in the 1990s. In the period 2000 to 2010, the average contribution of the service sector to the GDP rose to 47.82%; while within 2011 to 2019, the figure rose to as high as 54.02%. this is reflected in Fig. 2.

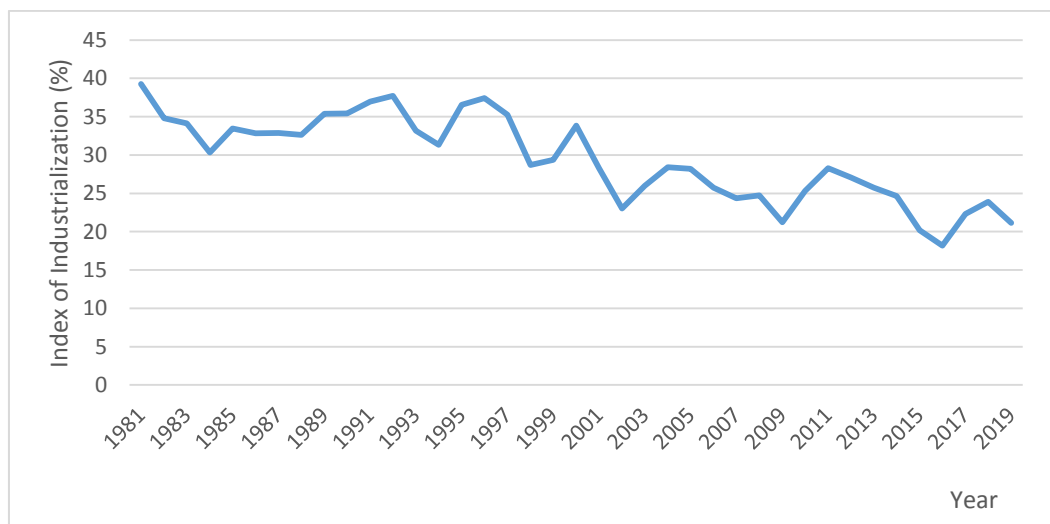


Fig. 1. Trend of Industrial Value Added in Nigeria (1981 – 2019)

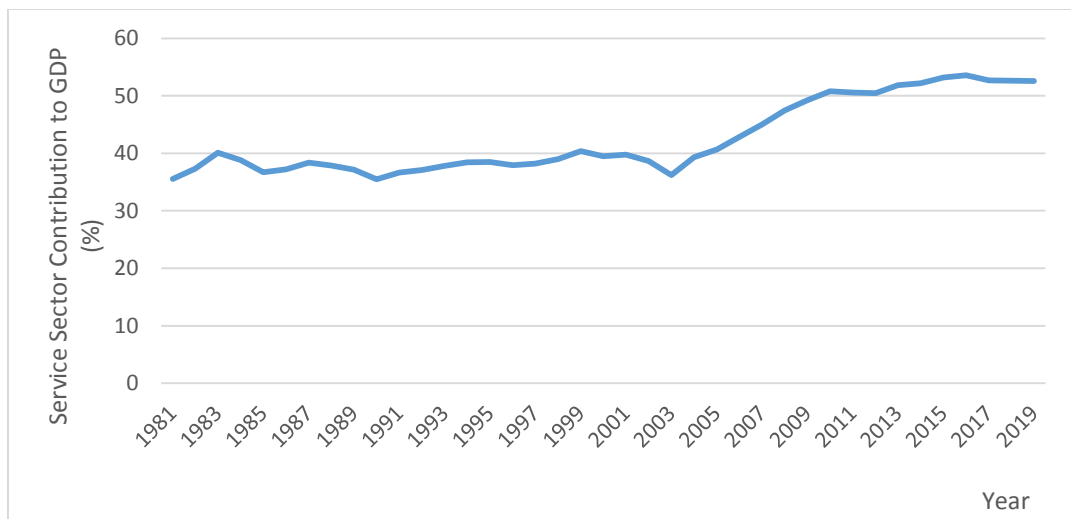


Fig. 2. Trend of Service Sector Contribution to GDP (1981 – 2019)

While industrialization (with a focus on manufacturing) is critical in the phase of economic growth, its success in Nigeria has been less than far below expectation. To address this paradox, two major methods have been implemented. The first strategy is an import substitution strategy, and the second is an export promotion strategy. Another policy, which has been in vogue since the implementation of the SAP in Nigeria in mid-1986, focuses on the elevation of value-added non-oil exports, chiefly manufactured goods, but has not yielded significant results [22].

Given the above statistics, we can say that Nigeria tried to industrialize in the 1980s where we observed a tremendous input of the industrial sector to GDP but deindustrialize in the 1990s and in the 2000s where the sectorial contribution has been declining drastically to as low as 27.654% in 2019 as against the 37.375% in 1981; while growth in the service sector gains greater significance to as high as 50.22% in 2019. As a result, the usual tendency in an economy is for agricultural growth to come first, followed by industrial growth, and finally, growth in the service sector. In comparison to the history of early industrialisers, this pattern suggests that Nigeria is running out of industrialisation prospects quicker and at even lesser rate of income, as pointed out by [23] in his study. It therefore follows that there is need for reindustrialization. But how?

According to [24], while financial progress is commonly viewed as a favourable mechanism with positive impacts on economic growth [6], the actual effects may be the contrary. Financialisation has been seen in the science literature to have “a negative impact on economic growth and sustainability” [25]. Over the last two decades, the emergence of the service sector as a principal vigour in numerous developing economies has been followed by widespread deindustrialization, leaving these economies susceptible to devastating financial fizzes [26].

Economists [20,27,28] on the other hand, have emphasized the role of the financial sector in developing new markets and acting as a driver for industrialization and economic growth. While the relationship between financial development and economic growth has long been studied, uncommon studies have looked into the liaison amid financial development and industrialization in Nigeria. This research work for that reason seeks to examine the influence of the financial

sector on industrialization in Nigeria for the period 1981 to 2019 plus empirically ascertaining the effect of industrialization on economic growth within the Nigerian context.

2. LITERATURE REVIEW

2.1 Theoretical Literature

The theoretical literature reviewed include the finance-growth theory and financial sector hypothesis, and Kaldor's first law.

2.1.1 Finance-growth theory

The finance-growth theory states that “there is a direct relationship between the financial sector and the real sector of the economy through the size of the financial sector”. This theory is made on the core financial intermediation purpose of banks which permits banks to intermediate between the surplus and deficits units of the economy. As the financial system turn out to be further developed in relations to magnitude and space of activities, its assistance to economic growth surges via the delivery of erudite debt tools which augments financing. This theory enthused the work of [29] to authenticate the precise sway of finance on economic growth with the aim of refining upon the core banking theory that nurtures the liaison amid the diverse segments of the economy.

2.1.2 Financial sector hypothesis

The linkages amid “the financial sector and real sector of an economy” has been discussed under five broad hypotheses – the supply-leading finance hypothesis, the demand-following finance hypothesis, the neutral hypothesis, the feedback hypothesis, and the structuralist hypothesis.

The supply-leading finance advocates are of the opinion that “it is development in the financial sector that leads to development in the real sector”. The supply of investment finance is believed to stimulate growth in the real sector of the economy. Key proponent of the supply-leading hypothesis is Schumpeter [30] and the idea is braced by scholars like King and Levine [31]. The crux of the matter here is that “financial development has a positive effect on economic growth, and that the effect runs from financial development to economic growth which is caused by an improvement in the efficiency of capital accumulation or an increase in the rate of savings as well as the rate of investment” [32].

The transmission mechanism is that as entrepreneurs get new access to the supply-leading funds, their prospects increase and new possibilities (or possible alternatives) are opened up, thereby propelling the entrepreneur “think big” [32].

The demand-following finance hypothesis asserts that it is development in the real sector that triggers financial development. Among the key proponents of the hypothesis are Goldsmith [29], Jung [33], Kar and Pentecost [34], and Lucas [35], who are of the opinion that causality runs from economic growth to financial development. That is to say, “an increase in economic growth causes a rise in demand for financial services and this results in the expansion of the financial sector”. In their view, “it is the improvements in the economy that drive higher demand for the use of money, which consequently promotes financial development” [33–35]. That is, financial markets advance and improve due to amplified demand for their services from the growing real sector [32]. The development in the real sector can be realised, based on the Keynesian theory, through an expansionary fiscal policy which surges aggregate demand and income, thereby raising demand for money. Thus, the Keynesians view is that financial deepening occurs as a result of an increase in government expenditure.

Scholars such as Apergis and Levine [36] are of the opinion of the neutral hypothesis which asserts that “there is no relationship between financial development and economic growth”. Thus, no causality flows between financial sector and the real sector of the economy. The feedback hypothesis stipulates that “there is a reciprocal effect amid financial development and economic growth” [32]. Thus, a bidirectional causality flows between financial sector development and the real sector of the economy. That is, “financial development causes economic growth; and economic growth also causes financial development” [32].

The Structuralist hypothesis is of the opinion that “the causal relationship between financial development and economic growth is a function of the stage of economic development” [32]. At the initial phase of development, the supply-leading finance becomes necessary since the enlargement of new financial services generates new openings for savers and investors and causes an upsurge in economic growth. The repercussion of this is that at the initial phase of

economic development, financial development is necessary for economic development as it will stimulate real capital formation [32]. As the economy and financial development soars, the supply-leading finance becomes less important and the demand-following finance sets into motion. The implication here is that economies at the early stage of development need to adopt the supply-leading finance, but as the economy grows over time, the demand-following finance becomes prominent.

2.1.3 Kaldor's first law

According to Kaldor [37], the connection between industrial expansion and overall economic performance is an essential stylised fact in the post-war growth trajectory of industrialized nations. This finding is the basis for Kaldor's first law, which asserts that the increase in manufacturing production is closely related to the growth of GDP. Kaldor's first law, which may be summarized as “manufacturing is the engine of growth”, was originally estimated by Kaldor in a cross-section of industrialized nations from 1952 – 1954 to 1963 – 1964. The following equation may be used to depict the law:

$$q_i = \alpha_i + \beta_i m_i - - - - (2.1)$$

where q denotes to the growth of total output and m refers to the growth of manufacturing output.

It is crucial to highlight that “the link amid the two variables is attributable to more than just the fact that industrial output accounts for a sizable portion of overall output”. The regression coefficient is anticipated to be positive and smaller than one, implying that the whole growth rate of the economy is related to the excess of the growth rate of manufacturing output over the growth rate of non-manufacturing output [38]. This argument suggests that high growth rates are typically seen when the manufacturing industry's proportion of GDP increases, and it may be evaluated using the equation:

$$q_i = c_i + d_i \cdot (m_i - nm_i) - - - - (2.2)$$

Where nm is the growth of non-manufacturing output.

As more proof for the notion that “manufacturing is the engine of growth”, Kaldor claimed that non-manufacturing output growth reacts positively to manufacturing output growth, as seen in the following equation:

$$nm_i = u_i + v_i.m_i - - - - - (2.3)$$

The influence of the former on the increase of productivity in the economy is the explanation for the link between the growth of manufacturing output and the overall performance of the economy. There are two plausible explanations for this phenomenon. The first is that increased manufacturing production and employment leads to a shift of workers from low-productivity sectors to industrial activity. Given the availability of surplus labour, the result is an increase in total productivity in the economy with little or no negative impact on the traditional sector of production [38]. This process, according to Kaldor, is typical of the shift from “immaturity” to “maturity,” where an “immature” economy is characterized as one with a high number of labour available in low productivity sectors that may be moved to industrial sector.

The existence of static and dynamic increasing returns in the industrial sector is the second explanation for the relationship between manufacturing expansion and productivity. Static returns are primarily concerned with internal firm economies of scale, whereas dynamic returns are concerned with rising productivity as a result of learning by doing, ‘induced’ technical development, external economies in production, and so on. In this example, Kaldor’s interpretation is inspired by the work of Young [39], which views growing returns as a macroeconomic phenomenon based on the interplay of activities throughout the process of general economic expansion. It also recalls Adam Smith’s concept that growing productivity is reliant on the division of labour, which is dependent on market expansion.

2.2 Empirical Literature

To analyse the connection amid financial development and economic growth, various strategies such as cross-country, panel, time series, sector specific, sector level, and case study-study studies have been used [15,16,40,41].

Demirguc-Kunt and Maksimovic [42] discover that companies do not expand faster in either market-based or bank-based financial structures when access to external financing is considered. Thus, rather than the advancement of a single aspect of the financial structures, the overall degree of financial development is essential for economic growth [15,16,40]. Beck and Levine

[43] revealed proof that more financial production hastens the growth of financially based sectors using industry-level data.

The literature contains conflicting data suggesting either a progressive or deleterious bond amid financial sector growth and industrialization. For example, [44] and [45] revisited the impact of financial progress on industrial growth impulsiveness using cross-industry (firm) data, using the methodology of [17]. Larrain [44] realized a slightly negative coefficient on the interface term, arguing that lower impulsive production exists in industries with greater outward dependency and in countries with higher financial growth. According to [45], financial growth decreases the volatility of sectors that demand a considerable amount of liquidity.

Loayza and Ranciere [46], on the other hand, discovered “an optimistic long-run relationship between financial development and production growth, which coexists with a mainly negative short-run relationship between financial fragility, viz., banking crises, financial sector instability, and output growth”. Similarly, [40] used an *augmented neoclassical growth paradigm* to discover proof that financial integration has a progressive effect on Malaysian economic development.

In addition, [47] conducted a study on “the influence of financial and legal institutions on economic growth rates using data from Chinese provinces”. They discovered that improving political plurality, the legal environment, and the financial sector had a momentous impact on Chinese economic growth.

Udoh and Ogbuagu [48] used an “aggregate production framework” and the autoregressive distributed lag (ARDL) cointegration technique to discover that both the long-run and short-run dynamic coefficients of financial sector growth variables have an undesirable and statistically substantial effect on the Nigerian industrial production. Similarly, Lin and Huang (2012) discover that instability in the banking sector has a negative impact on the development of industries that depend more on foreign financing.

Zhang, Wang, and Wang [49] collected 5 years’ data from 2001 to 2005 from 286 Chinese localities to scrutinize the link amid financial development and economic growth. The study demonstrated that financial development and

economic growth at the city level in China are positively connected using “first-difference, cross-sectional regression, and GMM estimation methods”.

Okodua and Ewetan [50] investigated “the impact of stock market performance on economic development and discovered that, in the long run, total productivity in the Nigerian economy is less vulnerable to shifts in stock market capitalization and average dividend yield”. Thumrongvit, Kim, and Pyun [51], in a report on “the impact of bond markets as a third core component of the financial system on economic growth, found that government bonds positively contribute to economic growth, while the effects of corporate bonds shift from negative to positive as domestic financial systems increase in size and variety”.

Similarly, [52] challenge whether today’s emerging economies will reach high-income position without initially developing significant industrial sectors, as well as how problematic it is to maintain extraordinary points of manufacturing production. They discovered that almost all high-income country currently has a manufacturing job portion in surplus of 18% to 20%, while the highest projected job share for a developing economy has dropped to about 13% to 15%. As a result, the authors argue that the road to growth through industrialization has become more complicated.

Rodrik [23] recorded a major deindustrialisation pattern over the last few epochs. He observed that “countries are running out of industrialisation prospects much earlier and at much lower income levels than early industrialised countries”. The author emphasizes the disparities between countries, emphasizing that Asian nations and manufacturing exports have been relatively immune to these patterns, whereas Latin American nations have been particularly highly affected. The author concludes that while progressive markets have lost significant jobs, they have performed exceptionally fine in relations to industrial export contribution at constant prices. The proof showed that these advances are the result of “both globalisation and labour-saving technical advancement in manufacturing” [5].

Eric and Zhongxiu [28] investigated the underlying connection concerning the “financial sector development and industrialization in Cameroon”. The study employed the aggregate

production framework and the ARDL approach to analyse time-series data through the era of 1970 to 2014. The study reported presence of a long-run liaison amid financial development and industrial output. It was observed that financial development impact significantly on investment, and therefore on industrialization in Cameroon. It was further realized that nominal deposit rate has both short-run and long-run influence on industrialization; while bank deposits exerted only a short-run impact.

Shahbaz, Bhattacharya, and Kumar [27] examined the impact of industrialization and urbanization on financial development in India and China through 1970 – 2013, incorporating the function of institutional quality to define the manifestation of cointegration between the variables. The bounds test approach was employed in the study, which allows for structural breakdowns. The findings show that long-run dynamics exist between the series. Furthermore, the study discovered that industrialization and urbanization promote financial growth, but a lack of institutional quality and government size stymies financial development.

Nwogo and Orji [53] used the vector error correction and system equation estimation techniques to investigate “the influence of industrialisation on the growth of the Nigerian economy”. The study discovered that manufacturing sector output, crude petroleum and natural gas production, and solid mineral and mining output all had a positive and substantial influence on real GDP; moreover, a long-run link was discovered amid the variables utilized.

Finally, [5] applied panel data from 2005 to 2015 to investigate the role of financial conditions in the process of industrialization in CEE countries. The data was analysed using “a fixed-effect panel regression model”, and the results revealed that the financial sector plays a critical role in the level of industrialisation.

2.3 Summary of Literature Reviewed

The literature contains conflicting result suggesting either a progressive or deleterious relationship amid financial sector development and industrialization; and between industrialization and economic growth. This lack of consensus creates a gap that warrants further investigation in the area. Also, there seem to be few studies in Nigeria on the link concerning

financial sector development and industrialization. As a result, this study is an extra effort to uncover the ties amid Nigerian financial development and industrialization.

3. METHODOLOGY

3.1 Basic Research Design

This study employs the econometric approach. Data were obtained from secondary sources of which they were being subjected to diagnostic test before their use in the main analysis. The data were analysed using statistical software package.

3.2 Model Specification

The models for this study are built based on the objectives that is to be achieved.

Model I: In examining the influence of financial sector development on industrialization in Nigeria, this study adapts the model of [5]. In their study, they modelled industrialization, “being measured by manufacturing value added as a percentage of GDP in constant prices (MAN)”, as a function of real effective exchange rate (REER), real interest rate ratio (INTR), household final consumption (HFC), foreign direct investment (FDI), and trade openness (OPEN). The model is modified to suit this study and is specified as follows:

$$INDV = f(GFCF, LABR, CRGD, INTR, INFR, EXCH) - - - (3.1)$$

Transforming Equation (3.1) into its estimable form,

$$INDV = \lambda_0 + \lambda_1 GFCF + \lambda_2 LABR + \lambda_3 CRDG + \lambda_4 INTR + \lambda_5 INFR + \lambda_6 EXCR + \mu - (3.2)$$

Where:

INDV = Index of Industrial Production

GFCF = Gross fixed capital formation

LABR = Labour force growth rate

CRDG = The ratio of total credit to gross domestic product (a measure of financial development)

INTR = Interest rate

INFR = Inflation rate

EXCR = Real exchange rate

λ_0 to λ_6 = parameters to be estimated

μ = the random error term

Model II: To probe the influence of industrialization on economic growth in Nigeria, the model of [22] was adapted. In their model, they defined economic growth as a function of industrial output, total savings, foreign direct investment, and inflation rate. In this study, their model is modified to include labour and capital components along with the index of industrial production. This is expressed in Equation 3.3.

$$RGDP = f(GFCF, LABR, INDV, INFR, TOPN, EXCR) - - - (3.3)$$

Transforming Equation (3) into its estimable form,

$$RGDP = \beta_0 + \beta_1 GFCF + \beta_2 LABR + \beta_3 INDV + \beta_4 INTR + \beta_5 TOPN + \beta_6 EXCR + \mu - (3.4)$$

Where:

RGDP = The “growth rate of real gross domestic product” (capturing economic growth)

GFCF = Gross Fixed Capital Formation

LABR = Labour Force Growth Rate

INDV = Index of Industrial Production (an index of industrialization)

INTR = Interest Rate

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

β_1 to β_6 = The parameters to be estimated

μ = The random error term.

3.3 Sources of Data

Data for this study were gotten from secondary platforms, and they span through the period 1981 to 2019. Specifically, data on gross fixed capital formation, “growth rate of real gross domestic product”, index of industrial production, inflation rate, and labour force were obtained from World Bank (see World Development Indicators). Data on all other variables (financial development, trade openness, interest rate, and exchange rate) were collected from the Central Bank of Nigeria statistical bulletin.

3.4 Diagnostic Test

The diagnostic test conducted is the unit root test. The unit root test is done to make certain the order of integration (or stationarity) of a given time series variable. In analysis for the stationarity of the series, the “Augmented Dickey-Fuller” (ADF) and the Phillip-Peron unit root test is utilized. The test is conducted under the constant and trend assumption. Such analysis is necessary because “regressing a non-stationary

time series variable with another non-stationary time series variable will produce a spurious result - a strong relationship between two or more variables that is not caused by a real underlying causal relationship" [54]. Given a time series variable, say X , test equation is presented below:

$$\Delta X_t = \alpha_0 + \alpha_1 X_{t-1} + \sum_{i=1}^m \alpha_2 \Delta X_{t-i} + \varepsilon_t \quad (3.5)$$

And that

$$\Delta X_t = \alpha_0 + \delta t + \alpha_1 X_{t-1} + \sum_{i=1}^m \alpha_2 \Delta X_{t-i} + \varepsilon_t \quad (3.6)$$

Where X_t is the variable to be tested for unit root, t measures time, Δ captures first difference, β_0 is the drift, i is the optimum lag length for the independent variables, and ε_t is stochastic component. Equation (3.5) embodies the ADF unit root test grounded on the constant with no trend supposition; while Equation (3.6) conforms to the constant with a linear deterministic time trend supposition. The test's null hypothesis is that X_t has a unit root and is detailed as follows:

$$H_0: \alpha_1 = 1$$

Against the alternative hypothesis, that there is no unit root, expressed as:

$$H_1: \alpha_1 < 0$$

If the expected α_1 is considerably smaller than zero as dignified by a τ -statistic, then we can discard the null hypothesis; this infers that the variable is stationary. If the expected α_1 is not

considerably less than zero, then we cannot discard the null hypothesis; this infers that the variable is nonstationary.

3.5 Analytical Technique

The study employed the "Autoregressive Distributed Lag (ARDL) Bounds Test for cointegration; then the Vector Error Correction Model" to ascertain the existence of a long-term equilibrium relationship.

3.5.1 Test for cointegration

In testing for cointegration, the ARDL Bounds test is being utilized. The Bounds test is also employed "to test for the occurrence of a long run relationship". The H_0 for the bounds test is that there no long run relationship. The H_0 is therefore discarded once F-statistic is greater than the critical bounds values at the different level of significance. Cointegration is therefore found if regressing variables which are stationary at first difference, yields a residual which is stationary at level. The decision rule in the Bounds test is that cointegration exist when F-statistic is outside the critical bounds value at the 5% level.

3.5.2 Error correction mechanism

The existence of cointegration, often propel the use of "the error correction mechanism to reflect how the short-run disequilibrium is corrected annually". The model for the error correction mechanism is specified as follows:

For Model I,

$$\begin{aligned} \Delta INDV_t = & \varphi_0 + \sum_{i=0}^p \varphi_1 \Delta INDV_{t-i} + \sum_{i=1}^q \varphi_2 \Delta GFCF_{t-i} + \sum_{i=1}^q \varphi_3 \Delta LABR_{t-i} + \sum_{i=1}^q \varphi_4 \Delta CRGD_{t-i} \\ & + \sum_{i=1}^q \varphi_5 \Delta INTR_{t-i} + \sum_{i=1}^q \pi_5 \Delta INFR_{t-i} + \sum_{i=1}^q \varphi_6 \Delta EXCR_{t-i} + \theta ECM_{t-1} + \mu_{2t} \quad (3.7) \end{aligned}$$

For Model II,

$$\begin{aligned} \Delta RGDP_t = & \pi_0 + \sum_{i=0}^p \pi_1 \Delta RGDP_{t-i} + \sum_{i=1}^q \pi_2 \Delta GFCF_{t-i} + \sum_{i=1}^q \pi_3 \Delta LABR_{t-i} + \sum_{i=1}^q \pi_4 \Delta INDV_{t-i} \\ & + \sum_{i=1}^q \pi_5 \Delta INTR_{t-i} + \sum_{i=1}^q \pi_8 \Delta TOPN_{t-i} + \sum_{i=1}^q \pi_{10} \Delta EXCR_{t-i} + \lambda ECM_{t-1} + \mu_{it} \quad (3.8) \end{aligned}$$

Of which p and q are the optimal lag length for the dependent and explanatory variables correspondingly; θ and λ sizes the swiftness of correction of the system to its long-run equilibrium for Model I and Model II respectively; and ECM is the error correction model. The coefficients of the ECM (θ and λ) measures the swiftness of fine-tuning of the short run imbalance so that stability is established in the long run.

4. EMPIRICAL FINDINGS

4.1 Descriptive Statistics

The descriptive statistics here covers the mean, standard deviation, skewness and kurtosis, as well as the minimum and maximum value of the series. The result is presented in Table 1.

Table 1 offers the descriptive statistics of the variables applied in this study. It is observed that the index of industrial production averaged 29.438 with a standard deviation (S.D.) of 5.594. Its minimum value stood at 18.173 while its maximum value was 39.245 within the study period. The negative skewness coefficient of -0.109 is an indication that the values of the index of industrial production are tilted to the left – indicating the declining industrial sector contribution to the overall economy.

The growth rate of real gross domestic product is also being observed to have an average value of 3.149% with a 5.464% S.D. The maximum value was 15.329% and its minimum value was -13.13%. Also, the variable exhibits a negative skewness as shown by the -0.866 coefficient. This also portrays the fact that the Nigerian economy has a lot of its growth tilted to the negative rates.

Other variables can be discussed in a similar manner. For instance, exchange rate average 94.0143 with a 92.821 S.D. This indicates a greater variability in the variable. This can be validated since its coefficient of variability will be 98.60%. The variable has its minimum value to be 0.620 and its maximum value as 603.92. The positive skewness coefficient of +0.810 is an indication that the variable of interest tilts to the right. This is evidenced in the periodic upsurge in the naira/dollar exchange rate over the years.

4.2 Correlation Analysis

The correlation matrix for the variables for Model I is presented in the first part of Table 2, while

that of Model II is presented in the second part of the same Table 2.

The correlation matrix is conducted to ascertain the behaviour of one variable with the other, but does not in any way imply a cause-effect relationship. The variables are observed to associate seamlessly with themselves giving the perfect correlation coefficient of unity (1). The result designates that there is a high negative correlation concerning index of industrial production and financial sector development, given the correlation coefficient of -0.807. Similarly, the variable has a strong negative correlation with both exchange rate and gross fixed capital formation given their corresponding correlation coefficient of -0.849 and -0.806. Meanwhile, a fairly high negative correlation is observed to exist between index of industrialization and labour force growth rate as observed from the correlation coefficient of -0.562. On the contrary, inflation rate and interest rate both has a weak positive correlation between index of industrialization given their corresponding correlation coefficient of +0.408 and +0.002.

In the second part of Table 2, it is observed that there is a fairly weak positive correlation between growth rate of real gross domestic product with gross fixed capital formation, interest rate, and trade openness given the respective correlation coefficients of +0.408, 0.519, and 0.418. The variable exhibits a very weak positive correlation with labour force growth rate and exchange rate, given the respective correlation coefficients of +0.302 and +0.250. However, the variable had a weak negative correlation with index of industrial production given the correlation coefficient of +0.364.

4.3 Unit Root Test

The Augmented Dickey-Fuller (ADF) and Philip-Peron unit root test result for the variables are presented in Table 3. The upper segment of Table 3 reflects the unit root test result for Model I, while the second segment of the same table reflects the unit root test result for Model II.

The unit root test result for variables in Model I, as presented in the upper part of Table 3 indicates that the variables are in mixed order of integration (levels and first difference). The Philip-Peron unit root test is considered to be more powerful than the ADF test and its result is

upheld in case of disparity in the stationarity of the variables by both test. The probabilities are enclosed in brackets. The only point of disagreement between the two test is in the case of interest rate. The ADF reported that interest rate is stationary at level, while the PP test reported that it is stationary at first difference. Therefore, the outcome of the PP test is upheld hence, interest rate is stationary at first difference (i.e., interest rate is an I(1) variable).

Apart from this disparity, the two test agrees with each other with respect to every other variable. Both the ADF and PP test indicate that index of

industrial production is stationary at level. This implies that the variable is an I(0) variable. Gross fixed capital formation is stated to be stationary at first difference by both the ADF test and the PP test. Hence, GFCF is stationary at first difference (i.e., GFCF is an I(1) variable). Labour force is stated to be stationary at first difference by both the ADF test and the PP test. Therefore, labour force is an I(1) variable. In the same vein, financial sector development, and exchange rate are reported to be stationary at first difference by the two tests. Hence, exchange rate is an I(1) variable and financial sector development is also an I(1) variable.

Table 1. Descriptive statistics of the variables

	Mean	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis
Index of Industrial Production (INDV)	29.438	39.245	18.173	5.594	-0.109	1.944
Growth Rate of Real Gross Domestic Product (RGDP)	3.149	15.329	-13.130	5.467	-0.866	4.635
Gross Fixed Capital Formation (GFCF)	7.451	10.108	4.467	1.856	-0.312	1.632
Labour Force Growth (LABF)	53.072	53.780	52.090	0.555	-0.453	1.933
Financial Development (CRGD)	9.275	20.124	4.483	4.145	0.974	3.207
Interest Rate (INTR)	17.511	29.800	7.750	4.583	0.244	3.725
Inflation Rate (INFR)	19.120	72.835	5.382	17.073	1.783	4.996
Exchange Rate (EXCR)	94.143	306.920	0.620	92.821	0.810	2.854
Trade Openness (TOPN)	30.127	58.917	7.362	12.468	-0.019	2.419

Source: Researcher's Computation Using Eviews 10

Table 2. Correlation matrix

	INDV	CRGD	EXCR	GFCF	INFR	INTR	LABR
INDV	1						
CRGD	-0.807	1					
EXCR	-0.849	0.701	1				
GFCF	-0.806	0.727	0.885	1			
INFR	0.408	-0.435	-0.351	-0.312	1		
INTR	0.002	-0.159	0.032	0.167	0.342	1	
LABR	-0.562	0.433	0.616	0.781	-0.333	0.084	1
	RGDP	GFCF	LABR	INDV	INTR	TOPN	EXCR
RGDP	1						
GFCF	0.408	1					
LABR	0.302	0.781	1				
INDV	-0.364	-0.806	-0.562	1			
INTR	0.519	0.167	0.084	0.002	1		
TOPN	0.418	0.455	0.56	0.036	0.445	1	
EXCR	0.25	0.885	0.616	-0.849	0.032	0.117	1

Source: Researcher's Computation Using Eviews 10

Table 2. Unit root test result

Augmented Dickey-Fuller (ADF)		Phillip-Peron (PP)			Order of Integration
Variable	t-statistic at Level	t-statistic at First Difference	Adjusted t-statistic at Level	Adjusted t-statistic at First Difference	
INDV	-4.0376 (0.0159)**	-----	-4.4749 (0.0067)**	-----	I(0)
CRGD	-3.2431 (0.0919)*	-5.0167 (0.0013)***	-2.2277 (0.4614)	-7.0943 (0.0000)***	I(1)
EXCR	-2.0793 (0.5399)	-4.5055 (0.0049)**	-1.5111 (0.8081)	-4.2496 (0.0094)**	I(1)
GFCF	-0.8987 (0.9457)	-4.0876 (0.0141)**	-1.4881 (0.8163)	-3.9735 (0.0187)**	I(1)
INTR	-5.1071 (0.0012)**	-----	-3.2976 (0.0820)*	-10.1409 (0.0000)***	I(1)
INFR	-4.0118 (0.0169)**	-----	-2.8678 (0.1837)	-10.6195 (0.0000)***	I(1)
LABR	-1.7423 (0.7124)	-5.2136 (0.0007)***	-2.0956 (0.5316)	-5.2621 (0.0007)***	I(1)
RGDP	-3.9821 (0.0179)**	-----	-3.9821 (0.0179)**	-----	I(0)
GFCF	-0.8987 (0.9457)	-4.0876 (0.0141)**	-1.4881 (0.8163)	-3.9735 (0.0187)**	I(1)
LABR	-1.7423 (0.7124)	-5.2136 (0.0007)***	-2.0956 (0.5316)	-5.2621 (0.0007)***	I(1)
INDV	-4.0376 (0.0159)**	-----	-4.4749 (0.0067)**	-----	I(0)
INTR	-5.1071 (0.0012)**	-----	-3.2976 (0.0820)*	-10.1409 (0.0000)***	I(1)
TOPN	-2.3735 (0.3867)	-8.0997 (0.0000)***	-2.175 (0.4892)	-19.8236 (0.0000)***	I(1)
EXCR	-2.0793 (0.5399)	-4.5055 (0.0049)**	-1.5111 (0.8081)	-4.2496 (0.0094)**	I(1)

Source: Researcher's Computation Using Eviews 10.

Note: *, **, and *** denotes significance at 10%, 5%, and 1% level; probabilities in ().

With respect to Model II (captured in the lower segment of Table 3), the new variables that is involved are 2growth rate of real gross domestic product" which is reported to be stationary at level by both test (RGDP is an I(0) variable); and trade openness which is however stated to be stationary at first difference by both test. Hence, trade openness is an I(1) variable.

Hence, we still have a scenario where the variables in the model are stationary at diverse 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.

4.4 Autoregressive Distributed Lag (ARDL) Bounds Test for Cointegration

The test for long-run equilibrium relationship is conducted for both Model I and Model II and the outcome is presented in Table 4 and Table 5 respectively. 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.

Given that the F-statistic (9.1804) in Model I lies outside the upper and lower critical bounds value at the 5% level (2.27 and 3.28 for upper and lower bounds respectively), we discard the null hypothesis of "no levels relationship" and conclude that there is levels relationship. That is, there is cointegration. The existence of cointegration validate that "there is a long run

relationship between financial development and industrialization in Nigeria".

Similarly, the F-statistic in Model II (5.1186) is over and above the 5% upper and lower critical bounds value. Therefore, we discard the null hypothesis of "no levels relationship" and conclude that cointegration exists. Hence, there is a long run equilibrium liaison amid industrialization and economic growth in Nigeria. The existence of long-run equilibrium rapport in the two models propels us to proceed to estimate "the error correction model" for the respective models under the ARDL framework.

4.5 ARDL Short-Run Error Correction Model

The ARDL short-run error correction regression is conducted to ascertain how the short-run imbalance is corrected so that equilibrium is achieved in the long-run. This is done for Model I and Model II.

The outcome of the short-run error correction regression for Model I, as depicted in Table 6, portrays the effect of the short-run coefficients of the variables on industrialization. The estimated model follows ARDL(2, 2, 1, 2, 0, 3, 2). For instance, it is observed that the a one-period lag in the index of industrialization has a progressive and substantial effect on industrialization, since it increases industrialization by 0.62%. Gross fixed capital formation is detected to exert an undesirable but insignificant effect on industrialization in the short-run; but its one-period lag has a deleterious and substantial effect by decreasing industrialization by 4.97%.

Table 3. ARDL bounds test result for model i

Null Hypothesis: "No Levels Relationship"				
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	9.1804	10%	1.99	2.94
k	6	5%	2.27	3.28
		1%	2.88	3.99

Source: Researcher's Computation Using Eviews 10.

Table 4. ARDL bounds test result for model II

Null Hypothesis: "No Levels Relationship"				
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	5.1186	10%	1.99	2.94
k	6	5%	2.27	3.28
		1%	2.88	3.99

Source: Researcher's Computation Using Eviews 10.

Table 5. ARDL short run error correction model result for model 1

Dependent Variable: D(INDV)		Selected Model: ARDL(2, 2, 1, 2, 0, 3, 2)		
Variable	Coefficient	Standard Error	t-Statistic	Probability
D(INDV(-1))	0.6155	0.1123	5.4797	.000***
D(GFCF)	-1.9016	1.4145	-1.3443	.1965
D(GFCF(-1))	-4.9771	1.49171	-3.3365	.0039**
D(LABR)	4.0724	1.6221	2.5105	.0225**
D(CRGD)	-0.0246	0.1135	-0.2165	.8311
D(CRGD(-1))	-0.4062	0.1133	-3.5833	.0023**
D(INFR)	0.024	0.0167	1.4361	.1691
D(INFR(-1))	-0.0805	0.0164	-4.8923	.000***
D(INFR(-2))	-0.0403	0.0195	-2.0613	.0549*
D(EXCR)	-0.06	0.0151	-3.9492	.001**
D(EXCR(-1))	0.0547	0.0135	4.0411	.001***
CointEq(-1)*	-0.5698	0.1384	-4.1156	.000***
R-squared		0.88	Akaike info criterion	3.583
Adjusted R-squared		0.825	Durbin-Watson statistic	2.111

Source: Researcher's Computation Using Eviews 10.

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

Also, labour force growth rate has a helpful and substantial effect on industrial productivity in the short-run, given the p-value of .0225. Therefore, a unit percent increase/decrease in the growth rate of labour force will lead to a 4.07% increase/decrease in industrial productivity in the short-run.

Most importantly, financial sector development (measured as a ratio of total credit to GDP) exerts a negative but inconsequential effect on industrial productivity in Nigeria in the short-run. Meanwhile, its one-period lag exerts a deleterious and momentous effect, as it reduces industrial productivity by 0.4060%. This shows that financial sector development has been contributing to the deindustrialization trends in Nigeria in the short-run.

Inflation exerts a progressive but trivial effect on industrial productivity in the short-run; while its one-period and second-period lag exerts an undesirable and substantial effect. Thus, the one-period lag and two-period lag of inflation reduces industrial productivity by 0.0805% and 0.0403% respectively.

Exchange rate is detected to exerts an adverse and momentous effect on industrial productivity in the short-run at the 5% level, given the p-value of .001. Thus, a unit percent increase/decrease in exchange rate will lead to a 0.06% decrease/increase in industrial productivity. Meanwhile, the one-period lag in exchange rate exerts progressive and substantial effect on industrial productivity at the 1% level of

significance, given the p-value of .001. It follows from the coefficient that the one-period lag of exchange rate increases industrial productivity by 0.0547%. This can be perceived from the fact that the exchange rate has been rising over the years, with previous period exchange rate being lower than the current period.

The error correction term, represented as CointEq(-1)*, captures the speed of fine-tuning of the short-run disequilibrium for stability to be achieved in the long-run. The coefficient of the ECM (-0.5698) is statistically substantial at the 1% level of significance and is rightly signed (negative). The coefficient implies that 56.98% of the short-run distortions in industrial productivity is rectified yearly so that stability is reinstated in the long-run. This implies that it will take approximately two years before stability can be wholly reinstated.

The r-squared which is 0.8800 shows that 88.0% of the total short-run variations in industrial productivity is explained by the variations in the explanatory variables. The adjusted r-squared (0.8250), which has been adjusted for degree of freedom still reflects a goodness of fit by explaining about 82.50% of the total variations in industrial productivity in the short-run. Meanwhile, the Durbin-Watson statistic (2.111) is approximately 2 and portrays the fact that there is no serial correlation in the model.

The result of the ARDL short-run error correction model is presented in Table 7. The lag length is automatically selected using the Akaike Information Criterion.

Table 6. ARDL short run error correction model result for model 1i

Dependent Variable: D(RGDP)		Selected Model: ARDL(1, 0, 0, 2, 2, 1, 1)			
Variable		Coefficient	Standard Error	t-Statistic	Probability
D(INDV)		-0.6276	0.2194	-2.8598	.0089**
D(INDV(-1))		0.5223	0.1751	2.9822	.0067**
D(INTR)		0.5826	0.1327	4.3879	.0002***
D(INTR(-1))		0.3678	0.1398	2.6299	.0150**
D(TOPN)		0.0623	0.0727	0.858	.3997
D(EXCR)		-0.1085	0.0277	-3.913	.001***
CointEq(-1)*		-0.9306	0.1273	-7.3083	.000***
R-squared	0.77076		Akaike info criterion	5.07	
Adjusted R-Squared	0.6491		Durbin-Watson stat	2.102	

Source: Researcher's Computation Using Eviews 10.

Note: ** and *** denotes significance at 5% and 1%, respectively.

Table 7. Long-run result for model i

Variable	Coefficient	Standard Error	t-Statistic	Probability
GFCF	0.3254	0.1253	2.5967	.0148**
LAB	0.7448	0.1491	4.9941	.000***
CRGD	-0.6113	0.1831	-3.3383	.0021***
INTR	-0.0993	0.1137	-0.8736	.3888
INFR	0.0159	0.0301	0.5281	.6010
EXCR	-0.0341	0.0107	-3.1843	.0032**
C	85.2643	72.7477	1.1720	.2498
R-squared	0.8167	F-statistic		23.773
Adjusted R-squared	0.7824	Prob(F-statistic)		0.0000***

Source: Researcher's Computation Using Eviews 10.

In the short run, we observe that deindustrialization plays a destructive and momentous role in the economic growth of Nigeria. It trails from the coefficient that a unit percent increase/decrease in deindustrialization will lead to a 0.6276% decrease/increase in economic growth. Also, the one-period lag in industrial development exerts a helpful and substantial effect on economic growth in Nigeria. Thus, the one-period lag in industrial productivity increases economic growth by 0.5223%.

Interest rate and its one-period lag exerts a desirable and momentous effect on economic growth of Nigeria at 1% and 5% level of significance respectively. A unit percent increase/decrease in interest rate will lead to a 0.5826% increase/decrease in economic growth of Nigeria. Meanwhile, the one-period lag in interest rate increases economic growth by 0.3678%.

Furthermore, exchange rate exerts a deleterious and momentous short-run effect on economic

growth of Nigeria. This is revealed by the significance of the coefficient at the 1% level, reflected by the p-value of .001. It trails from the coefficient that a unit percent increase/decrease in exchange rate will lead to a 0.1085% decrease/increase in economic growth.

The error correction term (-0.9306) is negative and statistically significant at the 1% level and is rightly signed (negative). It means that 93.06% of the short-run distortions in economic growth is adjusted yearly so that stability can be re-established in the long-run. It therefore implies that it will take approximately one (1) year for equilibrium to be wholly re-established. The r-squared (0.7076) indicates that 70.76% of the entire short-run discrepancies in economic growth is elucidated by the variations in the explanatory variables in the model, while the remaining 29.24% is elucidated by other variables not included in the model. The Durbin-Watson statistic of 2.102 is a clear indication of an absence of serial correlation.

4.6 Long-run result

The long-run result of Model I and Model II is presented in Table 8 and Table 9 respectively.

From Table 8, it is observed that both capital and labour are crucial for the growth of the industrial sector in Nigeria. The GFCF exerts a desirable and momentous influence on the index of industrial production (INDV) at the 5% level of significance, given the p-value of 0.015. It follows that an increase in domestic capital stock will provide the basis for industrial productivity while a decline in such will worsen industrial productivity. Given the coefficient of capital (0.3254), a unit percent increase/decrease in capital will lead to a 0.3254% increase/decrease in industrial output in Nigeria. Similarly, the labour force growth rate also exerts a positive and significant effect on index of industrial production at the 1% level of significance, given the p-value of .000. It follows from the coefficient of labour (0.7449) that a unit percent increase/decrease in labour will result to a 0.7449% increase/decrease in industrial productivity in Nigeria.

The financial sector development (CRGD) is perceived to have a deleterious and momentous effect on index of industrial production in Nigeria at the 1% level, given the p-value of .002. It follows from the coefficient (-0.6113) that a unit percent increase/decrease in financial development will lead to a 0.6113% decrease/increase in industrial productivity in Nigeria. This points out that financial development has not been stirring industrial productivity in Nigeria over the study period.

Also, inflation rate (INFR) exerts a progressive but paltry effect on industrial productivity in Nigeria, given the p-value of .6010 which is not statistically significant at the 5% level. In the same vein, interest rate generates a negative but insignificant effect on industrial productivity in Nigeria, since the p-value of .3888 is statistically insignificant at the 5% level.

Exchange rate generates an undesirable and momentous effect on industrial output at the 5% level, as portrayed by the p-value of .003. Given its coefficient (-0.0341), a unit percent increase/decrease in exchange rate will initiate a 0.0341% decrease/increase in industrial output. This implies that exchange rate depreciation will discourage importation of industrial manufactures

and therefore boost domestic production of such goods.

The r-squared (0.8167) is very high and indicates a good fit. It follows that 81.67% of the overall discrepancies in industrial productivity is explicated by variations in the explanatory variables; while the remaining 18.33% is elucidated by factors that are not captured in the model. The F-statistic (23.773) is statistically significant at the 1% level, given the p-value of .0000. The significance of the F-statistic is an indication that the overall model is statistically significant in explaining the dependent variable.

The long-run result for Model II is depicted in Table 8.

The result of the estimated growth model, being presented in Table 8, 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 GFCF and LABR are seen to exert a desirable and momentous influence on economic growth at the 5% level, given the p-value of .0055 and .0028 respectively. It follows from the coefficients that a unit percent increase/decrease in capital will lead to a 0.1661% increase/decrease in economic growth; while a unit percent increase/decrease in labour will exert a 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 desirable and momentous effect on economic growth of Nigeria at the 5% level, given the p-value of .0486. The coefficient (0.2718) portrays that a unit percent increase/decrease in trade openness will lead to a 0.2718% increase/decrease in economic growth in Nigeria. Similarly, interest rate is observed to exert a progressive and momentous effect on Nigeria's economic growth, given the p-value of .0276. It trails from the coefficient (0.4005) that a unit percent increase/decrease in interest rate will lead to a 0.4005% increase/decrease in economic growth. Meanwhile, exchange rate is observed to exert a deleterious but inconsequential effect on economic growth of Nigeria over the period of analysis.

Table 8. Long-run result for model ii

Variable	Coefficient	Standard Error	t-Statistic	Probability
GFCF	0.1661	0.0555	2.9942	.0055**
LABR	0.8490	0.2612	3.2495	.0028**
INDV	-0.9663	0.3277	-2.9486	.0059**
INTR	0.4005	0.1734	2.3088	.0276**
TOPN	0.2718	0.1325	2.0504	.0486**
EXCR	-0.0116	0.0216	-0.5368	.5951
C	127.1755	118.2891	1.0751	.2904
R-squared	0.8226	F-statistic		5.8401
Adjusted R-squared	0.7931	Prob(F-statistic)		0.0003***

Source: Researcher's Computation Using Eviews 10.

Note: ** and *** denotes significance at 5% and 1%, respectively.

The index of industrialization is detected to exert a deleterious and momentous influence on economic growth over the study period. This can be linked to the declining industrial sector contribution to the aggregate output over the years. From the coefficient (-0.9663), a unit percent increase/decrease in deindustrialization will lead to 0.9663% decrease/increase in economic growth.

The r-squared (0.8226) indicates that 82.26% of the overall discrepancies in economic growth is elucidated by the variations in the explanatory variables that are captured in the model, while the remaining 17.74% is elucidated by other factors not captured in the model. This indicates a good fit of the regression model. The F-statistic (5.8401), which is statistically significant at the 1% level (as captured by the p-value of .0003), indicates that the overall model is statistically significant in explaining the dependent variable.

4.7 Major Findings and Discussion of Findings

Financial sector development exerts a negative influence on industrialization in Nigeria. This submits that notwithstanding a number of financial sector reforms that have been put in place in the Nigeria economy, the financial sector has nosedived to impact positively on the industrial sector of the economy. Loayza and Ranciere [46] discovered an optimistic long-run rapport amid financial development and production growth, which coexists with a mainly undesirable short-run rapport amid financial fragility, viz., banking crises, financial sector instability, and output growth. According to [6], financial liberalization has a clear desirable impact on productivity growth, investment, manufacturing production, and economic growth for E.U. member countries. Our finding therefore

negates the position of the above studies as it relates to the Nigerian situation.

Such negative effect can be traced to indiscriminate financial globalization in the Nigerian setting. The negative impact of financial globalisation has been seen in increased financial uncertainty [7 – 8] and increased volatility in industrial activity [9]. Such negative influence of financial development on industrialization aligns with the work of [25]. It has also been clearly stated that “the emergence of the service sector as an overriding force in many developing economies has been followed by widespread deindustrialization, leaving these economies vulnerable to devastating financial bubbles” [26].

Labour and capital exerts a desirable and momentous influence on industrial productivity and economic growth of Nigeria. As noted by the traditional production function, $Q = f(K, L)$, labour and capital are very crucial in industrial production and thus enhance output growth of a nation.

Exchange rate vacillations are significant for industry, chiefly exporting industries. There is a substantial literature indicating “a connection between the real exchange rate and GDP growth” [55]. Rodrik [56] resolved that a feeble real exchange rate could reimburse for structural vulnerabilities plus market fiascos that contribute to “underinvestment” in developed countries' exchanged goods industry. According to [57], desirable exchange rates aid export industries such as manufacturing thrive in developed countries. “Exchange rate undervaluation serves as a subsidy to the tradable market” [58].

Industrialization is observed to exert a deleterious and momentous influence on

economic growth, both in the short-run and in the long-run. This is against the usual believe that “industrialization is an engine of economic growth” [2]. Growth in industries can boost the general productivity of the economy because it is a stimulant of other sub-sectors of the economy. The industrial sector is the one that can put to efficient use, the output from the primary sector of the economy. As industrial activities progresses, other tertiary sectors (such as the service sector) will develop in a faster pace to augment the activities of the industrial sector. Industrialization generates employment and also aid the enhancement of the standard of living of the people.

There is widespread agreement that industrialization is critical to a country's economic success. Some of these reasons may be traced back to Kaldor's law, which offers a conceptual foundation for the rapport concerning manufacturing and economic growth. The main argument of proponents of industrialization is that manufacturing has a larger productivity advantage over other sectors, as well as higher externalities that might result from manufacturing expansion [2]. In fact, the manufacturing sector not only has higher levels of productivity than other sectors and a greater capacity to absorb labour force [59], but it also promotes savings, accelerates the process of capital accumulation, and provides greater investment opportunities [60]. Furthermore, through pushing technical advancement, the manufacturing sector increases economies of scale [61], while also generating spill over benefits through links to other economic sectors. Other study has found that industrialization allows for broader economies of scale, with nations that can manufacture a wider range of commodities considerably more likely to see rapid economic expansion [62 – 63].

The negative effect observed in this study is attributable to the widespread deindustrialization recorded in Nigeria over the years. The industrial sector has been characterised with declining contribution to the overall output of the Nigerian economy, while the service sector has gained dominance. Inasmuch as growth in industrialization is an engine for growth, a declining industrial productivity can also be a bane on the growth of the overall economy. This is the Nigerian situation, as such, deindustrialization is working against the growth of the Nigerian economy over the period of study.

Interest rate is observed to exerts a desirable and substantial weight on economic growth. The positive relationship does not conform to the classical theory that when the rate of interest rises, saving rises and investment declines. Put differently, when interest rate rises, incentive to borrow for investment declines leading to a fall in investment and output. Unlike the standard view, some researchers have concluded that there is a favourable rapport concerning interest rates and spending. Lanyi and Saracoglu [64] discovered a favourable relationship concerning investment and interest rates in a volatile world and Beccarini [65] argued that the greater the impulsiveness of the interest rate, the stronger the association. Dore, Makken, and Eastman [66] discovered that spending was determined by macroeconomic demand rather than interest rates. If inflation exceeds the interest rate, the real interest rate will be negative. It could lead to currency depreciation and expenditure rationalization to other nations where policymakers are capable to sustain inflation. According to the “McKinnon–Shaw theorem”, a lesser or negative real interest rate depresses investment and thereby decreases the supply of loanable funds, restrains investment, which in turn slows the rate of economic growth.

Trade openness has a desirable but inconsequential weight on economic growth in the short-run; but such effect is desirable and substantial in the long-run. Countries that are export-oriented in the industrial sector have access to vast markets. Furthermore, “trade liberalization opens up access to imported inputs, technologies, and resources, as well as a more favourable exchange rate, which may fuel business growth” [67]. As pointed out by [67], trade openness has a substantial influence on economic development. According to [7], trade openness raises the likelihood of volatility in economic production induced by changes in trade conditions. The short-run insignificance and the corresponding significant long-run effect presupposes that the economy will progress as it moves along the learning curve of trade liberalization.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study examined the influence of the financial sector on industrialization in Nigeria from 1981 to 2019. Precisely, the study scrutinized the effect

of financial sector development on industrialization; and also probed the influence of industrialization on economic growth of Nigeria. Data were acquired from the "Central Bank of Nigeria Statistical Bulletin" and the "World Development Indicators". The study utilized the Augmented Dickey-Fuller unit root test, Autoregressive Distributed Lag (ARDL) Bounds test for co-integration, and Error Correction Model. The summary of findings of the study are as follows:

- i. Financial development exerts a negative and momentous impact on industrialization in Nigeria in the short-run and long-run. This implies that the underdeveloped financial system impedes industrial performance of the Nigerian economy.
- ii. Labour and capital exert a desirable and momentous weight on industrial productivity and economic growth in Nigeria. To produce the required output in the economy, an efficient and effective labour must be combined with adequate stock of capital. This implies that output of the industrial sector can be stimulated when both human and physical capital are in sufficient supply.
- iii. Exchange rate has a deleterious and momentous sway on industrialization and economic growth in Nigeria, in the short-run and long-run. The rising exchange rate renders the cost of importing required raw materials for industrial production. This impedes industrial activities which leads to deindustrialization and subsequent retardation of economic growth.
- iv. Industrialization exerts a negative and noteworthy impact on economic growth in Nigeria, both in the short-run and long-run. Though it could be expected that industrialization should drive growth, the declining industrial progression in Nigeria over the study period could however be attributed to the deleterious sway on economic growth.
- v. Interest rate has a desirable and substantial influence on economic growth both in the short-run and long-run. A certain degree of positive real interest rate is required to stimulate savings for capital formation. This will hitherto drive economic growth.
- vi. Trade openness has a positive but inconsequential weight on economic growth in the short-run; but such effect is positive and substantial in the long-run.

Trade openness encourages competition which could drive efficiency among local firms. Such competition which transcends to high productivity propels growth.

It is concluded that the financial sector has not been robust in boosting the industrialization drive of the Nigerian economy. Also, the industrial sector has not lived to its expectation of boosting growth in the Nigerian economy. As such, the study submits that deindustrialization trend arising from the underdeveloped financial sector in the Nigerian economy has been impeding long-term growth and prosperity of the Nigerian economy.

5.2 Recommendations

Given the findings of the study, the following recommendations are proffered:

- i. Previous financial sector reforms should be consolidated to make the financial sector robust to support industrialization, which will propel in Nigerian economy. Sound and developed financial system advances financial intermediation and the efficiency of economic activities. There is need to further strengthen and develop the activities in the Nigerian capital market. This will serve as a rallying point to mobilize huge capital for investments in the industrial sector of the Nigerian economy.
- ii. For the growth of the industrial sector of the Nigerian economy to be achieved, there is need for exchange rate stability since it generates a negative effect on the industrial sector output. High naira per dollar rates can generate high cost of importation of the required raw materials and machines required for efficient productivity and this in turn affects the overall output and growth of the industrial sector.
- iii. The availability of investment funds can also help drive industrial sector growth in Nigeria. There is need for effective credit rationing in favour of the industrial sector. This will lead to a significant investment and concomitant growth in the sector, which will in turn lead to growth in the overall economy. The monetary authority should make policy that will lead to increase in bank credit to the industrial sector.
- iv. Deindustrialization is observed to be a key impediment to sustainable economic

growth in Nigeria. It is therefore pertinent that growth in the industrial sector should be stimulated by removing the structural rigidities that may hamper the efficient and effective operation of the sector. The required infrastructures such as electricity, rail, road, security, etc. should be made available to boost productivity in the sector. Investors should be encouraged to redirect their investment plans towards the industrial sector. As evidenced in the study, there have been declining industrial sector performance over the years while a tremendous growth in the service sector have been witnessed. A paradigm shift to the industrial sector will boost industrial productivity which will in turn propel the growth of the Nigerian economy.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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