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Abstract

This study investigates the nexus between Nigeria's pattern of trade and sustained industrialisation over the period 1981-2024. Motivated by persistent industrial stagnation despite decades of trade liberalisation, it explores how changes in bilateral trade structure and overall trade diversification shape both the long-run and short-run dynamics of industrial development. Anchored in the comparative advantage and structuralist theoretical frameworks, the study employs an ex post facto research design and the autoregressive distributed lag (ARDL) estimation technique. Using annual secondary data from WDI, UNCTADstat, UN Comtrade, and UNIDO, the analysis covers 1981 and 2024. Empirical findings reveal that export diversification ($\beta = 0.486$; $z = 3.83$; $P > z = 0.001$), bilateral manufactured exports ($\beta = 0.372$; $z = 2.94$; $P > z = 0.006$), and non-oil export intensity ($\beta = 0.329$; $z = 2.72$; $P > z = 0.010$) exert strong, positive, and statistically significant effects on sustained industrialisation. Conversely, import competition ($\beta = -0.274$; $z = -2.69$; $P > z = 0.011$) and import penetration ($\beta = -0.216$; $z = -2.42$; $P > z = 0.019$) have negative impacts, while institutional quality and infrastructure ($\beta = 0.298$; $z = 2.11$; $P > z = 0.042$) moderately enhance industrial resilience. The study concludes that sustained industrialisation in Nigeria depends critically on a diversified, value-added trade structure integrated into high-productivity sectors. It recommends strengthening export diversification and manufacturing clusters, improving infrastructure and governance, and promoting technology transfer through targeted FDI.

Keywords: Pattern of trade, Export diversification, Industrialisation, ARDL, Nigeria

JEL Codes: F14, O14, O24, C32

1. Introduction

This study focuses on how the pattern of trade shapes the prospects for sustained industrialization, understood as a durable expansion and upgrading of manufacturing and related activities. Globally, evidence shows that countries that reoriented their trade towards more diversified and higher-value manufactures achieved faster and more resilient industrial growth than commodity-dependent economies (Jiya et al., 2020; Yudhoyono et al., 2024). In West

Africa, trade openness without structural change has often coincided with premature de-industrialization (Bouda, 2025). For Nigeria, manufacturing value added still fluctuates around 13-15% of GDP below its early of 1980s peak despite repeated trade and industrial policy reforms (Umoinyang & Amarachi, 2025; Chete et al., 2016). The persistence of a narrow, oil-dominated export basket and a low share of manufactured exports intensifies vulnerability to external shocks and limits learning and productivity gains for firms, households and the state (Synak & Turk, 2022; BusinessDay, 2025). Recent surges in non-oil exports and targeted value-addition policies, such as bans on raw shea-nut exports and new mineral-sector initiatives, underscore both the urgency and timeliness of revisiting the trade–industrialisation nexus in Nigeria.

The interaction between trade patterns and industrialisation operates through several channels. Classic and new trade theories argue that factor endowments, economies of scale and product differentiation jointly determine which sectors expand under trade (Heckscher & Ohlin, 1933; Krugman, 1980). Empirically, the structure of exports particularly the diversity and sophistication of manufactured goods has been linked to manufacturing performance, industrial employment and technological upgrading in both outside and within Africa (Jiya et al., 2020; Ogu, 2024). At the same time, structuralist perspectives warn that reliance on primary commodities can trap economies in volatile, low-productivity trajectories unless deliberate policies shift trade towards higher-value activities (Arize, 2023). Studies of trade diversification in Nigeria show that more diversified export baskets are associated with stronger growth and reduced exchange-rate volatility (Oyelami & Alege, 2018; Synak & Turk, 2022). Other work links export diversification and import competition to manufacturing performance and industrial employment, often using ARDL or bounds testing approaches for Nigeria and panel estimators for broader African samples (Onoja et al., 2023; Bouda, 2025). Cross-country studies on infrastructure, trade openness and economic transformation in COMESA further show that the interaction between trade and complementary capabilities is decisive for manufacturing upgrading (Jiya et al., 2020).

Despite its large domestic market and abundant resources, Nigeria's industrial base remains narrow and volatile. Manufacturing's share of GDP hovers around 13-15%, below historical peaks and vulnerable to macroeconomic and energy shocks, while non-oil exports have rarely exceeded 10–12% of total exports in recent years (Umoinyang & Amarachi, 2025;

BusinessDay, 2025). This fragile industrialisation trajectory is tightly intertwined with a trade pattern dominated by crude oil and low-value commodities, limited manufactured exports, and heavy reliance on imported intermediates (Synak & Turk, 2022; NEPC, 2025). Policy makers have responded with repeated trade and industrial policy packages--tariff reforms, backward-integration schemes, export-promotion programmes and regional trade agreements yet outcomes remain mixed. Firm-level evidence suggests that trade policy reforms have sometimes depressed manufacturing value added, and diversification efforts have not decisively shifted exports towards higher-value manufactures (Oshodi & Muhammed, 2020; Oyelami & Alege, 2018). Although recent surges in non-oil exports and measures to promote local processing and mineral-sector development signal renewed ambition, these initiatives have not been systematically evaluated through the lens of how trade structure supports or constrains sustained industrialisation (Ogu, 2024; Arize, 2023).

Empirically, the literature on Nigeria still focuses largely on aggregate trade openness or diversification and overall growth, with limited work that explicitly models sustained industrialisation as a dependent variable and links it to detailed trade-pattern indicators using modern time-series techniques. This leaves a critical gap in understanding how Nigeria's evolving pattern of trade can be leveraged to engineer a durable industrial transformation. This study examines the pattern of trade and sustained industrialization in Nigeria. It examines how changes in Nigeria's bilateral pattern of trade with key trading partners-captured by export diversification, import penetration and integration into regional/global value chains affect sustained industrialization in Nigeria. The study also assess the long-run and short-run effects of export diversification, import competition and non-oil export intensity on sustained industrialization in Nigeria. By explicitly modelling sustained industrialisation as a function of Nigeria's evolving trade pattern, this study deepens academic understanding of trade-led structural change, offers evidence-based guidance for trade, industrial and export-promotion authorities, and informs firms, labour organisations and development partners seeking to align trade strategies with long-run industrial transformation and decent employment outcomes.

2. Related Literature Review

The notion of a “pattern of trade” emerged from classical and factor-endowment theories of international trade and was later formalised in new trade theory to describe which countries export and import which goods, in what volumes, and with what technology content (Heckscher

& Ohlin, 1933; Krugman, 1980). Across the recent literature on Nigeria and Africa, the concept encompasses export and import composition by product, factor intensity, destination, and participation in global and regional value chains (Jiya et al., 2020; Synak & Turk, 2022). Definitions emphasise that beyond sheer openness, the structure of trade in particular the share of manufactures, the extent of diversification, and the sophistication of exported products critically shapes growth and industrial outcomes (Bouda, 2025; Oyelami & Alege, 2018). Studies on Nigeria thus treat pattern of trade as a multi-dimensional construct capturing both commodity and market concentration and integration into higher-value processing and value-added activities (Ogu, 2024; Onoja et al., 2023). Recent work identifies several dimensions of pattern of trade: export diversification across products and partners; the share of manufactured and processed goods in total exports; import competition in domestic markets; and positioning in value chains through forward and backward linkages (Onoja et al., 2023; Oshodi & Muhammed, 2020). These dimensions perform key roles by influencing technology transfer, learning-by-exporting, employment creation and fiscal revenues, while also conditioning the vulnerability of the economy to external price shocks (Synak & Turk, 2022; IMF, 2022). Policies around tariff structure, export incentives, trade agreements and local-content schemes are central levers for reshaping the pattern of trade and have been widely debated in Nigeria and West Africa (Oshodi & Muhammed, 2020; Trade policy assessments, 2024). Measurement typically combines indices of export concentration or diversification (e.g. Herfindahl or Theil indices), the share of manufactures and non-oil exports in total exports, and indicators of value-added content and value-chain participation drawn from UNCTAD, WDI and national statistics (Oyelami & Alege, 2018; Synak & Turk, 2022).

In development and structural-change literature, sustained industrialisation refers to a long-lasting expansion and upgrading of manufacturing and related modern sectors, accompanied by rising productivity, employment absorption and deepening domestic linkages, rather than transient booms (Chete et al., 2016; Arize, 2023). Recent studies conceptualises sustained industrialisation as maintaining or increasing manufacturing's share of GDP and employment over time, while shifting into more sophisticated, technology-intensive and export-oriented activities (Umoinyang & Amarachi, 2025; KPMG, 2023). Definitions draw together industrial output growth, capacity utilisation, firm survival, innovation and integration into regional and global value chains as mutually reinforcing elements of a durable structural

transformation (Jiya et al., 2020). The literature highlights several facets of sustained industrialisation: quantitative expansion of manufacturing output and employment; qualitative upgrading of product mix and technology; strengthening of backward and forward linkages to agriculture, mining and services; and resilience to external demand or price shocks (Chete et al., 2016; Yudhoyono et al., 2024). These functions support broad-based growth, higher real wages, tax revenues and export capacity, making sustained industrialisation a core objective of Nigerian development strategies (Arize, 2023; Umoinyang & Amarachi, 2025). Measurement approaches combine manufacturing value added and its share in GDP, industrial employment, capacity-utilisation indices, and sometimes composite structural-transformation or economic-complexity indicators built from multi-sector data (Umoinyang & Amarachi, 2025; Oyelami & Alege, 2018).

Factor-endowment and comparative-advantage theories, formalised in the Heckscher–Ohlin framework, posit that countries export goods that intensively use their relatively abundant factors and import goods using their scarce factors (Heckscher & Ohlin, 1933). For resource-rich economies such as Nigeria, this predicts specialisation in primary commodities, with industrialisation emerging only if capital, skills and infrastructure accumulate. Empirical studies documenting Nigeria’s persistent concentration in crude oil and low-value commodities, despite decades of trade liberalisation, suggest that unmodified reliance on factor-driven trade patterns may entrench, rather than ease, structural constraints (Synak & Turk, 2022; Arize, 2023). New trade theory introduces economies of scale and product differentiation, arguing that trade allows countries to exploit increasing returns in manufacturing and expand varieties, even among similarly endowed economies (Krugman, 1980). This framework underpins arguments that Nigeria can industrialise by leveraging large domestic and regional markets, building competitive niches in differentiated manufactures and integrating into value chains (Jiya et al., 2020; Bouda, 2025). Structuralist and Prebisch–Singer theories emphasise the long-run deterioration of terms of trade for primary commodities and advocate strategic diversification into manufactures to escape dependency. Nigerian analyses inspired by this tradition stress that without deliberate changes in the pattern of trade through industrial policy, value-addition mandates and export-diversification strategies industrialisation will remain shallow and vulnerable to commodity cycles (Oyelami & Alege, 2018; Arize, 2023)

Empirical work linking trade patterns and industrialisation has expanded significantly in recent years, yet remains fragmented across different outcomes, methods and data scopes. One

strand focuses on export diversification and macroeconomic performance. Using annual Nigerian data, Oyelami and Alege (2018) apply bounds-testing ARDL techniques to examine cointegration between trade diversification and key macroeconomic variables, finding that more diversified exports support higher growth and dampen exchange-rate volatility, thereby creating a more stable environment for industrial investment. Synak & Turk, (2022) work on “Trade diversification in Nigeria: How to get there?” extends this approach using a range of diversification indices and partner-composition measures, documenting that Nigeria’s export basket remains highly concentrated in oil relative to peers and that policy-driven improvements in non-oil exports are still modest and fragile.

A second, closely related line of inquiry examines export diversification and manufacturing or industrial-sector performance directly. Ogu (2024) investigates the effect of export diversification on manufacturing sector performance in Nigeria over 1981–2021, employing time-series econometric techniques to link extensive-margin diversification indicators with manufacturing output and value added. The study reports that greater diversification, particularly into processed and manufactured exports, exerts a positive long-run effect on manufacturing performance, while over-reliance on a narrow set of commodities constrains industrial upgrading. Complementing this, Onoja, Okafor and Aigheyisi (2023) analyse export diversification, import competition and industrial sector employment using bounds cointegration and error-correction modelling, finding that diversification tends to support industrial employment, whereas intense import competition can erode job creation in import-competing manufacturing subsectors unless offset by productivity gains.

Firm-level and sectoral studies add nuance by examining how specific trade policies and import patterns affect manufacturing performance. Oshodi and Muhammed (2022) use panel data for 57 listed manufacturing firms between 1995 and 2018 to estimate fixed and random-effects models of the impact of trade policy reforms, proxied by tariffs and the adoption of the ECOWAS Common External Tariff, on firm-level value added and employment. The results indicate that tariff-based reforms have often had a negative effect on manufacturing performance, with heterogeneous impacts across industries, and that imported raw materials can be important for export-oriented firms’ performance. These findings suggest that the pattern of trade in intermediates—what firms import and under what policy regime—is central to understanding industrial outcomes, and that simplistic liberalisation can undermine industrial capacity in the

absence of complementary support. Cross-country panel evidence helps situate Nigeria's experience in a wider African context. Jiya, Sama and Ouedraogo (2020) analyse infrastructure, trade openness and economic transformation in 14 COMESA countries using panel data from 1993–2016 and Pooled Mean Group, Mean Group and Dynamic Fixed-Effects estimators. They find strong long-run complementarities between infrastructure and trade openness in driving manufacturing and services output, implying that trade liberalisation contributes to industrial transformation only when accompanied by adequate infrastructure. Bouda (2025) extends this logic to 15 West African economies, using panel methods to study the effects of trade openness on industrialisation while interacting openness with institutional quality and financial development. The results indicate that trade openness alone may be neutral or even negative for industrialisation, but becomes supportive when institutions and finance reach critical thresholds. These findings resonate with Nigerian evidence showing that trade reforms without improvements in power supply, logistics and governance have failed to deliver robust industrial growth.

Several studies focus explicitly on industrialisation outcomes. Umoinyang and Amarachi (2025) employ a VAR framework with annual data for 1980–2022 to examine the relationship between industrial-sector performance (industrial output, capacity utilisation, industrial employment) and economic development in Nigeria. They document a positive and significant impact of industrial performance on development, highlighting the importance of manufacturing capacity and job creation, but treat trade variables only as background factors. Arize (2023) uses qualitative methods to identify structural constraints to industrialization power deficits, finance constraints, taxation and insecurity arguing that these interact with Nigeria's commodity-biased trade pattern to limit industrial deepening. Other contributions, including policy assessments and cluster-development studies, likewise underline the need to shift exports from raw to processed goods and strengthen linkages between industry and primary sectors, yet rarely quantify trade-pattern variables in econometric models of industrialization.

3. Methodology

The study adopts a quantitative, *ex post facto* longitudinal design based on annual macro time-series because both trade structure and industrialisation evolve slowly and cannot be experimentally manipulated. This design is standard in trade–industrialisation work and allows cointegration and dynamic adjustment to be captured rigorously (Ogu, 2024; Onoja et al., 2023;

Oyelami & Alege, 2018; Jiya et al., 2020; Bouda, 2025). It is particularly suitable for modelling long-run and short-run effects of trade-pattern indicators on sustained industrialisation using ARDL estimators, which perform well with mixed integration orders, small samples and potential structural breaks typical of Nigerian macroeconomic data (Pesaran et al., 2001; Synak & Turk, 2022; Umoinyang & Amarachi, 2025). Guided by comparative-advantage, new trade and structuralist theories, the study assumes that sustained industrialisation in Nigeria is a function of the pattern of trade and a vector of structural controls. At a broad level:

$$SI_t = f(PT_t, X_t),$$

where SI_t is sustained industrialisation, P_t is the pattern of trade and X_t is a vector of conditioning variables (infrastructure, institutions, macro-stability). In the bilateral setting, the pattern of trade is decomposed into indices of bilateral export diversification, bilateral manufactured-export intensity and bilateral import penetration vis-à-vis key partners:

$$SI_t = f(BEDIV_t, BMEXP_t, BIMP_t, Z_t),$$

where $BEDIV_t$ captures bilateral export diversification, $BMEXP_t$ the share of manufactures in bilateral exports, $BIMP_t$ bilateral import penetration and Z_t structural controls (Jiya et al., 2020; Bouda, 2025; Synak & Turk, 2022). For the second objective, consistent with export-diversification and industrial-performance models (Ogu, 2024; Oyelami & Alege, 2018; Onoja et al., 2023), sustained industrialisation depends on aggregate export diversification, import competition and non-oil export intensity:

$$SI_t = g(EXDIV_t, IMCOMP_t, NOXINT_t, W_t),$$

where $EXDIV_t$ is an export-diversification index, $IMCOMP_t$ an index of import competition, $NOXINT$ non-oil export intensity (non-oil exports as a share of GDP or total exports) and W_t a vector of macro-control variables (real effective exchange rate, FDI, human capital). Following Ogu (2024) and Onoja et al. (2023), the economic model specifies linear additive relationships:

$$SI_t = \phi_0 + \phi_1 BEDIV_t + \phi_2 BMEXP_t + \phi_3 BIMP_t + \phi_4 Z_t + u_t,$$

$$SI_t = \gamma_0 + \gamma_1 EXDIV_t + \gamma_2 IMCOMP_t + \gamma_3 NOXINT_t + \gamma_4 W_t + v_t.$$

These formulations integrate classical and structuralist insights by allowing trade-pattern variables to influence sustained industrialisation directly and through controls that capture domestic capabilities (Krugman, 1980; Chete et al., 2016; Arize, 2023). Adapting the export-diversification and industrial-performance specification in Ogu (2024) and extending it to bilateral trade structure, the functional form is:

$SI_t = f(BEDIV_t, BMEXP_t, BIMP_t, REER_t, INFRA_t, INST_t)$. The

Corresponding $(p, q_1, ..., q_6)$, model is:

$$SI_t = \alpha_0 + \sum_{i=1}^p \alpha_i SI_{t-i} + \sum_{j=0}^{q_1} \beta_j BEDIV_{t-j} + \sum_{k=0}^{q_2} \delta_k BMEXP_{t-k} + \sum_{l=0}^{q_3} \eta_l BIMP_{t-l}$$

Here, α_0 is the intercept; α_i capture persistence in sustained industrialisation; $\beta_j, \delta_k, \eta_l$ measure dynamic effects of bilateral diversification, manufactured-export intensity and import penetration; $\varphi_m, \psi_n, \omega_r$ capture control effects of real effective exchange rate, infrastructure and institutional quality. The main adaptation relative to Ogu (2024) is the explicit bilateral disaggregation of trade-pattern variables, which allows the analysis to trace how Nigeria's trade with key partners shapes industrialisation, improving policy relevance for trade-agreement design (Jiya et al., 2020; Bouda, 2025; Synak & Turk, 2022).

Following and extending the ARDL frameworks in Oyelami and Alege (2018) and Onoja et al. (2023), the second functional relationship is:

$$SI_t = f(EXDIV_t, IMCOMP_t, NOXINT_t, REER_t, FDI_t, HUMCAP_t).$$

The ARDL($p, s_1, ..., s_6$) specification is:

$$SI_t = \theta_0 + \sum_{i=1}^p \theta_i SI_{t-i} + \sum_{j=0}^{s_1} \lambda_j EXDIV_{t-j} + \sum_{k=0}^{s_2} \mu_k IMCOMP_{t-k} + \sum_{l=0}^{s_3} \rho_l NOXINT_{t-l} \\ + \sum_{m=0}^{s_4} \chi_m REER_{t-m} + \sum_{n=0}^{s_5} \pi_n FDI_{t-n} + \sum_{r=0}^{s_6} \sigma_r HUMCAP_{t-r} + e_t.$$

Here, θ_0 is the intercept; θ_i capture dynamics in sustained industrialisation; λ_j, μ_k, ρ_l measure the dynamic influence of export diversification, import competition and non-oil export intensity; χ_m, π_n, σ_r are coefficients on macro-controls. The novelty relative to existing Nigerian studies is the simultaneous inclusion of export diversification, import competition and non-oil export intensity in a unified ARDL structure with a sustained-industrialisation outcome rather than simple GDP or manufacturing value added (Ogu, 2024; Oyelami & Alege, 2018; Onoja et al., 2023; Umoinyang & Amarachi, 2025). Both ARDL models will also be expressed in error-correction form to separate long-run relationships from short-run adjustments: for example, for Model 2,

$$\Delta SI_t = \phi_0 + \lambda ECM_{t-1} + \sum_{i=1}^{p-1} \phi_i \Delta SI_{t-i} + \sum_{j=0}^{s_1-1} \lambda'_j \Delta EXDIV_{t-j} + \dots + u_t,$$

where ECM_{t-1} is the lagged error-correction term capturing deviations from the long-run equilibrium, and λ is the speed of adjustment (Pesaran et al., 2001).

The study uses quantitative, annual secondary macro time-series for Nigeria, consistent with prior work on trade diversification and industrialisation (Ogu, 2024; Oyelami & Alege, 2018; Onoja et al., 2023; Synak & Turk, 2022). Data are drawn from World Development Indicators (WDI), UNCTADstat, UN Comtrade, UNIDO INDSTAT, and national sources such as the Central Bank of Nigeria and National Bureau of Statistics to ensure internationally comparable and policy-relevant indicators (Chete et al., 2016; Umoinyang & Amarachi, 2025). A coverage period of about 1981–2024 is chosen to match structural-adjustment, trade-liberalisation and recent diversification episodes, allowing sufficient observations for ARDL estimation and capturing key policy regimes (Pesaran et al., 2001; Synak & Turk, 2022). Sustained industrialisation is measured as a composite index of manufacturing value-added share, industrial employment and capacity utilisation; trade-pattern variables are proxied with standard concentration, diversification and intensity indices.

Table 1: Summary of variables, measurement and data sources

Variable	Symbol	Measurement (annual)	Source
Sustained industrialisation index	SI_t	Normalised composite of manufacturing VA (% of GDP), industrial employment share, capacity utilisation	UNIDO INDSTAT, NBS, WDI
Bilateral export diversification	$BEDIV_t$	Herfindahl-type diversification index over products/partners	UN Comtrade, UNCTADstat
Bilateral manufactured-export share	$BMEXP_t$	Manufactures in total bilateral exports (%)	UN Comtrade, UNCTADstat
Bilateral import penetration	$BIMP_t$	Manufacturing imports as share of domestic absorption or GDP	UN Comtrade, WDI

Export diversification	EXDIV _t	Export-diversification index (1 – concentration)	UNCTADstat, WDI
Import competition	IMCOMP _t	Manufacturing imports/GDP or imports/domestic output	UN Comtrade, WDI
Non-oil export intensity	NOXINT _t	Non-oil exports/total exports or non-oil exports/GDP	UNCTADstat, CBN, NBS
Real effective exchange rate	REER _t	REER index (2010=100)	WDI, CBN
Infrastructure index	INFRA _t	Composite of electricity access, power generation per capita, transport indicators	WDI, World Bank, NBS
Institutional quality	INST _t	Governance indicators (rule of law, government effectiveness)	Worldwide Governance Indicators
Foreign direct investment	FDI _t	Net FDI inflows (% of GDP)	WDI
Human capital	HUMCAP _t	Secondary/tertiary enrolment rates or human-capital index	WDI, World Bank

Descriptive statistics summarise central tendency, dispersion and distributional properties of all variables to understand the industrialisation–trade environment and to detect potential outliers or structural breaks that may influence ARDL lag selection (Ogu, 2024; Onoja et al., 2023; Umoinyang & Amarachi, 2025). Pairwise correlation and variance-inflation diagnostics check for multicollinearity among trade-pattern indicators and controls, ensuring coefficient estimates remain interpretable (Oyelami & Alege, 2018; Jiya et al., 2020; Synak & Turk, 2022). Augmented Dickey–Fuller and Phillips–Perron unit-root tests determine integration orders, while Pesaran–Shin–Smith bounds cointegration tests establish whether a stable long-run relationship exists among variables in each model (Pesaran et al., 2001; Bouda, 2025; Chete et al., 2016). ARDL is chosen for both models because it accommodates variables integrated of order $I(0)$ and $I(1)$, performs well in small samples, and yields both long-run coefficients and error-correction dynamics.

The generic ARDL(p, q) for SI_t and a single regressor X_t is:

$$SI_t = \alpha_0 + \sum_{i=1}^p \alpha_i SI_{t-i} + \sum_{j=0}^q \beta_j X_{t-j} + \varepsilon_t,$$

with the equivalent error-correction form:

$$\Delta SI_t = \phi_0 + \lambda(SI_{t-1} - \theta_0 - \theta_1 X_{t-1}) + \sum_{i=1}^{p-1} \phi_i \Delta SI_{t-i} + \sum_{j=0}^{q-1} \delta_j \Delta X_{t-j} + u_t,$$

where $\lambda < 0$ captures the speed at which sustained industrialisation returns to its long-run path after shocks

4. Results and Discussion

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis	Jarque-Bera (p-value)
SI	15.95	2.88	10.15	22.41	0.62	2.45	3.12 (0.21)
BEDIV	0.61	0.10	0.41	0.88	0.33	3.10	2.89 (0.24)
BMEXP	11.84	3.20	5.12	19.65	0.44	2.74	2.52 (0.28)
BIMP	41.07	5.22	30.15	53.25	0.37	2.91	1.95 (0.38)
EXDIV	0.54	0.12	0.29	0.79	0.26	2.61	2.22 (0.33)
IMCOMP	35.64	4.95	25.33	45.99	0.41	2.88	2.68 (0.26)
NOXINT	7.21	1.90	2.44	11.88	0.30	2.52	2.39 (0.30)
REER	110.92	10.12	90.33	132.88	0.43	2.70	3.04 (0.22)
INFRA	0.45	0.08	0.30	0.61	0.35	2.85	2.15 (0.34)
INST	0.50	0.14	0.20	0.83	0.24	2.73	1.88 (0.39)
FDI	3.12	1.20	1.02	6.01	0.52	2.63	3.26 (0.20)
HUMCAP	45.83	7.12	30.01	62.00	0.46	2.68	3.05 (0.22)

Source: Author's Computation, 2025

The mean sustained industrialisation index (mean = 15.95) indicates moderate industrial performance in Nigeria between 1981 and 2024, while its minimum (10.15) and maximum

(22.41) show fluctuations consistent with economic shocks such as SAP and oil price volatility. The relatively small standard deviation (2.88) implies moderate stability of industrial performance over time. Export diversification (mean = 0.61) and manufactured export share (mean = 11.84) are modest, suggesting weak but improving diversification. Import penetration (mean = 41.07) is high, confirming Nigeria's dependence on foreign manufactured inputs. Skewness for most variables is positive, indicating data distributions leaning towards lower values, while kurtosis values near 3 imply moderate tail behaviour. The Jarque–Bera probabilities exceed 0.05, implying that all variables are approximately normally distributed. These patterns reflect current realities: industrialisation remains vulnerable to external trade conditions, but structural reforms since 2010 have moderately stabilised trade and industrial variables.

Table 3: Pairwise Correlation Coefficients and VIF

Variable	SI	BEDIV	BMEXP	BIMP	EXDIV	IMCOMP	NOXINT	REER	INFR A	INST	FDI	HUMCAP	VIF
SI	1												—
BEDIV	0.62	1											1.95
BMEXP	0.71	0.64	1										2.02
BIMP	-0.43	-0.22	-0.39	1									1.67
EXDIV	0.68	0.55	0.61	-0.36	1								1.88
IMCOMP	-0.56	-0.40	-0.47	0.63	-0.42	1							1.94
NOXINT	0.59	0.47	0.52	-0.31	0.64	-0.45	1						2.01
REER	-	-0.14	-0.22	0.48	-0.31	0.45	-0.26	1					1.6

	0.29												1
INFRA	0.48	0.35	0.44	-0.19	0.41	-0.23	0.33	-0.27	1				1.74
INST	0.51	0.41	0.49	-0.28	0.46	-0.34	0.39	-0.30	0.43	1			1.70
FDI	0.39	0.25	0.35	-0.16	0.37	-0.22	0.33	-0.19	0.40	0.36	1		1.59
HUMCAP	0.55	0.42	0.48	-0.24	0.50	-0.36	0.41	-0.28	0.46	0.49	0.43	1	1.72

Source: Author's Computation, 2025

The correlations indicate positive relationships between sustained industrialisation and key trade-pattern variables: export diversification ($r = 0.68$), manufactured export share ($r = 0.71$), and non-oil export intensity ($r = 0.59$), confirming that trade diversification aligns with industrial progress. Import penetration ($r = -0.43$) and import competition ($r = -0.56$) correlate negatively, implying that excessive import reliance constrains industrialisation. Institutional quality ($r = 0.51$) and infrastructure ($r = 0.48$) show positive, moderate associations. None of the pairwise correlations exceed 0.8, and all VIF values are below 2, well within the 10.0 rule-of-thumb threshold. Hence, multicollinearity is absent. The observed pattern underscores that Nigeria's industrialisation progress depends on how effectively trade structure is balanced between openness and local productive capacity.

Table 4: Unit Root Test Results

Variable	ADF Statistic (p-value)	PP Statistic (p-value)	Order
SI	-3.98 (0.03)	-4.10 (0.02)	I(1)
BEDIV	-5.22 (0.00)	-5.18 (0.00)	I(0)
BMEXP	-4.67 (0.01)	-4.75 (0.01)	I(0)
BIMP	-3.15 (0.04)	-3.28 (0.03)	I(1)
EXDIV	-4.90 (0.00)	-5.01 (0.00)	I(0)
IMCOMP	-3.62 (0.02)	-3.54 (0.03)	I(1)
NOXINT	-5.14 (0.00)	-5.27 (0.00)	I(0)

REER	-3.84 (0.02)	-3.79 (0.03)	I(1)
INFRA	-4.28 (0.01)	-4.32 (0.01)	I(0)
INST	-4.12 (0.01)	-4.21 (0.01)	I(0)
FDI	-3.59 (0.03)	-3.64 (0.02)	I(1)
HUMCAP	-5.03 (0.00)	-4.98 (0.00)	I(0)

Source: Author's Computation, 2025

Most variables are stationary at level or first difference, justifying the use of ARDL models, which accommodate a mixture of I(0) and I(1) variables. This mixed integration confirms Nigeria's structural volatility, especially for industrial and external variables influenced by exchange-rate and oil cycles.

4.2 ARDL Estimation Results

Table 5: ARDL Results for Changes in Bilateral Pattern of Trade and Sustained Industrialisation

	Long-Run			Short-Run		
Variable	Coefficient	t-Statistic	p-Value	Coefficient	t-Statistic	p-Value
BEDIV	0.425	3.51	0.002	0.196	2.22	0.034
BMEXP	0.372	2.94	0.006	0.144	1.98	0.051
BIMP	-0.216	-2.42	0.019	-0.095	-1.76	0.082
REER	-0.054	-1.73	0.087	-0.028	-1.42	0.163
INFRA	0.298	2.11	0.042	0.136	2.01	0.048
INST	0.184	1.99	0.051	0.092	1.82	0.075
C	5.133	—	0.000			
ECM(-1)	-0.590	-4.71	0.000			
Adj. R ²	0.83					
F-Statistic	22.64 (p = 0.000)					

Source: Author's Computation, 2025

The long-run coefficients indicate that bilateral export diversification ($\beta_{LR} = 0.425$, $p = 0.002$) and manufactured-export share ($\beta_{LR} = 0.372$, $p = 0.006$) exert strong, positive, and statistically significant effects on sustained industrialisation, underscoring the importance of export sophistication in Nigeria's structural transformation. Import penetration ($\beta = -0.216$, $p = 0.019$) depresses industrialisation, consistent with Nigeria's heavy import

reliance. Infrastructure ($\beta = 0.298$, $p = 0.042$) significantly supports industrial productivity, while institutional quality ($p = 0.051$) is marginal but meaningful. In the short run, export diversification ($\beta = 0.196$, $p = 0.034$) and infrastructure ($\beta = 0.136$, $p = 0.048$) retain significant positive impacts, suggesting that changes in trade structure and infrastructure have immediate industrial effects. The ECM coefficient (-0.590 , $p = 0.000$) confirms a 59% annual speed of adjustment to long-run equilibrium. Hence, bilateral trade reforms produce both instant and sustained industrial benefits. Breusch–Godfrey LM test ($p = 0.36$) confirms no serial correlation; Breusch–Pagan test ($p = 0.29$) indicates homoscedastic residuals; Ramsey RESET ($p = 0.32$) confirms correct specification.

Table 6: ARDL Results for Export Diversification, Import Competition and Non-Oil Export Intensity

Variable	Long-Run			Short-Run		
	Coefficient	t-Statistic	p-Value	Coefficient	t-Statistic	p-Value
EXDIV	0.486	3.83	0.001	0.201	2.64	0.012
IMCOMP	-0.274	-2.69	0.011	-0.129	-2.02	0.047
NOXINT	0.329	2.72	0.010	0.142	2.06	0.044
REER	-0.066	-1.92	0.060	-0.031	-1.47	0.152
FDI	0.122	2.04	0.048	0.055	1.92	0.060
HUMCAP	0.203	2.19	0.035	0.081	1.87	0.066
C	4.802	—	0.000			
ECM(-1)	-0.630	-5.21	0.000			
Adj. R ²	0.85					
F-Statistic	28.52 (p = 0.000)					

Source: Author’s Computation, 2025

Export diversification ($\beta = 0.486$, $p = 0.001$) is the most powerful long-run driver of sustained industrialisation in Nigeria, confirming that broader export bases strengthen resilience. Non-oil export intensity ($\beta = 0.329$, $p = 0.010$) complements diversification, reflecting how non-oil exports now anchor Nigeria’s industrial performance. Import competition (β_{LR})

= -0.274, $p = 0.011$) exerts a contractionary effect, as excessive exposure to imports undermines local manufacturing. Real exchange rate movements ($p = 0.060$) are borderline significant, implying exchange-rate sensitivity in industrial competitiveness. Short-run dynamics show that diversification ($\beta = 0.201$, $p = 0.012$) and non-oil export intensity ($\beta = 0.142$, $p = 0.044$) exert immediate growth effects, while import competition ($\beta = -0.129$, $p = 0.047$) instantly constrains output. The ECM (-0.630, $p = 0.000$) confirms a fast convergence rate, implying that 63% of disequilibrium is corrected annually. The model fits well (Adj. $R^2 = 0.85$), confirming the explanatory strength of trade-pattern variables. LM serial-correlation test ($p = 0.41$) and heteroskedasticity test ($p = 0.33$) confirm robustness. Normality (Jarque–Bera = 1.77, $p = 0.41$) is accepted, and stability tests affirm structural consistency.

5. Summary, Conclusion and Recommendations

This study examined the nexus between Nigeria's pattern of trade and sustained industrialisation from 1981 to 2024. Motivated by the enduring stagnation in Nigeria's industrial sector despite trade liberalisation, it addressed how changes in bilateral trade structure and aggregate trade diversification influence long-run and short-run industrial outcomes. It bridged a notable literature gap where existing studies largely emphasised growth rather than sustained industrialisation as a dependent outcome. Using an ex post facto design anchored in trade and structuralist theories, the study employed ARDL estimation on secondary data from WDI, UNCTADstat, UN Comtrade, and UNIDO. Models were developed to capture bilateral trade structure and overall diversification impacts, with pre-tests confirming data stationarity, absence of multicollinearity, and mixed integration orders suitable for ARDL. Empirical findings revealed that export diversification (mean = 0.61; $\beta = 0.486$; $p = 0.001$), bilateral manufactured exports ($\beta = 0.372$; $p = 0.006$) and non-oil export intensity ($\beta = 0.329$; $p = 0.010$) significantly enhance sustained industrialisation. Conversely, import competition ($\beta = -0.274$; $p = 0.011$) and import penetration ($\beta = -0.216$; $p = 0.019$) hinder progress. Institutional quality and infrastructure ($\beta = 0.298$; $p = 0.042$) moderately reinforce industrial resilience. Collectively, the findings suggest that Nigeria's structural transformation requires trade patterns that prioritise value-added production over raw commodity exports.

The analysis concludes that the pattern of trade remains a decisive determinant of Nigeria's industrial trajectory. Sustained industrialisation flourishes when trade is diversified, value-added, and embedded in high-productivity sectors. While Nigeria has achieved gradual

improvements in export diversity, excessive import dependence and weak institutional structures continue to inhibit structural transformation. Effective policy coherence between trade, industrial, and macroeconomic frameworks is indispensable for translating export expansion into industrial deepening. To promote sustained industrialisation, policies must strengthen value addition through export diversification programmes and manufacturing clusters. Targeted incentives should support sectors with revealed comparative advantage in processed and manufactured exports. Import substitution should prioritise inputs that enhance domestic competitiveness rather than restrict trade arbitrarily. Infrastructure and governance reforms must lower production costs, while technology transfer through FDI should be deepened to upgrade industrial capabilities. Finally, further research should incorporate firm-level microdata and structural-panel modelling to examine heterogeneity across industries and trading partners for more policy-relevant insights.

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