

Industrialization Strategies and Economic Growth in Nigeria

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Abstract

This study examined the impact of industrialization strategies on economic growth in Nigeria using annual time-series data covering the period 1980–2018. Real gross domestic product (RGDP) was employed as the proxy for economic growth, while industrial production index (IND) represented the principal measure of industrialization. Trade openness (OPNS), aggregate bank lending (ABL), tariff (TAR), exchange rate (EXR) and inflation (INF) were included as complementary explanatory variables. Secondary data were obtained from the Central Bank of Nigeria Statistical Bulletin, International Financial Statistics and World Development Indicators. The study employed Dickey-Fuller Generalised Least Squares and Phillips-Perron unit-root tests, followed by the Autoregressive Distributed Lag (ARDL) bounds-testing procedure and an Error Correction Model. Analysis of Variance (ANOVA) and the Welch test were also employed to examine differences among the means of the series. The unit-root results established that the variables were integrated at levels and first differences, with none integrated at order two. The ARDL bounds test produced an F-statistic of 10.02356, exceeding the relevant upper-bound critical values and confirming a long-run relationship among economic growth and the industrialization strategy variables. The short-run results showed that industrial production, trade openness and aggregate bank lending had positive and statistically significant effects on real GDP, while exchange rate had a negative and statistically significant effect. Tariff and inflation were statistically insignificant in the short run. In the long run, industrial production, trade openness and aggregate bank lending had positive and statistically significant effects on real GDP, while exchange rate and inflation had negative and statistically significant effects. Tariff and lagged RGDP were statistically insignificant. The error correction coefficient of -0.4503 indicated that approximately 45.03% of short-run disequilibrium was corrected within each period. The ANOVA F-test and Welch F-test both produced probability values of 0.0000, indicating statistically significant differences among the means of the series. The study concludes that industrialization strategies significantly contribute to economic growth in Nigeria, although their effectiveness depends on financial development, trade integration and macroeconomic stability. The study recommends strengthening domestic industrial production, expanding affordable credit to productive sectors, promoting export-oriented industrialization, maintaining exchange-rate stability, controlling inflation and improving the coordination and implementation of industrial policies.

Keywords: Industrialization, economic growth, industrial production, trade openness, bank lending, exchange rate, inflation, Nigeria, ARDL.

1.0 Introduction

1.1 Background of the Study

Industrialization is widely regarded as an important pathway through which developing economies can transform their productive structures, increase productivity, generate employment and achieve sustained economic growth. The process involves the transformation of an economy from dependence on primary production towards manufacturing, processing and other higher-productivity activities. In the Nigerian context, industrialization is particularly important because of the country's historical dependence on crude oil and other primary commodities. Chete, Adeoti, Adeyinka, and Ogundele (2016) observed that Nigeria's industrial structure has historically been dominated by petroleum and other primary-sector activities, while manufacturing has remained relatively weak. They argued that Nigeria's industrial policy needs to strengthen the linkages between primary production, manufacturing, domestic trade and international markets in order to achieve meaningful structural transformation.

The historical development of industrial policy in Nigeria reflects several attempts by successive governments to promote industrial growth. Following independence, the country adopted an import-substitution industrialization strategy aimed at reducing dependence on imported manufactured goods by encouraging domestic production. Chete et al. (2016) noted that import substitution was supported through measures such as import-duty relief, investment incentives and infrastructure development. However, the dominance of petroleum following the oil boom gradually weakened the relative importance of agriculture and manufacturing in the Nigerian economy. The subsequent economic difficulties of the early 1980s resulted in further policy adjustments, including the Structural Adjustment Programme introduced in 1986, which promoted greater market orientation and economic liberalization. These successive policy shifts demonstrate the continuous efforts of the Nigerian government to create an environment conducive to industrial development. Despite these policy efforts, the Nigerian industrial sector has continued to face considerable challenges. Asogwa (2018), in assessing industrial policy and manufacturing subsector performance in Nigeria, found no significant performance difference between prioritised and less-prioritised manufacturing subsectors under the examined policy regimes. This suggests that the existence of industrial policies alone may not be sufficient to produce the expected transformation when implementation constraints and structural bottlenecks persist. Similarly, Abiola, Kolawole, and Adebayo (2019) argued that industrial policy can serve as a powerful instrument for economic growth and sustainable development when it is properly designed and effectively implemented. Their analysis of Nigeria's industrial policy experience also highlighted weaknesses in policy implementation as an important obstacle to industrial development. Another important consideration is the relationship between industrial output and economic growth. Industrial development contributes to economic growth through increased production, employment creation, capital accumulation, technological development and the expansion of domestic and international markets. Ighodaro and Ajayi-Ojo (2019) empirically examined macroeconomic policies, industrialization and economic growth in Nigeria using annual data covering 1981–2017. Their findings showed that industrial output positively affected economic growth, while macroeconomic factors such as exchange rate, government expenditure and money supply influenced industrial output. The authors therefore emphasised the need for fiscal and macroeconomic policies that directly address the requirements of the industrial sector. Trade openness is also relevant to the industrialization process because access to international markets can provide opportunities for investment, technology transfer, competition and export expansion. However, excessive dependence on imported manufactured goods can also

undermine domestic production where local industries are unable to compete effectively. Afaha and Njogo (2012) examined trade openness and its implications for the Nigerian economy, while Guadagno (2012) examined the determinants of industrialization in developing countries and identified the importance of economic and structural conditions in determining industrial development. The attached study similarly identifies openness to trade as one of the important explanatory variables through which industrialization strategies may affect economic growth.

The availability of finance constitutes another important condition for industrial development. Industrial firms require access to credit to finance fixed investment, working capital, technology acquisition and expansion. Monogbe, Nduka, and Edori (2016) examined financial development and economic performance in Nigeria and highlighted the relationship between financial-sector development and economic performance. In the Nigerian industrial context, inadequate access to affordable long-term finance can constrain firms' ability to expand production and adopt modern technologies. Consequently, aggregate bank lending is relevant to understanding the relationship between industrialization strategies and economic growth. Macroeconomic stability is equally important because inflation, exchange-rate movements and interest rates influence the cost of production, investment decisions and the competitiveness of domestic industries. Agba and Odu (2013) identified globalisation and the challenges associated with industrialization as important issues for developing economies such as Nigeria. Similarly, the empirical study underlying this research includes exchange rate and inflation among the variables used to explain economic growth within the framework of industrialization strategies. The study's findings indicate that industrial production, trade openness and aggregate bank lending had positive and significant long-run relationships with economic growth, while exchange-rate movements exhibited a significant negative relationship with growth. The performance of Nigeria's industrial sector has also been characterised by fluctuations over time. Effiong (2022) reviewed Nigeria's industrial policies and industrial-sector performance from 1981 to 2020 and reported considerable fluctuations in industrial performance across different periods. The study concluded that greater coordination and synergy among industrial policies are required to improve industrial-sector performance. This observation is important for understanding the Nigerian experience because successive industrial strategies have not always produced corresponding improvements in industrial productivity and economic transformation. The period 1980–2018 is therefore particularly relevant for examining the relationship between industrialization strategies and economic growth in Nigeria. The period captures important changes in the country's industrial and macroeconomic policy environment, including the economic crisis of the 1980s, the Structural Adjustment Programme, subsequent liberalisation policies, democratic reforms and various industrial development initiatives. It therefore provides an appropriate period for assessing whether industrialization strategies translated into measurable improvements in economic growth. Against this background, the present study empirically examines the impact of industrialization strategies on economic growth in Nigeria between 1980 and 2018. In line with the framework in the source study, real gross domestic product represents economic growth, while industrial production index, trade openness, aggregate bank lending, tariff, exchange rate and inflation are considered within the industrialization-growth framework. The study is motivated by the continued concern that Nigeria has implemented several industrialization strategies without achieving the level of industrial transformation required to diversify the economy and sustain broad-based economic growth. The central issue, therefore, is whether industrialization strategies significantly influenced Nigeria's economic growth during the period under investigation.

1.2 Statement of the Problem

Industrialization is expected to serve as an important instrument for economic transformation, employment generation, poverty reduction and productivity improvement in developing economies. Despite the various industrial policies adopted by successive Nigerian governments, the country's industrial sector has not achieved the level of development required to significantly transform the structure of the economy. Nigeria's industrialization policies have undergone several changes, including import substitution, export-oriented approaches and market-oriented reforms. However, these changes have not consistently produced the expected industrial take-off. The source document notes that the transition from one industrial strategy to another did not translate into the anticipated economic transformation. This raises questions concerning the effectiveness of the strategies adopted to promote industrial development in Nigeria. The problem is further compounded by the closure and declining performance of industries. Economic, political and exchange-rate instability have affected the ability of industries to operate sustainably. Industrial enterprises require a stable economic environment in which investment and production decisions can be made with reasonable certainty. Persistent instability can therefore discourage investment, increase production costs and weaken industrial competitiveness. Inadequate access to finance is also a major constraint. The development and expansion of industrial enterprises require sufficient credit for investment and working capital. Where financial institutions are unable or unwilling to provide adequate loans and advances at appropriate conditions, industrial enterprises may experience difficulties in expanding their production capacity. The source document consequently identifies the financial system as an important prerequisite for successful industrialization. Another dimension of the problem concerns the interaction between industrialization and macroeconomic policies. Trade openness, tariffs, exchange rates and inflation can either support or constrain industrial development. Appropriate policies can encourage investment, production and competitiveness, whereas inappropriate policies may increase production costs and undermine domestic industries. The attached study therefore incorporated these variables into its empirical model in order to assess their relationship with economic growth. The limited industrial performance of Nigeria has important implications for economic growth. Weak industrial development restricts employment opportunities, limits diversification, reduces opportunities for value addition and maintains dependence on primary commodity activities. This creates a challenge for achieving sustainable and broad-based economic growth. Although previous empirical studies have investigated industrialization, trade openness, financial development and economic growth, the evidence remains mixed. The empirical review contained in the attached document shows differences in findings concerning the effects of foreign investment, trade liberalisation and financial development on industrialization and economic performance. It is therefore necessary to empirically assess the extent to which industrialization strategies have influenced Nigeria's economic growth. The central problem of this study is the inadequate industrial performance of Nigeria despite successive industrialization strategies and the need to establish empirically whether such strategies have significantly contributed to economic growth during the period 1980–2018.

1.3 Objectives of the Study

1.3.1 Main Objective

The main objective of this study is to empirically assess the impact of industrialization strategies on the economic growth of Nigeria.

1.3.2 Specific Objectives

The study specifically seeks to:

1. Evaluate the industrialization performance on economic growth in Nigeria;
2. Examine the ANOVA view on industrialization strategies in Nigeria; and
3. Examine the effect of policy on industrial performance in Nigeria.

1.4 Research Questions

Based directly on the objectives stated in the attached document, the study seeks to answer the following research questions:

1. What is the industrialization performance on economic growth in Nigeria?
2. What is the ANOVA view on industrialization strategies in Nigeria?
3. What is the effect of policy on industrial performance in Nigeria?

1.5 Research Hypotheses

The hypotheses are retained from the attached document, with only minor grammatical polishing while preserving their original meaning.

Hypothesis One

H₀₁: industrialization performance has no significant effect on economic growth in Nigeria.

H₁₁: industrialization performance has a significant effect on economic growth in Nigeria.

Hypothesis Two

H₀₂: The ANOVA view of industrialization strategies cannot be established in Nigeria.

H₁₂: The ANOVA view of industrialization strategies can be established in Nigeria.

Hypothesis Three

H₀₃: There is no significant effect of policy on industrial performance in Nigeria.

H₁₃: There is a significant effect of policy on industrial performance in Nigeria.

2.0 Review of Related Literature

2.1 Conceptual Review

2.1.1 Concept of Industrialization

Industrialization refers to the process through which an economy transforms its productive structure from predominantly primary activities towards manufacturing, processing and other activities characterised by greater value addition, productivity and technological content. It is not limited to the establishment of factories; rather, it encompasses the development of productive capacity, technological capability, infrastructure, finance, human capital and institutional arrangements that support sustained industrial production. In developing economies, industrialization is closely associated with structural transformation because it facilitates the movement of labour and capital from relatively low-productivity activities into higher-productivity manufacturing and related activities. Newman et al. (2019) emphasised that manufacturing transformation remains an important pathway for developing economies seeking to diversify production, increase productivity and generate employment. They further noted that industrial development depends not only on manufacturing capacity but also on the institutional and policy environment within which firms operate. The importance of manufacturing-led industrialization remains particularly relevant to African economies. Haraguchi, Cheng, and Smeets (2019) examined patterns of structural change and industrialization and demonstrated that manufacturing continues to occupy an important position in the development process, although the nature and speed of industrialization differ considerably across countries. More

recently, Mensah et al. (2024) found that manufacturing continues to represent an important route to structural transformation in Sub-Saharan Africa, despite concerns about premature deindustrialization. Their findings suggest that manufacturing remains a reliable pathway through which African economies can increase productive capacity and diversify away from dependence on primary commodities. For Nigeria, industrialization is particularly significant because the economy has historically depended heavily on crude oil and other primary commodities. The Central Bank of Nigeria describes manufacturing as a productive hub of the Nigerian economy and identifies inadequate electricity, limited access to affordable finance, weak infrastructure and multiple taxation as continuing constraints on manufacturing performance. Thus, industrialization in Nigeria requires more than industrial policy formulation; it requires a combination of productive investment, finance, infrastructure, appropriate trade policies and macroeconomic stability.

2.1.2 Concept of industrialization Strategies

Industrialization strategies are deliberate policy measures adopted by governments to promote industrial production, productivity, investment, employment and structural transformation. Such strategies may include import substitution, export promotion, trade liberalisation, tariff protection, investment incentives, credit interventions, infrastructure provision, exchange-rate management and policies designed to encourage foreign and domestic investment.

Nigeria has implemented different industrialization strategies over time. The historical pattern has included import-substitution policies, export-oriented approaches, structural adjustment and market-oriented reforms. The effectiveness of these strategies depends not simply on their formulation but on the extent to which they create incentives for productive investment and improve the operating environment of firms. Chete et al. (2019) argue that industrial policy in resource-rich economies such as Nigeria must address structural weaknesses that constrain manufacturing competitiveness. Their analysis highlights the importance of infrastructure, skills, finance, market access and institutional coordination in determining whether industrial policies produce meaningful transformation. The contemporary understanding of industrialization strategies also recognises the interaction between domestic policy and international economic integration. Structural transformation research by Felipe, Mehta, and Rhee (2019) demonstrates that the movement of economies into manufacturing and other productive sectors is influenced by trade, technology, productivity and the changing structure of domestic demand. This implies that industrialization strategies must be designed in a manner that allows domestic industries to benefit from international markets without being overwhelmed by import competition.

2.1.3 Industrial Production

Industrial production represents the volume or level of output generated by industrial activities within an economy. In empirical studies, industrial production is commonly measured using an industrial production index or industrial output indicator. It captures changes in the productive activities of manufacturing, mining, utilities and other industrial subsectors.

Industrial production is a central variable in the present study because it provides an empirical measure of industrialization performance. An increase in industrial production may indicate greater utilisation of productive capacity, increased investment, employment creation and higher value addition. Consequently, improvements in industrial production can contribute directly and indirectly to aggregate economic growth. The relationship between industrial production and economic growth has continued to receive empirical attention. Lopes Rocha (2018) argues that

manufacturing possesses special characteristics, including increasing returns, technological learning and productivity spillovers, which can make it an important driver of economic growth. Similarly, recent evidence continues to support the proposition that manufacturing output is positively associated with aggregate output growth. Abebe (2026), for example, found evidence supporting Kaldor's manufacturing-led growth proposition in Ethiopia, with manufacturing output growth exerting a significant positive causal effect on aggregate GDP and non-manufacturing output. For Nigeria, Udeaja, Akanni, and Offum (2021) found that finance is an important driver of industrial growth and showed that sector-specific credit provides a better explanation of industrial performance than aggregate private-sector credit. This finding reinforces the relevance of industrial production as a central indicator of industrialization performance.

2.1.4 Economic Growth

Economic growth refers to a sustained increase in the productive capacity and real output of an economy over time. It is commonly measured by real gross domestic product (RGDP), which adjusts output for changes in prices and therefore provides a better indication of changes in actual production. In the present study, real GDP constitutes the dependent variable because the objective is to determine whether industrialization strategies significantly influence economic growth in Nigeria. The relationship between industrialization and growth is based on the proposition that an expanding industrial sector can generate employment, investment, productivity improvements, technological advancement, export earnings and inter-sectoral linkages. Recent Nigerian evidence confirms the importance of industrial and macroeconomic variables for economic growth. Ighodaro and Ajayi-Ojo (2019) found that industrial output and macroeconomic policy variables were important determinants of Nigeria's economic performance. The Nigerian economy has also experienced substantial fluctuations in real GDP growth. IMF data show, for example, that real GDP growth was 1.9% in 2018, 2.2% in 2019, contracted sharply in 2020, and subsequently recovered in 2021 and 2022. Such fluctuations reinforce the importance of identifying structural and policy factors capable of supporting sustained growth.

2.1.5 Trade Openness

Trade openness refers to the degree to which an economy participates in international trade. It is commonly measured as the ratio of the sum of exports and imports to GDP:

$$\text{Trade Openness} = (\text{Exports} + \text{Imports}) / \text{GDP} \times 100$$

Trade openness can affect industrialization through several channels. First, access to international markets provides domestic firms with opportunities to expand exports. Second, imported machinery, intermediate inputs and technology can improve domestic productive capacity. Third, international competition can encourage firms to improve productivity. However, excessive import competition can weaken domestic industries where local firms face significant infrastructure, financing and technological disadvantages.

Recent evidence indicates that the effect of trade openness on Nigerian economic growth can depend on exchange-rate conditions. Gimba, Omale, and Anaba (2025) examined trade openness and economic growth in Nigeria and specifically investigated the moderating effect of exchange-rate volatility. Their study demonstrates the importance of considering trade openness together with exchange-rate conditions rather than treating openness as an isolated determinant of growth. The relationship between trade and structural transformation is also supported by international

evidence. Felipe et al. (2019) demonstrate that trade is an important component of structural transformation, although its contribution depends on the productive capabilities and industrial structure of individual economies. Consequently, trade openness can promote industrialization when it facilitates access to technology, capital goods and international markets, but it may produce weaker industrial outcomes where domestic productive capacity is insufficient.

2.1.6 Aggregate Bank Lending

Aggregate bank lending refers to the volume of credit supplied by banking institutions to economic agents. Within the context of industrialization, bank lending provides firms with funds required for investment, working capital, acquisition of machinery, expansion of production and technological upgrading. Access to credit is particularly important for industrial firms because industrial investment often requires substantial initial capital and long repayment periods. Where lending is inadequate or prohibitively expensive, firms may operate below capacity or postpone investment. Udejaja et al. (2021) found that finance is a significant driver of industrial growth in Nigeria. Their study further showed that aggregate credit to the industrial sector provides a more appropriate measure for analysing the finance-industrial growth relationship than general private-sector credit. Similarly, Effiong and Ekong (2022) examined bank credit and industrial-sector growth in Nigeria for 1981–2018 and found that bank credit had a positive and significant effect on industrial-sector performance in both the short and long run. More recent evidence by Uyo, Anthony, and Nsonwu (2024) also indicates a significant long-run relationship among deposit-money-bank credit, lending rates, inflation and manufacturing-sector output in Nigeria.

The relevance of bank lending is also reflected in the policy interventions of the Central Bank of Nigeria. The CBN has implemented facilities such as the Real Sector Support Facility, Non-Oil Export Stimulation Facility and Export Development Facility to improve access to finance for productive sectors. Therefore, aggregate bank lending represents an important component of the industrializations strategy examined in this study.

2.1.7 Tariff

A tariff is a tax imposed on imported goods and services. Tariffs are commonly used as instruments of trade and industrial policy. Governments may impose tariffs to protect domestic industries from foreign competition, generate government revenue or encourage domestic production. From an industrialization perspective, tariffs can provide temporary protection to infant industries by increasing the price of imported competing products. However, excessively high tariffs can increase production costs where domestic industries depend on imported machinery, raw materials and intermediate inputs. The effectiveness of tariffs therefore depends on their design and the structure of domestic production. Industrial policy must distinguish between tariffs that protect productive domestic capacity and tariffs that simply increase costs without improving competitiveness. Newman et al. (2019) emphasise that successful industrial transformation requires policy measures that strengthen productive capabilities rather than merely sheltering inefficient firms from competition. For Nigeria, tariff policy is particularly relevant because many manufacturing firms depend on imported machinery and intermediate inputs. A tariff regime that raises the cost of productive inputs may adversely affect industrial output, whereas appropriately designed protection can support domestic value addition.

2.1.8 Exchange Rate

The exchange rate represents the value of one country's currency relative to another currency. In an industrializing economy, exchange-rate movements influence the cost of imported inputs, machinery and raw materials, while also affecting the competitiveness of exports.

Exchange-rate depreciation can make domestic exports cheaper in international markets and potentially encourage local production. However, where domestic industries depend heavily on imported inputs, depreciation can substantially increase production costs. The ultimate effect of exchange-rate movements on industrial production therefore depends on the import intensity of domestic production, the structure of exports and the degree of exchange-rate stability.

Recent Nigerian evidence confirms the importance of exchange-rate management. Wosu and Aturuchi (2024) found a negative relationship between exchange rate and industrial capacity utilisation in Nigeria over 1980–2023. Likewise, Olubiyi and Ogunro (2025) examined exchange-rate volatility and manufacturing-sector output in Nigeria and identified exchange-rate volatility as an important factor affecting sectoral manufacturing performance.

At the broader economic level, Oyadeyia et al. (2025) found that exchange-rate depreciation beyond certain thresholds can become harmful to Nigerian economic growth. Their findings highlight the importance of exchange-rate stability for sustainable economic performance.

2.1.9 Inflation

Inflation refers to a sustained increase in the general price level of goods and services. Inflation affects industrialization through its influence on production costs, purchasing power, investment decisions, interest rates and macroeconomic stability.

Moderate and predictable inflation may be less disruptive to industrial investment than high and volatile inflation. However, persistent inflation increases the cost of raw materials, labour and other production inputs and may reduce real demand for manufactured goods.

Oyadeyia et al. (2025) examined inflation, interest rates and exchange rates in Nigeria and found that inflation has an important threshold relationship with economic growth. Their findings indicate that inflation becomes harmful to growth when it exceeds growth-supporting levels, highlighting the need for macroeconomic stability as part of growth policy.

Inflation is therefore relevant to this study because industrialization does not occur in isolation from the macroeconomic environment. A sustained increase in production costs caused by inflation can weaken industrial competitiveness and reduce the capacity of firms to invest and expand.

2.2 Conceptual Relationship among the Variables

The conceptual framework of the study is based on the proposition that industrialization strategies influence economic growth through industrial production and the broader economic environment. Industrial Production Index (IND) represents industrialization performance. Increased industrial production is expected to raise real GDP through increased output, employment, productivity and value addition. Trade Openness (OPNS) represents the extent of Nigeria's participation in international trade. Greater openness may enhance growth by expanding markets and facilitating technology and capital-goods imports, although its effect may depend on domestic productive capacity and exchange-rate conditions. Aggregate Bank Lending (ABL) represents financial support for productive activities. Increased lending is expected to promote industrial investment and output by relaxing financing constraints.

Tariff (TAR) represents trade-policy intervention. Its effect depends on whether tariff protection

stimulates domestic production or raises the cost of imported productive inputs.

Exchange Rate (EXR) represents an important macroeconomic policy variable affecting the cost of imported inputs and the competitiveness of Nigerian exports.

Inflation (INF) represents macroeconomic stability. High and unstable inflation is expected to increase production costs and weaken investment and economic growth.

The dependent variable, Real Gross Domestic Product (RGDP), represents economic growth.

Thus, the study's conceptual relationship can be expressed as:

$RGDP = f(IND, OPNS, ABL, TAR, EXR, INF)$

The framework is consistent with the original study, which specified real GDP as the dependent variable and industrial production, openness, aggregate bank lending, tariff, exchange rate and inflation as explanatory variables.

2.3 Theoretical Review

2.3.1 Kaldor's Growth Theory

Origin and Proponent of the Theory

The theoretical foundation adopted for this study is Kaldor's Growth Theory, associated with the British economist Nicholas Kaldor. Kaldor developed his major propositions concerning manufacturing and economic growth in his 1966 paper, "Causes of the Slow Rate of Economic Growth of the United Kingdom," and subsequently developed them further in his writings during the late 1960s and 1970s. Although Kaldor's original theory predates the 2018–2026 literature period, it is retained here because the theory itself was formulated in 1966. The recent literature continues to test, refine and apply Kaldor's propositions to contemporary economies. For example, recent research continues to find evidence that manufacturing output growth is associated with aggregate economic growth.

Content of Kaldor's Growth Theory

Kaldor's theory places the manufacturing sector at the centre of economic development. The central proposition is that manufacturing acts as an engine of economic growth because it possesses characteristics that enable productivity and output to expand more rapidly than in many other sectors. Kaldor's framework is generally expressed through three major propositions. First, the growth of manufacturing output is positively associated with the growth of the economy as a whole. In other words, economies in which manufacturing output expands more rapidly are expected to experience faster aggregate economic growth. Manufacturing therefore functions as an engine that pulls other sectors of the economy along with it. Second, manufacturing output growth generates productivity growth within manufacturing. This proposition is closely related to the Verdoorn effect. As manufacturing production expands, firms benefit from economies of scale, learning-by-doing, technological improvements and greater specialisation. These processes increase labour productivity. Third, the growth of manufacturing generates productivity growth in the wider economy through inter-sectoral linkages. Expanding manufacturing creates demand for agricultural inputs, transportation, financial services, energy, communications and other supporting activities. Thus, industrial development can generate multiplier effects throughout the economy. Recent scholarship continues to support the relevance of these propositions. Rocha (2018) identifies the Keynesian-Kaldorian, structuralist and neo-Schumpeterian approaches as important explanations of manufacturing-led growth and emphasises the special characteristics of manufacturing for productivity and development.

Similarly, Szirmai and Verspagen (2019) and subsequent structural-transformation research continue to examine the role of manufacturing in development. More recent empirical evidence from Portugal indicates that manufacturing output growth is positively associated with aggregate economic growth, productivity and employment transformation.

Evidence from Africa is particularly relevant to the present study. Mensah et al. (2024) found that manufacturing remains a leading pathway towards structural transformation in Sub-Saharan Africa, notwithstanding concerns about premature deindustrialization. More recently, Abebe (2026) found strong support for Kaldor's first growth law in Ethiopia, with manufacturing output growth exerting a positive causal effect on GDP and non-manufacturing output.

Relevance of Kaldor's Growth Theory to the Present Study

Kaldor's Growth Theory is highly relevant to this study for several reasons.

First, the first proposition of Kaldor directly corresponds with the first objective of the study, which seeks to evaluate industrialization performance in relation to economic growth in Nigeria. The study uses the industrial production index as a measure of industrialization performance and real GDP as the measure of economic growth. The theory predicts that an increase in industrial production should be associated with an increase in aggregate output.

Second, the theory provides a theoretical justification for treating industrial production as a major explanatory variable in the economic-growth model. The original study identifies industrial production index as the major industrialization variable, while trade openness, aggregate bank lending, tariff, exchange rate and inflation capture the broader economic and policy environment. Third, Kaldor's emphasis on increasing returns, productivity and inter-sectoral linkages explains why industrialization can generate effects beyond the industrial sector itself. Manufacturing requires finance, transportation, energy, raw materials and commercial services. Consequently, increased industrial activity can stimulate other sectors and contribute to aggregate GDP. Fourth, the theory helps explain the relevance of trade openness. Kaldorian analysis recognises the importance of expanding markets for manufacturing production. Contemporary research similarly finds that manufactured exports and productive integration with international markets can support structural transformation. Fifth, the theory provides a basis for considering exchange rate and other policy variables within the industrialization-growth relationship. A competitive and relatively stable macroeconomic environment can support industrial production and exports, whereas unstable exchange rates and high inflation can undermine industrial competitiveness. Finally, the theory is particularly appropriate for Nigeria because the country's persistent dependence on primary commodity exports makes structural transformation and manufacturing development important policy concerns. The theory therefore provides a coherent framework for examining whether improvements in industrial production, supported by finance, trade and appropriate macroeconomic policies, translate into higher economic growth. On this basis, Kaldor's Growth Theory provides the theoretical foundation for investigating whether Nigeria's industrialization strategies significantly affected economic growth during 1980–2018.

2.4 Summary of the Reviewed Literature

The literature reviewed establishes that industrialization is a multidimensional process involving expansion of productive capacity, manufacturing development, technological advancement, finance, trade and supportive macroeconomic policies. Industrial production is particularly important because it represents the productive dimension of industrialization and is theoretically

expected to contribute to economic growth. The review further shows that trade openness can provide access to international markets, technology and capital goods, although its effect depends on domestic productive capacity. Aggregate bank lending can relax financing constraints and stimulate industrial investment, while tariff policy can either support infant industries or increase production costs depending on its design. Exchange-rate movements affect the cost of imported inputs and export competitiveness, while inflation affects production costs and macroeconomic stability. Recent Nigerian evidence generally supports the importance of finance, industrial production and macroeconomic policy in determining industrial and economic performance. For instance, Udejaja et al. (2021) identify finance as a significant driver of industrial growth, while Effiong and Ekong (2022) find that bank credit positively affects industrial-sector performance. More recent studies also demonstrate that exchange-rate and inflation conditions remain important for Nigeria's growth and industrial performance. The review therefore provides theoretical and empirical support for examining the joint influence of industrial production, trade openness, aggregate bank lending, tariff, exchange rate and inflation on real GDP. It also establishes the relevance of Kaldor's Growth Theory as the theoretical foundation of the study.

2.5 Research Gap

The review of related literature reveals that considerable empirical and theoretical attention has been devoted to the relationship between industrialization and economic growth, particularly in developing economies and Nigeria. Existing studies generally establish that industrial development and manufacturing activities can contribute to economic growth through productivity improvement, employment generation, technological advancement, capital accumulation and linkages with other sectors of the economy. The reviewed literature also indicates that the effectiveness of industrialization is influenced by complementary macroeconomic and financial conditions, including trade openness, availability of bank credit, tariff structure, exchange-rate movements and inflation. However, a number of gaps remain in the existing literature. First, several recent studies have examined individual aspects of industrialization, such as manufacturing output, industrial sector performance, bank credit, exchange-rate movements or trade openness, rather than examining industrialization as a broader strategy involving the simultaneous interaction of industrial production and relevant macroeconomic and financial variables. For example, Ighodaro and Ajayi-Ojo (2019) examined the relationship among macroeconomic policies, industrialization and economic growth in Nigeria, while Udejaja, Akanni, and Offum (2021) focused specifically on the finance-industrial growth nexus. Effiong and Ekong (2022) investigated bank credit and industrial-sector growth, while Gimba, Omale, and Anaba (2025) concentrated on trade openness and economic growth with exchange-rate volatility as a moderating factor. These studies provide useful evidence but leave room for an integrated assessment of industrialization strategies and economic growth within a single empirical framework. Second, the literature shows limited attention to the combined influence of industrial production index, trade openness, aggregate bank lending, tariff, exchange rate and inflation on economic growth. The present study addresses this gap by incorporating these variables into a common model, with real gross domestic product representing economic growth. This approach makes it possible to examine not only the contribution of industrial production to growth but also the extent to which the financial, trade and macroeconomic environment supports or constrains industrialization and economic performance.

Third, there is a period-specific gap in the literature. Although a number of recent studies have used more contemporary data, there is comparatively limited evidence that systematically examines Nigeria over the 1980–2018 period using an integrated industrialization-growth framework. The selected period covers important changes in Nigeria's industrial and macroeconomic policy environment and therefore provides an appropriate basis for examining the longer-term relationship between industrialization strategies and economic growth.

Fourth, existing studies have paid greater attention to regression-based relationships than to the statistical comparison of industrialisation strategies and their performance across observations or groups. The present study therefore complements the econometric analysis with an ANOVA perspective, as specified in the study objectives, in order to examine whether statistically significant differences exist in the means associated with the industrialization strategies under consideration. Fifth, although studies such as Asogwa (2018) and Effiong (2022) have examined industrial policies and industrial-sector performance in Nigeria, the evidence remains fragmented regarding how policy instruments interact with industrial production and broader economic growth. Asogwa (2018), for instance, found no significant performance difference between prioritised and less-prioritised manufacturing subsectors or between the policy regimes examined, while Effiong (2022) reported fluctuations in industrial-sector performance and emphasised the need for greater policy synergy. This suggests the need for further empirical investigation into the role of policy-related variables and the macroeconomic environment in shaping industrial performance. Consequently, the major gap addressed by this study is the absence of a sufficiently integrated empirical assessment of industrialization strategies and economic growth in Nigeria, incorporating industrial production index, trade openness, aggregate bank lending, tariff, exchange rate and inflation within a single framework. The study further extends the literature by combining ARDL-based short-run and long-run analysis with an ANOVA assessment over the 1980–2018 period. In doing so, the study seeks to provide evidence on whether industrialization performance significantly influences economic growth, whether differences in industrialization strategy outcomes can be statistically established, and whether policy and associated macroeconomic conditions significantly affect industrial performance in Nigeria. The gap is particularly important because Nigeria's industrialisation challenge cannot be understood solely from the perspective of industrial output. Industrial performance is closely connected to access to finance, international trade, tariff protection, exchange-rate stability and price stability. A comprehensive empirical investigation of these interconnected factors can therefore provide stronger evidence for the formulation of industrial and macroeconomic policies aimed at achieving sustained economic growth in Nigeria.

3.0 Methodology

3.1 Research Design

The study adopted an ex-post facto research design based on annual time-series data for Nigeria covering the period 1980–2018. The choice of the period was informed by the need to capture different phases of industrialization and economic policy in Nigeria, including the period before and after the trade liberalisation reforms introduced in the mid-1980s. The study's stated scope is specifically to empirically assess the impact of industrialization strategies on Nigerian economic growth during 1980–2018. The ex-post facto design is appropriate because the variables under investigation had already occurred and could not be manipulated by the researcher. The study therefore relied on historical observations on real gross domestic product, industrial production, trade openness, aggregate bank lending, tariff, exchange rate and inflation.

The empirical approach is consistent with recent Nigerian studies that have employed time-series econometric techniques to investigate industrialization, manufacturing performance, financial development and macroeconomic conditions. For instance, Udejaja, Akanni, and Offum (2021) employed an ARDL framework to investigate the finance-industrial growth nexus in Nigeria, while Effiong and Ekong (2022) used ARDL to examine bank credit and industrial-sector performance. (CBN Digital Commons)

3.2 Population and Sample

The population of the study comprises the Nigerian economy over the period covered by the available annual macroeconomic and industrial-sector observations. The sample consists of 39 annual observations from 1980 to 2018. The final effective sample size after model adjustments was 39 observations, as reported in the ARDL estimation. □

3.3 Model Specification

The study investigates the effect of industrialization strategies on economic growth, with real gross domestic product (RGDP) serving as the proxy for economic growth and industrial production index (IND) serving as the principal proxy for industrialization.

The explanatory variables incorporated into the model are:

- Industrial Production Index (IND)
- Trade Openness (OPNS)
- Aggregate Bank Lending (ABL)
- Import Tariff (TAR)
- Exchange Rate (EXR)
- Inflation Rate (INF)

The functional relationship is specified as:

$$RGDP = f(IND, OPNS, ABL, TAR, EXR, INF)$$

The econometric model is therefore expressed as:

$$\ln RGDP_t = \alpha_0 + \beta_1 \ln RGDP_{t-1} + \beta_2 \ln IND_{t-1} + \beta_3 OPNS_{t-1} + \beta_4 ABL_{t-1} + \beta_5 TAR_{t-1} + \beta_6 EXR_{t-1} + \beta_7 INF_{t-1} + \epsilon_t$$

where:

RGDP = real gross domestic product;
IND = industrial production index;
OPNS = trade openness;
ABL = aggregate bank lending;
TAR = import tariff;
EXR = exchange rate;
INF = inflation rate;
 β_1 = intercept
 $\beta_1 - \beta_6$ = parameters to be estimated; and
 ϵ_t = stochastic error term.

The attached study specifies the same general relationship and states that all variables were expressed in natural logarithms except inflation. □

3.3.1 A Priori Expectations

The expected signs of the coefficients are:

A' Priori Expectation: $\alpha_0 > 0$, $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 < 0$, $\beta_5 < 0$, $\beta_6 < 0$ and $\beta_7 > 0$

Industrial production, trade openness and bank lending are expected to support economic growth, while excessive tariffs, exchange-rate instability/depreciation and inflation are expected to constrain growth. These expectations are also consistent with recent Nigerian evidence showing the importance of industrial output, finance, trade and macroeconomic stability for economic performance. Ighodaro and Ajayi-Ojo (2019), for example, found a positive effect of industrial output on economic growth, while recent evidence indicates that exchange-rate instability and inflation can become constraints on economic performance. (UDSM Journals)

3.4 Measurement of Variables

Variable	Symbol	Measurement	Source
Real Gross Domestic Product	RGDP	GDP adjusted for inflation	CBN
Industrial Production Index	IND	Industrial production index	IFS
Trade Openness	OPNS	(Imports + Exports)/GDP	Author's computation
Aggregate Bank Lending	ABL	Aggregate bank lending/financial-sector credit	CBN/WDI
Tariff	TAR	Import tariff	WDI
Exchange Rate	EXR	Sterling exchange-rate index	CBN
Inflation	INF	Percentage change in GDP deflator	CBN

The variable definitions and sources follow the original study's data construction. □

3.5 Sources and Type of Data

The study utilised secondary annual time-series data covering 1980–2018. Data were obtained principally from the Central Bank of Nigeria Statistical Bulletin, International Financial Statistics and World Development Indicators. Trade openness was computed by the researcher as the ratio of imports plus exports to GDP.

3.6 Estimation Techniques

3.6.1 Unit Root Tests

The study employed the Dickey-Fuller Generalised Least Squares (DF-GLS/ERS) and Phillips-Perron (PP) unit root tests. The purpose was to determine the order of integration of each variable and ensure that none of the variables was integrated of order two, I(2).

This preliminary procedure is important because non-stationary time-series variables can produce misleading regression relationships. The original study reports that the variables were a mixture of I(0) and I(1), making the ARDL bounds-testing procedure appropriate. □

3.6.2 ARDL Bounds Cointegration Test

The study employed the Autoregressive Distributed Lag (ARDL) bounds-testing approach developed by Pesaran, Shin, and Smith. The technique is suitable where variables are integrated at different orders, provided none is I(2). It also permits the estimation of both short-run and long-run relationships within a single framework.

The attached study explicitly selected ARDL because of the mixed order of integration and the

relatively small annual sample. □

The null hypothesis is:

The test has the null hypothesis of $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ against the alternative hypothesis $H_1: \beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0, \beta_4 \neq 0, \beta_5 \neq 0$ Null hypothesis indicates the absence of a long-run relationship

A calculated F-statistic greater than the upper-bound critical value leads to rejection of the null hypothesis and establishes a long-run relationship.

3.6.3 Error Correction Model

$$\begin{aligned} \Delta \ln \text{RGDP}_t &= \alpha_0 + \sum_{i=0}^q \alpha_{1j} \Delta \ln \text{RGDP}_{t-i} \\ &+ \sum_{i=1}^p \alpha_{2j} \Delta \ln \text{IND}_{t-i} + \sum_{i=0}^q \alpha_{3j} \Delta \ln \text{OPNS}_{t-i} + \sum_{i=0}^q \alpha_{4j} \Delta \ln \text{TAR}_{t-i} + \sum_{i=0}^q \alpha_{5j} \Delta \ln \text{EXR}_{t-i} \\ &+ \sum_{i=0}^q \alpha_{6j} \Delta \ln \text{INF}_{t-1} + \sum_{i=0}^q \alpha_{7j} \Delta \text{ABL}_{t-1} + \lambda \text{ECT}_{t-1} + \epsilon_t \end{aligned}$$

Where the error correction term, ECT_{t-1} captures the short-run dynamics. ECT_{t-1} guides the variables in the system to restore back to the long-term equilibrium relationship which shows at what rate the short-run disequilibrium is eliminated. Its coefficient should be negative and statistically significant after the estimation, which subsequently validates that there is long-run equilibrium relationship among the variables.

3.6.4 Analysis of Variance

ANOVA was employed to test the equality of means among the series in accordance with the second specific objective. Both the conventional ANOVA F-test and Welch F-test were used. The Welch test is particularly useful where equality of variances across groups may not be assumed. The decision rule is to reject the null hypothesis when the probability value is less than 0.05.

4.0 Data Presentation, Analysis and Discussion of Results

4.1 Presentation and Analysis of Results

4.1.1 Unit Root Test

As a preliminary step in the estimation process, the study conducted unit-root tests using the Dickey-Fuller Generalised Least Squares (DF-GLS/ERS) and Phillips-Perron (PP) procedures. The purpose was to determine the order of integration of the variables and ensure that none of the variables was integrated of order two, $I(2)$, which would invalidate the application of the ARDL bounds-testing procedure.

Table 4.1a: Dickey-Fuller GLS (ERS) Unit Root Test

Variable	T-Statistic	Critical Value at 5%	Order of Integration	Probability
RGDP	7.136135	2.943427	I(1)	0.0000
IND	3.505167	2.941145	I(1)	0.0000
OPNS	1.992663	1.949856	I(0)	0.0000
TAR	2.486598	1.950117	I(0)	0.0178
EXR	4.763174	1.949856	I(1)	0.0000
INF	6.823087	1.949856	I(1)	0.0000

Source: Author's Computation (2021).

Table 4.1b: Phillips-Perron Unit Root Test

Variable T-Statistic Critical Value at 5% Order of Integration Probability

RGDP	7.613547	2.943427	I(1)	0.0000
IND	6.095336	2.941145	I(0)	0.0000
OPNS	4.710963	2.941145	I(1)	0.0005
TAR	6.928161	1.950117	I(1)	0.0000
EXR	3.142602	1.949856	I(1)	0.0004
INF	7.340876	2.941145	I(1)	0.0000

Source: Author's Computation (2021).

The results indicate that the variables are integrated at either level, I(0), or first difference, I(1), depending on the test employed. Importantly, none of the variables is integrated at I(2). This satisfies the stationarity requirement for the ARDL bounds-testing approach. The mixture of I(0) and I(1) variables further justifies the selection of ARDL as the appropriate estimation technique for the study.

4.1.2 Bounds Cointegration Test

The bounds-testing procedure was employed to determine whether a long-run relationship exists among real gross domestic product, industrial production index, trade openness, aggregate bank lending, tariff, exchange rate and inflation.

Table 4.2: ARDL Bound Cointegration Test Result
Dependent Variable: EDC (Restricted Constant and No Trend)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0) Asymptotic: n=1000	I(1)
F-statistic K	10.02356 5	10%	3.67	3.2
		5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	39		Finite Sample: n=39	
		10%	2.592	3.454
		5%	3.1	4.088
		1%	4.31	5.544
			Finite Sample: n=34	
		10%	3.728	3.431
		5%	3.164	4.194
		1%	4.428	5.816

Source: Author's Computation (2021)

The calculated F-statistic of 10.02356 exceeds the relevant upper-bound critical values. Consequently, the null hypothesis of no levels relationship is rejected at the conventional significance levels. The result establishes the existence of a long-run equilibrium relationship among RGDP and the selected industrialization strategy variables.

This finding implies that although individual variables may experience short-run fluctuations, their movements are linked by a stable long-run relationship over the study period.

4.1.3 Regression Result
Table 4.3: ARDL Result

Dependent var.	Δ RGDP
	Short-run Parameters
ECT	-0.4503*** (0.2213)
Δ RGDP(-1)	0.1591 (0.1426)
Δ IND	0.2204* (0.1715)
Δ OPNS	0.1747* (0.1575)
Δ ABL	0.3576** (0.0545)
Δ TAR	-0.0694 (0.1494)
Δ EXR	-0.0165** (0.0165)
Δ INF	0.0165 (0.0165)
Constant	0.1026 (0.5762)
	Long-run Parameters
RGDP(-1)	0.0200 (0.1674)
IND	0.2558** (0.1250)

OPNS	0.1432** (0.0745)
ABL	0.5678** (0.0879)
TAR	-0.0534 (0.2107)
EXR	-0.0876* (0.3425)
INF	-0.0876* (0.3425)
Included	39
Obs. after adjustments	

NOTE: ***, ** and * indicate the level of significance at 1%, 5% and 10% respectively

Source: Author's Computation (2021)

4.1.3 ARDL Regression Results

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively.
Source: Author's Computation (2021).

4.1.3.1 Interpretation of Short-Run Results

The short-run ARDL estimates indicate that industrial production index, trade openness, aggregate bank lending and exchange rate have statistically significant effects on real GDP, while tariff and inflation are statistically insignificant in the short run.

The coefficient of lagged real GDP is 0.1591 and is positive but statistically insignificant. Therefore, the result indicates a positive association between past and current real GDP, but there is insufficient statistical evidence to conclude that lagged RGDP significantly affects current RGDP within the estimated short-run model. The previous interpretation that a 1% increase in lagged RGDP would cause a fall in current RGDP is incorrect because the reported coefficient is positive. Industrial production index has a coefficient of 0.2204, which is significant at the 10% level. This indicates that a 1% increase in industrial production is associated with approximately a 0.22% increase in real GDP in the short run, holding the other variables constant. The result provides evidence that industrial production contributes positively to economic activity.

Trade openness has a coefficient of 0.1747, significant at the 10% level. Thus, a 1% increase in trade openness is associated with approximately a 0.17% increase in real GDP in the short run, ceteris paribus. Aggregate bank lending has a coefficient of 0.3576, significant at the 5% level. This implies that a 1% increase in aggregate bank lending is associated with approximately a 0.36% increase in real GDP in the short run. The result highlights the importance of financial-sector support to productive activity. Tariff has a coefficient of -0.0694, but it is statistically insignificant. The negative sign suggests that increases in import tariffs may be associated with lower economic output, potentially through increased costs of imported machinery and intermediate inputs; however, the statistical evidence is insufficient to establish a significant short-run effect. Exchange rate has a coefficient of -0.0165, significant at the 5% level. Hence, exchange-rate movements have a statistically significant negative association with real GDP in the short run. The finding suggests that exchange-rate instability or adverse exchange-rate movements can constrain economic activity. Inflation has a coefficient of 0.0165, but it is

statistically insignificant. Therefore, although the estimated coefficient is positive, the result does not provide sufficient statistical evidence that inflation significantly affects real GDP in the short run. The positive coefficient should consequently not be interpreted as evidence that inflation causes higher economic growth.

4.1.3.2 Interpretation of Long-Run Results

The long-run estimates reveal that industrial production, trade openness and aggregate bank lending have positive and statistically significant effects on economic growth, while exchange rate and inflation have negative and statistically significant effects. Tariff and lagged RGDP are statistically insignificant. The coefficient of lagged RGDP is 0.0200, which is positive but statistically insignificant. Therefore, while the estimated relationship is positive, the study does not establish a statistically significant long-run effect of lagged RGDP on current RGDP.

Industrial production index has a coefficient of 0.2558, significant at the 5% level. This means that a 1% increase in industrial production is associated with approximately a 0.26% increase in real GDP in the long run, holding other variables constant. The finding provides strong evidence in support of industrial production as an important driver of Nigerian economic growth.

Trade openness has a coefficient of 0.1432, significant at the 5% level. A 1% increase in trade openness is therefore associated with approximately a 0.14% increase in real GDP in the long run. Aggregate bank lending has the largest positive coefficient among the major explanatory variables, at 0.5678, and is significant at the 5% level. Thus, a 1% increase in aggregate bank lending is associated with approximately a 0.57% increase in real GDP in the long run. This finding demonstrates the importance of financial-sector development and access to credit for sustained economic activity. Tariff has a coefficient of -0.0534 , but the coefficient is statistically insignificant. The negative sign indicates an inverse association between tariff and economic growth, although the study does not establish a statistically significant long-run tariff effect.

Exchange rate has a coefficient of -0.0876 , significant at the 10% level. The result indicates that adverse exchange-rate movements are associated with lower real GDP in the long run. This finding suggests that exchange-rate instability constitutes an important constraint on sustained economic performance. Inflation also has a coefficient of -0.0876 , significant at the 10% level. Therefore, a 1% increase in inflation is associated with approximately a 0.09% decline in real GDP in the long run, holding other factors constant. The result indicates that persistent inflationary pressures can undermine long-run economic performance.

4.1.4 Error Correction Mechanism

The error correction term is -0.4503 and statistically significant at the 1% level. The negative and significant coefficient confirms the existence of an adjustment mechanism through which short-run deviations from long-run equilibrium are corrected. The coefficient implies that approximately 45.03% of the previous period's disequilibrium is corrected in the subsequent period. Thus, the system adjusts substantially toward its long-run equilibrium following a short-run shock. The reciprocal of the adjustment coefficient, approximately 2.22 periods, provides a rough indication of the time required for substantial restoration toward equilibrium. Since the data are annual, this corresponds to approximately two years and three months under the simple reciprocal interpretation. However, the appropriate interpretation of the ECT coefficient itself is a 45.03% annual speed of correction, rather than **2.2207 as the speed-of-adjustment coefficient**. The significant ECT also confirms that the variables share a long-run equilibrium relationship. It should not, however, be interpreted by itself as evidence that every individual explanatory

variable causes RGDP. Rather, it establishes the presence of systematic adjustment toward long-run equilibrium.

4.1.5 Analysis of Variance

Table 4.4: Test for Equality of Means Between Series

Method	Df	F-Statistic	Probability
ANOVA F-test (5, 228)		56.86668	0.0000
Welch F-test (5, 98.3433)		62.23166	0.0000

Analysis of Variance

Source of Variation	df	Sum of Squares	Mean Square
Between	5	6.63E+20	1.33E+20
Within	228	5.32E+20	2.33E+18
Total	233	1.19E+21	5.13E+18

Source: Author's Computation (2021).

The probability value of the ANOVA F-test is 0.0000, which is below the 5% significance level. Similarly, the Welch F-test produces a probability value of 0.0000. The null hypothesis of equality of means is therefore rejected. The result indicates that the means of the series are statistically different. The Welch result reinforces this conclusion even when unequal variances across groups are allowed. The ANOVA result therefore provides statistical evidence of significant differences among the series considered in the study. It should be noted that ANOVA establishes differences in means; it does not by itself establish causality among the variables. The evidence concerning the effect of industrialization strategies on economic growth is therefore primarily derived from the ARDL estimates, while ANOVA provides complementary evidence concerning differences among the series.

4.2 Test of Hypotheses

Hypothesis One

H₀₁: industrialization performance has no significant effect on economic growth in Nigeria.

The ARDL results show that industrial production index has a positive and statistically significant effect on real GDP in both the short run and long run. The coefficient is 0.2204 in the short run at the 10% level and 0.2558 in the long run at the 5% level.

Therefore, H₀₁ is rejected.

The study concludes that industrialization performance significantly affects economic growth in Nigeria.

Hypothesis Two

H₀₂: ANOVA view on industrialization strategies cannot be established in Nigeria.

The ANOVA F-test and Welch F-test both produce probability values of 0.0000, which are below the 5% significance level.

Therefore, H₀₂ is rejected.

The study concludes that statistically significant differences exist among the means of the series examined.

Hypothesis Three

H₀₃: There is no significant effect of policy on industrial performance in Nigeria.

The empirical evidence demonstrates that selected policy-related macroeconomic variables have statistically significant relationships with economic performance. In particular, exchange rate is significant in both the short run and long run, while inflation is significant in the long run. Tariff carries the expected negative sign but is statistically insignificant.

Accordingly, the evidence does not support the proposition that policy-related variables have no effect whatsoever. H_{03} is rejected in the broader policy-effect interpretation, with the qualification that not every individual policy variable is statistically significant.

4.3 Discussion of Results

The study established a long-run relationship among real GDP, industrial production index, trade openness, aggregate bank lending, tariff, exchange rate and inflation. This finding indicates that industrialization and economic growth in Nigeria are interconnected with financial, trade and macroeconomic conditions. The positive and significant effect of industrial production on economic growth is consistent with Ighodaro and Ajayi-Ojo (2019), who found a positive effect of industrial output on Nigerian economic growth. It also supports the broader argument that industrial production can stimulate economic growth through productivity, employment, investment and inter-sectoral linkages. The positive effect of trade openness on economic growth indicates that international trade can contribute to Nigerian economic performance. This result is consistent with recent evidence by Gimba, Omale and Anaba (2025), who reported a significant relationship between trade openness and economic growth in Nigeria, while also demonstrating the importance of exchange-rate volatility in determining the strength of that relationship.

The strong positive effect of aggregate bank lending demonstrates the importance of financial-sector development to economic activity. This finding is consistent with Udejaja, Akanni and Offum (2021), who established that finance is a significant driver of industrial growth in Nigeria. It is also consistent with Effiong and Ekong (2022), who reported that bank credit positively and significantly affected industrial-sector growth in both the short and long run.

The negative and significant effect of exchange rate in the short and long run suggests that exchange-rate instability constitutes a major constraint on Nigeria's economic performance. This result is consistent with more recent Nigerian evidence. Wosu and Aturuchi (2024) found an adverse relationship between exchange-rate conditions and industrial-sector performance, while Olubiyi and Ogunro (2025) examined exchange-rate effects on industrial output and further demonstrated the importance of exchange-rate conditions for different industrial subsectors.

The negative and significant long-run effect of inflation indicates that persistent inflationary pressures can undermine economic growth. This finding is consistent with Oyadeyia et al. (2025), who identified threshold effects of inflation and exchange-rate movements on Nigerian economic growth. Their findings reinforce the importance of maintaining macroeconomic stability for sustainable growth. The insignificant tariff coefficient suggests that tariff policy alone did not exert a statistically significant effect on real GDP within the estimated model, despite its negative sign. This finding should therefore be interpreted cautiously. It does not imply that tariffs are irrelevant to industrialization; rather, the evidence from this particular model and period is insufficient to establish a statistically significant tariff effect.

The findings also provide an important qualification to the interpretation of industrial policy in Nigeria. Asogwa (2018) found no significant difference in manufacturing performance between prioritised and less-prioritised subsectors or between the policy regimes examined. This suggests that the mere formulation or prioritisation of industrial policy may not be sufficient to generate improved industrial performance. Policy effectiveness depends on implementation, finance,

infrastructure, trade conditions and macroeconomic stability.

5.0 Summary, Conclusion, Contribution and Recommendations

5.1 Summary of Findings

The study examined the effect of industrialization strategies on economic growth in Nigeria using annual time-series data from 1980 to 2018. Real GDP represented economic growth, while industrial production index represented the principal measure of industrialization. Trade openness, aggregate bank lending, tariff, exchange rate and inflation were incorporated as additional explanatory variables.

The major findings are summarized as follows:

1. The DF-GLS and Phillips-Perron tests established that the variables were integrated at either $I(0)$ or $I(1)$, with none integrated at $I(2)$.
2. The ARDL bounds test produced an F-statistic of 10.02356, which exceeded the relevant upper-bound critical values, confirming a long-run relationship among the variables.
3. In the short run, industrial production, trade openness and aggregate bank lending had positive and statistically significant effects on real GDP, while exchange rate had a negative and statistically significant effect.
4. Tariff had a negative but statistically insignificant short-run effect.
5. Inflation had a positive but statistically insignificant short-run coefficient and therefore should not be interpreted as a significant determinant of short-run economic growth in the estimated model.
6. In the long run, industrial production, trade openness and aggregate bank lending had positive and statistically significant effects on real GDP.
7. Exchange rate and inflation had negative and statistically significant long-run effects on economic growth.
8. Tariff had a negative but statistically insignificant long-run effect.
9. Lagged RGDP had positive but statistically insignificant coefficients in both the short-run and long-run specifications.
10. The error correction coefficient of -0.4503 indicates that approximately 45.03% of short-run disequilibrium is corrected each year.
11. The ANOVA and Welch tests both produced probability values of 0.0000, indicating statistically significant differences among the means of the series.

5.2 Conclusion

The study concludes that industrialization strategies are important determinants of economic growth in Nigeria. The evidence particularly demonstrates that industrial production, trade openness and aggregate bank lending contribute positively to economic performance.

The positive effect of industrial production confirms the importance of expanding Nigeria's productive and manufacturing base. Similarly, the positive effect of aggregate bank lending demonstrates that industrialization requires adequate access to finance. Trade openness also contributes positively to economic performance, suggesting that international market integration can support growth when domestic productive capacity is sufficiently developed.

However, the negative effects of exchange rate and inflation in the long run demonstrate that industrialization cannot be sustained without macroeconomic stability. Exchange-rate instability increases uncertainty and the cost of imported industrial inputs, while persistent inflation can undermine purchasing power, investment and production.

The study therefore concludes that Nigeria's industrialization strategy should be implemented within an integrated policy framework that combines industrial development, financial-sector support, trade policy and macroeconomic stability.

5.3 Contribution to Knowledge

The study contributes to existing knowledge in four principal ways.

First, it provides empirical evidence that industrial production significantly contributes to Nigerian economic growth over the 1980–2018 period.

Second, it demonstrates the importance of financial-sector development by establishing a strong positive relationship between aggregate bank lending and economic growth.

Third, it demonstrates that industrialization outcomes are closely connected to macroeconomic conditions, particularly exchange rate and inflation.

Fourth, the study combines ARDL short-run and long-run analysis with ANOVA evidence, thereby providing complementary econometric and statistical perspectives on industrialization strategies in Nigeria.

5.4 Recommendations

Based on the corrected empirical findings, the study recommends that:

1. Industrial production should be strengthened

Government should pursue policies that increase domestic industrial and manufacturing capacity through improved infrastructure, technology adoption, local sourcing and value addition.

2. Affordable industrial finance should be expanded

Financial institutions should increase access to affordable medium- and long-term credit for manufacturing and other productive sectors. This recommendation is strongly supported by the positive and significant effect of aggregate bank lending.

3. Export-oriented industrialization should be encouraged

Nigeria should develop policies that enable domestic manufacturers to compete effectively in international markets and increase manufactured exports.

4. Exchange-rate stability should be prioritised

Given the negative and significant effect of exchange rate, monetary and fiscal authorities should adopt measures that reduce excessive exchange-rate volatility and improve foreign-exchange access for productive industries.

5. Inflation should be controlled

Macroeconomic authorities should strengthen inflation-control measures because the empirical evidence shows that persistent inflation has a significant negative long-run relationship with economic growth.

6. Tariff policy should be carefully designed

Although tariff was statistically insignificant, its negative coefficient suggests that excessive tariffs may increase production costs. Tariff policy should therefore distinguish between finished consumer goods and machinery/raw materials required by domestic industries.

7. Industrial and financial policies should be coordinated

Industrial policy should be implemented together with financial-sector, exchange-rate, trade and monetary policies. The evidence indicates that industrialization cannot be effectively promoted through isolated policy interventions.

8. Policy implementation should be strengthened

Government should focus not only on formulating industrial policies but also on implementation, monitoring and evaluation. The experience reported by Asogwa (2018) suggests that policy prioritisation alone does not guarantee superior industrial performance.

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