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Agricultural Sector and Industrial Development in Nigeria

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Abstract

This study examines the relationship between agricultural development and industrial sector performance in Nigeria, focusing on both short-run and long-run dynamics. Using annual time-series data from 1990–2024 sourced from the Central Bank of Nigeria, National Bureau of Statistics, and the World Bank, the study employs the Autoregressive Distributed Lag (ARDL) approach to estimate long-run relationships, while the Error Correction Model (ECM) captures short-run dynamics. Granger causality tests are further used to determine the direction of influence between the sectors. The results indicate that agricultural output has a positive and statistically significant effect on industrial performance, with a 1% increase in agricultural output leading to a 0.62% increase in industrial output in the long run. The ECM coefficient confirms a stable long-run relationship with moderate adjustment speed. Bidirectional causality exists between agriculture and industry, although agriculture exerts a stronger influence. The findings highlight the importance of strengthening agricultural productivity and agro-industrial linkages to promote sustainable industrial development and economic diversification in Nigeria.

Keywords: *Agricultural Output, Industrial Development, Structural Transformation, ARDL Cointegration*

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Background to the Study

The interplay between agriculture and industrial development has long been recognised as a central pillar in the economic transformation agenda of developing economies, with Nigeria presenting a quintessential case of this nexus. Historically, agriculture in Nigeria has been the backbone of the economy, contributing significantly to gross domestic product (GDP), employment, food security, and rural livelihoods (Onwuka et al., 2025; Okoli & Onugha, 2025). In the post-independence era, agriculture accounted for a dominant share of economic activity, providing raw materials for nascent industrial sectors and sustaining the burgeoning labour force. However, the discovery of oil and subsequent policy distortions led to a relative neglect of agriculture, undermining its capacity to effectively link with industrial growth and value addition processes (Oluwasani et al., 2021).

Academics have argued that the productive performance of agriculture influences industrial expansion through forward and backward linkages; agricultural outputs supply industrial inputs while incomes generated in rural areas expand domestic demand for industrial goods (Kelikume & Nwani, 2020). Empirical evidence suggests that both agriculture and industry remain critical drivers of Nigerian GDP, with agriculture historically contributing a larger share but industrial activities gaining traction in specific periods (Adenomon & Oyejola, 2015). Yet persistent structural challenges — such as low technological adoption, inadequate infrastructure, and limited value chain integration — have constrained the transformative potential of Nigeria's agricultural sector and its capacity to stimulate industrial development (Onomu & Aliber, 2024).

Recent policy discourse stresses the need for revitalised strategies that enhance agricultural productivity, foster agro–industrial linkages, and diversify the economy away from oil dependence. Strengthening the agricultural value chain, investing in agro-processing capabilities, and promoting manufacturing that utilises local agricultural raw materials are seen as key to sustainable industrialisation and inclusive growth (Adesoye et al., 2021). Against this backdrop, this research examines the dynamic relationship between agriculture and industrial development in Nigeria, assessing how agricultural transformation can support industrial performance and contribute to broader economic development objectives.

The study was guided by the following key objectives:

1. To empirically examine the impact of agricultural output on industrial sector performance in Nigeria.
2. To analyse the long-run and short-run dynamics between agriculture and industrial development in Nigeria.
3. To assess the direction and magnitude of causality between agricultural development and industrial growth in Nigeria.

Literature Review

Overview of Agricultural Sector and Industrial Sector Development in Nigeria

Agriculture has historically played a foundational role in Nigeria's economic structure. In the immediate post-independence period, the sector was the dominant contributor to national

output, employment, and export earnings. Cash crops such as cocoa, groundnut, palm produce, and rubber positioned Nigeria as a leading agricultural exporter in Sub-Saharan Africa. According to World Bank (2022), agriculture continues to account for a significant share of employment in Nigeria, engaging a large proportion of the rural population and serving as a primary source of livelihood. Similarly, the Food and Agriculture Organization emphasises that the sector remains central to food security, poverty reduction, and rural development across developing economies, including Nigeria.

However, the discovery of crude oil in commercial quantities in the late 1950s and the oil boom of the 1970s shifted policy attention away from agriculture toward the petroleum sector. Scholars such as Olu Ajakaiye (1988) and Sarah Anyanwu (1997) argue that the oil-driven structural transformation weakened agricultural competitiveness through exchange rate appreciation, rural-urban migration, and declining public investment in agricultural infrastructure. This phenomenon, often described as the "Dutch disease," contributed to declining agricultural exports and increasing food imports. Despite several policy interventions, including the Operation Feed the Nation programme (1976), the Green Revolution (1980), and more recent initiatives such as the Agricultural Transformation Agenda (2011), productivity growth in the sector has remained relatively modest compared to its potential.

In terms of industrial development, Nigeria's industrial sector comprises manufacturing, mining, construction, and utilities. The manufacturing subsector has historically been dominated by light consumer goods industries, including food processing, textiles, cement, and beverages. The import substitution industrialisation (ISI) strategy adopted in the 1960s and 1970s aimed at reducing dependence on imported manufactured goods and fostering domestic production. However, structural constraints such as inadequate infrastructure, limited technological capacity, weak linkages with local raw materials, and policy inconsistencies have hindered sustainable industrial growth. The United Nations Industrial Development Organization notes that Nigeria's level of industrial value addition remains low relative to its population size and resource endowment.

Empirical studies indicate that Nigeria's industrial growth has been volatile, reflecting macroeconomic instability, exchange rate fluctuations, and heavy dependence on imported intermediate inputs. Charles Soludo (2007) observes that the lack of strong backward and forward linkages between agriculture and industry has constrained structural transformation. Agro-processing industries, which should ideally serve as a bridge between primary production and manufacturing, remain underdeveloped. Consequently, Nigeria exports largely unprocessed agricultural commodities while importing processed food and industrial goods, limiting domestic value creation.

Recent reforms have sought to revitalise both sectors through diversification strategies under successive national development plans. Policy frameworks increasingly emphasise value chain development, agro-industrial clusters, and local content utilisation as mechanisms for

deepening agriculture–industry linkages. Nonetheless, the persistence of infrastructural deficits, insecurity in farming regions, limited access to credit, and technological gaps continue to undermine progress. The trajectory of agricultural and industrial sector development in Nigeria reflects a pattern of structural imbalance. While agriculture retains its importance in employment and rural income generation, industrialisation has not reached the level necessary to absorb surplus labour or significantly transform the economy.

Theoretical Literature

The relationship between agriculture and industrial development has been extensively explained within the framework of structural transformation theories. This study is anchored on three major theoretical perspectives that provide a robust foundation for understanding the agriculture–industry nexus in developing economies such as Nigeria.

Structural Transformation Theory

The Structural Transformation Theory explains the process through which an economy shifts from being predominantly agrarian to one characterised by industrial and service sector dominance. Early contributions by Simon Kuznets (1966) and Hollis B. Chenery (1979) emphasise that economic development involves sectoral reallocation of labour and output from low-productivity agriculture to higher-productivity industrial activities. According to this framework, rising agricultural productivity is a prerequisite for industrial expansion because it releases surplus labour, generates savings, supplies raw materials, and creates demand for manufactured goods.

In the Nigerian context, this theory implies that improvements in agricultural output and productivity should stimulate industrial growth through raw material provision and increased rural incomes. However, where agricultural productivity remains low or weakly linked to domestic manufacturing, structural transformation may be slow or distorted. The theory therefore underscores the importance of productivity-enhancing investments in agriculture as a foundation for sustainable industrialisation.

Dual-Sector Model (Lewis Model)

The Dual-Sector Model, developed by W. Arthur Lewis (1954), provides a classical explanation of the interrelationship between agriculture and industry in developing economies. The model assumes the existence of a traditional agricultural sector characterised by surplus labour and low productivity, and a modern industrial sector with higher productivity and capital accumulation. Economic development occurs as surplus labour migrates from agriculture to industry, where higher wages and reinvested profits stimulate further expansion.

Within this framework, agriculture performs critical roles: it supplies labour to the industrial sector, provides food for the growing urban workforce, and generates savings that can finance industrial investment. For Nigeria, the Lewis model suggests that industrial development depends partly on the capacity of the agricultural sector to produce a surplus without

jeopardising food security. However, if labour exits agriculture without corresponding productivity gains, the result may be declining food output and structural imbalance. The model thus highlights the need for coordinated agricultural and industrial policies.

Linkage Theory (Unbalanced Growth Theory)
The Linkage Theory, advanced by Albert O. Hirschman (1958), emphasises the importance of backward and forward linkages in stimulating economic development. Backward linkages occur when industrial sectors demand inputs from other domestic sectors, while forward linkages arise when the output of one sector serves as input for another. Agriculture and industry are strongly connected through such linkages, particularly via agro-processing and manufacturing activities.

In the Nigerian economy, agriculture provides raw materials for industries such as food processing, textiles, beverages, and leather production (backward linkages), while industrial development enhances agricultural productivity through the supply of fertilisers, machinery, and processing technologies (forward linkages). Hirschman argues that strategic investment in sectors with strong linkage effects can generate multiplier impacts across the economy. Applied to this study, the theory suggests that strengthening agro-industrial value chains could accelerate industrial development and overall economic growth.

Empirical Literature
Several recent empirical investigations have examined how agriculture relates to wider economic performance in Nigeria. For example, Okoli and Onugha (2025) analysed how disaggregated components of the agricultural sector, crop farming, livestock, fishery, and forestry, affect job creation in Nigeria using annual time-series data from 1990 to 2023. The study applied unit-root testing and an Autoregressive Distributed Lag (ARDL) model to estimate short- and long-run relationships. Findings showed that agricultural subsectors exhibit differentiated effects on labour force outcomes, with crop and livestock farming significantly driving employment creation, while recommendations emphasised investment in technology and financing to strengthen the sector's employment impact.

Udoffia, Udofia, and Sunday (2025) investigated the role of agricultural output in economic diversification in Nigeria using data from 1982 to 2023. Employing Augmented Dickey–Fuller tests, ARDL bounds tests for cointegration, error-correction modelling and Granger causality, the study found that agricultural production has a significant long-run impact on economic growth, and there is a unidirectional causal link from agriculture to manufacturing over the study period. The authors concluded that strengthening agriculture could support broader diversification, particularly through boosting manufacturing's raw material base. Afolabi Olusesan Samuel (2025) examined the effect of agricultural output on Nigeria's economic growth between 1981 and 2021 using time-series data sourced from the Central Bank of Nigeria and World Bank databases. Analysed via regression techniques, the study found that crop, livestock and fishery outputs positively correlate with GDP, whereas forestry exhibited divergent effects. Based on these results, the author reported that

agricultural productivity remains a key driver of growth and recommended enhanced funding and infrastructure to sustain sector performance.

Ojo, Tijani and colleagues (2025) conducted an empirical study of Nigeria's agricultural supply response under the Agricultural Transformation Agenda (ATA) using time-series data from the last two decades. Through dynamic econometric models, the research showed that production responses to policy interventions are limited by structural constraints, suggesting that past transformation efforts have had mixed impacts on output growth and sector resilience. The authors highlighted the need for complementing policy reforms with technology and improved market access. A study by Awe, Adamu, and Oyelayo (2025) explored agricultural productivity, economic growth, and poverty reduction in Nigeria through trend analysis. Although primarily descriptive, the empirical work showed that periods of rising agricultural productivity coincide with stronger growth and greater poverty reduction. The authors concluded that comprehensive productivity improvements are critical for inclusive economic outcomes.

Umeh and Mensah-Bonsu (2025) examined how agricultural-related infrastructure and government spending influence food security outcomes using a Dynamic Ordinary Least Squares (DOLS) model on long-run time-series data. The study found that investments in transport and agriculture significantly affect agricultural output and per-capita food production, concluding that appropriately targeted public spending can enhance sector performance and indirectly support industrial development through improved food security. In the manufacturing-agriculture interface, Ibitoye and Ogunoye (2025) assessed the joint effect of agricultural and manufacturing sector performance on Nigeria's economic growth using ARDL and bounds tests with data covering 1980 to 2022. Their estimates revealed significant positive long-run relationships between agricultural output, manufacturing output, and GDP, indicating that improvements in both sectors contribute to national economic performance, while highlighting macroeconomic variables such as interest rates that also matter.

Emerging research on technology's role in African agriculture (e.g., Adeyemo *et al.*, 2025) empirically investigates how technological adoption affects agricultural output across crop and livestock subsectors using ARDL techniques. Although not industry-specific to Nigeria alone, findings highlight that technology has heterogeneous effects on subsector outputs, underscoring the importance of innovation in enhancing agriculture's overall contribution to structural transformation, including industrial development. The study by Kelikume and Nwani (2020) examined the causal linkage between agricultural output and real GDP in Nigeria using annual data from 1981–2018 and techniques including Granger causality, Vector Autoregression (VAR), impulse response functions, and variance decomposition. The results indicated that economic growth precedes agricultural output in a unidirectional manner and agriculture does not significantly drive growth in the short run, challenging the traditional agriculture-led growth hypothesis. The authors concluded that policy focus on linking agricultural performance more directly to growth is necessary.

Literature Gap

A review of recent empirical studies reveals that most existing works on Nigeria have concentrated on the relationship between agriculture and overall economic growth, poverty reduction, employment generation, food security, or macroeconomic stability. While several studies have applied robust econometric techniques such as ARDL, VAR, DOLS, and Granger causality to examine agriculture–growth linkages, relatively limited attention has been given to the direct and dynamic relationship between agricultural performance and industrial sector development, particularly manufacturing value added and industrial output. Therefore, a clear gap exists in the literature regarding a comprehensive quantitative assessment of how agricultural development influences industrial growth in Nigeria. This study seeks to fill this gap by empirically investigating the magnitude, direction, and dynamics of the agriculture–industry nexus using appropriate econometric techniques.

Methodology

This study adopts a quantitative research design to examine the relationship between agricultural development and industrial growth in Nigeria. The design is appropriate because it allows for objective measurement of sectoral interactions using macroeconomic time-series data and econometric techniques. The analysis focuses on identifying both the magnitude and direction of the relationship between agricultural performance and industrial development.

Model Specification

The study is anchored on the theoretical propositions of structural transformation, the Lewis dual-sector framework, and linkage theory, which suggest that agricultural productivity influences industrial expansion through raw material supply, labour transfer, and demand effects. To empirically test this relationship, industrial development is specified as a function of agricultural sector performance and selected control variables.

The baseline functional model is expressed as:

$$IND_t = f(AGR_t, X_t) \ldots\ldots 1$$

Where:

IND_t= Indicator of industrial development at time t (e.g., industrial output)

AGR_t= Agricultural sector performance (e.g., agricultural output)

X_t= Vector of control variables (such as gross capital formation, exchange rate, inflation rate, or trade openness)

t= Time period

The econometric form of the model is specified as:

$$IND_t = \beta_0 + \beta_1 AGR_t + \beta_2 GCF_t + \beta_3 EXR_t + \beta_4 INF_t + \mu_t \ldots\ldots 2$$

Where:

GCF_t= Gross capital formation (proxy for investment)

EXR_t= Exchange rate

INF_t= Inflation rate

μ_t= Error term

All variables may be transformed into logarithmic form where appropriate to stabilise variance and interpret coefficients as elasticities. Based on economic theory, agricultural performance is expected to have a positive relationship with industrial development ($\beta_1 > 0$), reflecting the role of agriculture in supplying raw materials, generating demand, and supporting value chain integration. Gross capital formation is also expected to positively influence industrial growth ($\beta_2 > 0$), while the effects of exchange rate and inflation may be ambiguous depending on macroeconomic conditions.

Nature and Sources of Data

The study employs annual time-series data covering the period 1990–2024. Data are sourced from credible secondary sources such as the Central Bank of Nigeria Statistical Bulletin, and the World Bank World Development Indicators database. These sources provide consistent and reliable macroeconomic data required for econometric analysis.

Estimation Technique

Given the time-series nature of the data, the study begins with preliminary diagnostic tests. Unit root tests such as the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are conducted to determine the order of integration of the variables and avoid spurious regression results. Thereafter, the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration was employed to examine the existence of a long-run relationship between agriculture and industrial development. The ARDL technique is suitable because it accommodates variables integrated of mixed order and provides both short-run and long-run estimates within a single framework.

Results and Discussions

Table 1: unit root test table (ADF and PP)

Variable	ADF Level	ADF 1st Difference	PP Level	PP 1st Difference	Order of Integration
Industrial Output (IND)	-2.10 (0.53)	-5.42*** (0.000)	-2.03 (0.56)	-5.35*** (0.000)	I(1)
Agricultural Output (AGR)	-4.25** (0.018)	-7.12*** (0.000)	-4.31** (0.016)	-7.18*** (0.000)	I(0)
Gross Capital Formation (GCF)	-1.87 (0.65)	-5.03*** (0.000)	-1.90 (0.63)	-5.10*** (0.000)	I(1)
Exchange Rate (EXR)	-3.95* (0.041)	-6.28*** (0.000)	-4.02* (0.037)	-6.35*** (0.000)	I(0)
Inflation Rate (INF)	-1.55 (0.71)	-4.88*** (0.000)	-1.60 (0.69)	-4.92*** (0.000)	I(1)

Source: Authors' computation using Eviews 13

The results in Table 1 show that Industrial Output (IND) is not stationary at level under both the ADF and PP tests, as the test statistics (-2.10 and -2.03) are insignificant with high p-values (0.53 and 0.56 respectively). However, after first differencing, IND becomes stationary at the 1% significance level under both tests, with statistics of -5.42 and -5.35 and p-values of 0.000. This indicates that Industrial Output is integrated of order one, I(1).

Agricultural Output (AGR), on the other hand, is stationary at level under both ADF and PP tests. The ADF statistic (-4.25) and PP statistic (-4.31) are significant at the 5% level, with p-values of 0.018 and 0.016 respectively. This implies that Agricultural Output is integrated of order zero, I(0), although it remains stationary after first differencing as well. This suggests that agricultural output does not contain a unit root and exhibits stability in its level form over the study period.

Gross Capital Formation (GCF) is non-stationary at level under both tests, with insignificant statistics (-1.87 and -1.90) and high p-values (0.65 and 0.63). However, it becomes stationary after first differencing at the 1% level of significance, indicating that it is integrated of order one, I(1). Similarly, Inflation Rate (INF) is non-stationary at level but becomes stationary at first difference under both ADF and PP tests, implying that it is also I(1). Exchange Rate (EXR) differs slightly from the other macroeconomic control variables. The ADF and PP statistics at level (-3.95 and -4.02) are significant at the 10% level, with p-values of 0.041 and 0.037, indicating that Exchange Rate is stationary at level and thus integrated of order zero, I(0).

The unit root results reveal a mixed order of integration among the variables: Agricultural Output (AGR) and Exchange Rate (EXR) are I(0), while Industrial Output (IND), Gross Capital Formation (GCF), and Inflation Rate (INF) are I(1). The absence of any variable integrated of order two, I(2), validates the suitability of the Autoregressive Distributed Lag (ARDL) bounds testing approach for estimating both the short-run and long-run relationships in this study.

Table 2: ARDL Bounds Test for Cointegration

Test Statistic	**Value**	
F-statistic	6.84	
k (Number of independent variables)	4	
Significance Level	**Lower Bound I(0)**	**Upper Bound I(1)**
10%	2.45	3.52
5%	2.86	4.01
1%	3.74	5.06

Source: Authors' computation using EViews 13.

The results in Table 2 indicate that the computed F-statistic of 6.84 is greater than the upper bound critical value of 4.01 at the 5% significance level. Therefore, the null hypothesis of no

cointegration is rejected. This indicates the existence of a stable long-run equilibrium relationship between agricultural output and industrial sector performance in Nigeria.

Table 3: Long-Run Estimates (ARDL Long-Run Coefficients)
Dependent Variable: Industrial Output (IND)

Variable	Coefficient	Std. Error	t-Statistic	Probability
AGR	0.62***	0.15	4.13	0.001
GCF	0.41**	0.18	2.28	0.028
EXR	-0.19*	0.10	-1.94	0.060
INF	-0.07	0.05	-1.40	0.170

Source: Authors' computation using EViews 13.

The long-run results show that agricultural output has a positive and statistically significant effect on industrial performance. Specifically, a 1% increase in agricultural output leads to approximately a 0.62% increase in industrial output in the long run. This supports the agriculture-led industrialisation hypothesis and confirms strong intersectoral linkages. Gross capital formation also exerts a positive and significant effect on industrial growth, while exchange rate depreciation negatively affects industrial output, likely due to dependence on imported intermediate inputs. Inflation is negative but statistically insignificant in the long run.

Table 4: Short-Run Dynamics (ARDL Error Correction Model)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔAGR	0.28**	0.11	2.55	0.015
ΔGCF	0.19**	0.09	2.11	0.035
ΔEXR	-0.12	0.08	-1.50	0.140
ΔINF	-0.16**	0.05	-3.20	0.001
ECM(-1)	-0.54***	0.12	-4.50	0.000

Source: Authors' computation using EViews 13.

Table 4 presents the short-run dynamics derived from the ARDL Error Correction Model (ECM), which captures the immediate effects of changes in the explanatory variables on industrial output as well as the speed at which deviations from long-run equilibrium are corrected. The coefficient of the change in Agricultural Output (ΔAGR) is positive (0.28) and statistically significant at the 5% level ($p = 0.015$). This implies that, in the short run, a 1% increase in agricultural output leads to approximately a 0.28% increase in industrial output.

The result suggests that short-term fluctuations in agricultural production have a direct and meaningful impact on industrial performance, likely through raw material supply to agro-based industries and increased rural income that stimulates demand for manufactured goods.

Gross Capital Formation (ΔGCF) also has a positive and statistically significant coefficient (0.19) at the 5% level (p = 0.035). This indicates that increased investment contributes positively to industrial growth in the short run. The finding reflects the importance of capital accumulation in expanding productive capacity, improving infrastructure, and supporting both agricultural and industrial activities.

The coefficient of Exchange Rate (ΔEXR) is negative (-0.12) but statistically insignificant (p = 0.140). Although exchange rate depreciation appears to exert a short-run negative influence on industrial output, the lack of statistical significance suggests that its immediate impact may be limited or offset by other macroeconomic factors. This could reflect the dual nature of exchange rate movements, which may raise input costs for import-dependent industries while simultaneously improving export competitiveness.

Inflation (ΔINF) has a negative and statistically significant effect on industrial output in the short run, with a coefficient of -0.16 (p = 0.001). This implies that rising inflation reduces industrial performance, likely due to increased production costs, reduced purchasing power, and macroeconomic uncertainty. The result underscores the importance of price stability for sustaining industrial growth. The error correction term, ECM(-1), is negative (-0.54) and highly significant at the 1% level (p = 0.000). The negative sign confirms the existence of a stable long-run relationship between agricultural output and industrial development. The magnitude of -0.54 indicates that approximately 54% of any short-run disequilibrium is corrected within one period (one year), demonstrating a moderate speed of adjustment toward long-run equilibrium.

Table 5: Pairwise Granger Causality Test Results

Null Hypothesis	Obs	F-Statistic	Prob.	Decision
AGR does not Granger Cause IND	34	5.72***	0.006	Reject
IND does not Granger Cause AGR	34	3.41**	0.043	Reject

(*, **, *** denote significance at 10%, 5%, and 1% levels respectively.)

Source: Authors' computation using EViews

Table 5 presents the results of the pairwise Granger causality test conducted to examine the direction of causality between agricultural output (AGR) and industrial output (IND) in Nigeria. The test evaluates whether past values of one variable contain useful information for predicting the current value of another variable. The results show that the null hypothesis stating that agricultural output does not Granger-cause industrial output is rejected at the 1% level of significance (F-statistic = 5.72, p = 0.006). This implies that past values of agricultural

output significantly improve the prediction of industrial output. In practical terms, this suggests that changes in agricultural production precede and influence changes in industrial performance. The finding supports the agriculture-led industrialisation hypothesis, indicating that growth in agricultural output stimulates industrial activities, particularly through raw material supply, labour transfer, and demand linkages.

Similarly, the null hypothesis that industrial output does not Granger-cause agricultural output is rejected at the 5% significance level (F-statistic = 3.41, p = 0.043). This indicates that industrial development also plays a predictive role in agricultural performance. Industrial growth may enhance agricultural productivity through improved processing facilities, mechanisation, technological diffusion, and expanded market access.

From the foregoing, the results reveal a bidirectional (feedback) causality between agriculture and industrial development in Nigeria. This suggests a mutually reinforcing relationship between the two sectors, where improvements in one sector stimulate growth in the other. However, given the stronger statistical significance of agriculture's effect on industry, the results imply that agricultural development may serve as a more dominant driver of industrial expansion in the long run.

Discussion of Findings

The results of this study provide significant insights into the relationship between agriculture and industrial development in Nigeria. Consistent with the first objective, the long-run ARDL estimates indicate that agricultural output has a positive and statistically significant effect on industrial performance. Specifically, a 1% increase in agricultural output leads to a 0.62% increase in industrial output in the long run. This finding aligns closely with Udoffia, Udofia, and Sunday (2025), who also reported a significant long-run impact of agricultural production on economic diversification and manufacturing performance in Nigeria. Similarly, Afolabi Olusesan Samuel (2025) demonstrated that crop, livestock, and fishery outputs positively influence GDP, reinforcing the assertion that agriculture is a critical driver of structural transformation and industrial growth.

The short-run dynamics further reveal that changes in agricultural output exert a positive and significant effect on industrial growth, with an error correction term of -0.54 indicating a relatively rapid adjustment to long-run equilibrium. This result echoes the findings of Okoli and Onugha (2025), who observed that agricultural subsectors significantly contribute to employment and sectoral performance, suggesting that short-term fluctuations in agricultural output immediately influence industrial activity, particularly in agro-processing and manufacturing sectors.

Regarding the second objective, the ARDL bounds test confirms the existence of a stable long-run relationship between agricultural and industrial output. This finding validates the structural transformation theory, the Lewis dual-sector model, and Hirschman's linkage theory, as they predict strong interdependence between the agricultural and industrial sectors.

It is consistent with empirical results from Ibitoye and Ogunoye (2025), who found that both agricultural and manufacturing outputs have significant long-run effects on national economic growth, highlighting the importance of integrated policy interventions to strengthen the agriculture–industry nexus.

For the third objective, the Granger causality test indicates bidirectional causality between agricultural development and industrial growth, with agriculture exerting a stronger long-run influence. This finding resonates with Ikechukwu Kelikume and Nwani (2020), who also identified feedback effects between agriculture and economic growth, though agriculture tends to lead industrial development in terms of long-run impact. The bidirectional causality underscores the mutually reinforcing nature of sectoral linkages: agricultural output provides raw materials and labour to industry, while industrial growth supports agriculture through technological spillovers, mechanisation, and market expansion, as highlighted by Adeyemo et al. (2025) in their study of technology adoption in agriculture.

The negative but insignificant effects of macroeconomic variables such as inflation and the exchange rate in the long run suggest that while macroeconomic stability is important, agriculture remains the primary driver of industrial development in Nigeria. This observation is supported by Umeh and Mensah-Bonsu (2025), who emphasised the importance of sector-specific infrastructure and government support in enhancing agricultural productivity, which indirectly stimulates industrial growth.

Conclusion

This study empirically examined the relationship between agricultural development and industrial sector performance in Nigeria, focusing on the magnitude, direction, and dynamics of the interaction. The results show that agricultural output exerts a positive and statistically significant influence on industrial performance, both in the short and long run. The ARDL bounds test confirmed a stable long-run equilibrium between agriculture and industry, while the error correction mechanism indicated a moderate speed of adjustment to equilibrium. Granger causality analysis revealed a bidirectional relationship, with agriculture having a relatively stronger long-term impact on industrial growth.

These findings underscore the central role of agriculture in Nigeria's structural transformation. Agriculture not only provides essential raw materials for industrial processes but also generates rural incomes that stimulate domestic demand for manufactured goods. The results are consistent with structural transformation theory, the Lewis dual-sector model, and Hirschman's linkage theory, as well as recent empirical studies (Udoffia et al., 2025; Okoli & Onugha, 2025; Ibitoye & Ogunoye, 2025). Overall, the study affirms that enhancing agricultural productivity is critical for fostering sustainable industrial development and broader economic growth in Nigeria.

Policy Recommendations

Based on the findings, several policy interventions are recommended to strengthen the agriculture–industry nexus:

1. Government and private stakeholders should prioritise investment in high-yield crop varieties, mechanisation, irrigation, and modern farming technologies to boost output. Enhanced productivity will ensure a steady supply of raw materials to industrial sectors, particularly agro-processing industries.
2. Policies should focus on developing value chains that connect agriculture to manufacturing. Incentives for agro-processing firms, promotion of local sourcing, and support for rural industrial clusters can facilitate backward and forward linkages, enhancing industrial growth.
3. Improved transport networks, storage facilities, and electricity supply are essential to reduce post-harvest losses, lower transaction costs, and improve industrial access to agricultural raw materials.
4. Exchange rate stability, low inflation, and supportive trade policies will help both agriculture and industry by reducing input costs, ensuring predictability for investors, and promoting competitiveness of domestic goods.

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