MANUFACTURING SECTOR OUTPUT AND ECONOMIC PERFORMANCE IN WEST AFRICA: PANEL ANALYSIS

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ABSTRACT

This study examines the impact of manufacturing sector output on economic performance in West Africa using both theoretical and econometric approaches. Economic performance is treated as the dependent variable, while manufacturing sector output serves as the key independent variable, alongside other macroeconomic controls. The analysis covers the period 1990–2023 and employs second-generation econometric techniques to account for cross-sectional dependence and heterogeneity across countries. Preliminary analyses include cross-sectional dependence (CD) tests and panel unit root tests based on the Cross-Sectionally Augmented Dickey-Fuller (CADF) approach. The results reveal the presence of cross-sectional dependence and a mixed order of integration among variables, justifying the use of the Panel Autoregressive Distributed Lag (ARDL) model. The Westerlund error-correction-based cointegration test confirms the existence of a long-run equilibrium relationship among manufacturing output, economic growth, capital formation, inflation, and exchange rate. The Pooled Mean Group (PMG) estimator is employed to estimate both short-run and long-run dynamics. The findings indicate that manufacturing output has a positive and statistically significant effect on economic performance in both the short and long run. The error correction term is negative and significant, suggesting a stable adjustment toward long-run equilibrium. However, the results also indicate that manufacturing growth has not sufficiently translated into employment generation, pointing to jobless growth in the region. The study recommends strengthening industrial policies, improving infrastructure, enhancing access to finance, and promoting value addition and export-oriented manufacturing to achieve sustainable and inclusive growth.

Keywords: *Manufacturing output, Economics performance, Growth, Industrialization, manufacturing value added*

1. INTRODUCTION

Economic performance across the world has always been strongly connected to the performance of the manufacturing sector. Industrialisation remains a key driver of structural change because it

supports large-scale production, job creation, and increased productivity needed for long-term growth (Kruse et al., 2021). In many developing regions, manufacturing plays a central role in generating value, improving income, and transforming economies

Across Africa, the past few years have been shaped by rising food and energy prices, climate pressure, and political instability. These issues have slowed economic activities and weakened the continent's overall growth. Actual data show that Africa's real GDP growth declined from 4.1% in 2022 to 3.1% in 2023, before recording a modest rise to 3.4% in 2024 (African Development Bank [AfDB], 2024). Even with this slight recovery, the continent continues to struggle with weak productivity, high unemployment, and deepening fiscal pressures. West Africa reflects this same mixed reality. The region recorded actual GDP growth of 3.2% in 2023 and 3.6% in 2024 (AfDB, 2024). However, country-level performance shows clear differences. Nigeria, the largest economy in the region, grew by 2.74% in 2023 and 3.4% in 2024, driven mostly by the services sector and not by manufacturing (IMF, 2024). Ghanas economy expanded by 2.9% in 2023 and 3.1% in 2024, signaling gradual stabilization after earlier macroeconomic challenges (World Bank, 2024). Côte d'Ivoire performed more strongly, recording 6.7% growth in 2023 and 6.5% in 2024, supported by agro-processing and improved indtustrial activities (AfDB, 2024). While these figures show progress, many West African economies remain under pressure from rising public debt, inflation, and limited fiscal space, all of which restrict the capacity to invest in productive sectors such as manufacturing.

The manufacturing sector's impact on economic performance is widely recognised in development literature. When manufacturing output expands, it stimulates productivity, strengthens export performance, increases job creation, and boosts household income. Countries in West Africa with stronger manufacturing bases such as Cote d'Ivoire and Senegal tend to record more stable growth and greater resilience to external shocks. In contrast, economies with weak or declining manufacturing sectors struggle with low productivity, limited diversification, and greater vulnerability to fluctuations in commodity prices. The sharp decline in Nigeria' s manufacturing output in 2024 illustrates how policy reforms, foreign exchange instability, and high production costs can undermine industrial competitiveness and slow overall economic performance (World Bank, 2024). The interaction between manufacturing output, trade openness, and economic growth also continues to attract debate. Some studies argue that openness enhances industrial productivity by expanding market access and encouraging technology transfer (Sghaier, 2021), while others find that weak domestic capacity can expose fragile manufacturing sectors to heavy import competition, thereby limiting their growth potential (Takam et al., 2017).

Economic performance is widely recognized as the engine that drives real economic transformation, yet this promise has remained largely unfulfilled in West Africa. In theory, manufacturing should be the pillar that moves economies beyond raw commodity dependence by creating jobs, raising productivity, deepening value addition, and supporting sustainable growth. However, across much of the region, including Nigeria, this engine has struggled to take off. Despite the abundance of labour, natural resources,

and policy intentions, manufacturing output has remained weak, inconsistent, and unable to translate into the broad economic progress the region urgently needs.

Regional initiatives such as the ECOWAS technology and industrialisation framework, and continental shifts like the African Continental Free Trade Area (AfCFTA), were introduced to enhance competitiveness, expand markets, and improve investment conditions (ECOWAS/ECOPOST, 2011; AfCFTA Secretariat, 2021). International partners have supported infrastructure projects, SME financing, and reforms aimed at improving the business environment (World Bank, 2024). Yet implementation weaknesses, energy instability, currency volatility, policy reversals, and limited access to affordable credit continue to undermine the effectiveness of these interventions, required to address these in efficiencies**.**

2. LITERATURE REVIEW

Manufacturing sector output

Manufacturing is the production of merchandise for use or sale using labour and machines, tools, chemical and biological processing, or formulation. The term may referto a range of human activity, from handicraftto high tech, but is most commonly applied to industrial production, in which raw materials are transformed into finished goods on a large scale.Such finished goods may be used for manufacturing other, more complex products, such as aircraft, household appliances or automobiles, or sold to wholesalers, who in turn sell them to retailers, who then sell them to end users and consumers Friedman (2006) Manufacturing takes turns under all types of economic systems in a free market economy, manufacturing is usually directed toward the mass production of productsfor sale to consumers at a profit. In a collectivist economy, manufacturing is more frequently directed by the state to supply a centrally planned economy. In mixed market economies, manufacturing occurs under some degree of government regulation. Friedman (2006) Manufacturing, the single most important sub-sector of industry, accounts for nearly two-thirds of industrial GDP. Within manufacturing, the most important sub-sectors are food processing, basic metallurgy, machinery and equipment, and chemical products. The production of motor vehicles, aircraft, certain electronic products and machinery and equipment are world class. Some of these industries are recipients of generous public incentives (World Trade organization,2004).

Economic Performance

Economic performance is essentially the sustained aggregate increase in the production activities of an economy relative to commodities and services over a period of time usually measured in years (Owan et al., 2020). Economic performance is defined from a population standpoint as the ratio of the entire amount of goods and services produced in an economy in a given year to the total population of the country in question. Either real or nominal words might be used to express the economic growth statement. For instance, real economics (Owan et al., 2020). Economic performance, the process by which a nation’s wealth increases over time. Although the term is often used in discussions of short-term economic performance, in the context of economic theory it generally refers to an increase in wealth over an extended period.

Growth can best be described as a process of transformation. Whether one examines an economy that is already modern and industrialized or an economy at an earlier stage of development, one finds that the process of growth is uneven and unbalanced. Economic historians have attempted to develop a theory of stages through which each economy must pass as it grows given to metaphor, often stressed the resemblance between the evolutionary character of economic development and human life growth, maturity, and decadence (Colin, 2022) have stressed the dominance of different sectors of an economy at different stages of its development and modernization. Development is a process of successive domination by primary (agriculture), secondary (manufacturing), and tertiary (trade and service) production.

Theoretical Review

Solow growth model

Robert Solow's contribution to the theory of economic growth (1956) the aggregate production function is major contribution to economic growth high saving led to high capital and high output or level of production. Population growth in Solow's theory is also one of the reasons for continuing economic growth in the stable condition of the economy, however if population growth is not accompanied by an increase in investment it will lead to reduction in the capital stock per work. Third source of economic growth after investment is an increase in the number of employees in technical progress, which is qualitative changes in production, such as increasing the education level of workers. Despite recent developments in endogenous growth theory, the Solow model remains the essential starting point to any discussion of economic growth. Theory of Endogenous growth model rather than unexplained technological progress.

The theory emphasizes the need for the government to provide incentives and subsidies for businesses in the private sector. It motivates businesses to invest in research and development so they can continue to drive innovation. There are increasing returns to scale by investing in human capital through education or training programs which in turn improve the quality of labor, which increases productivity. The theory emphasized the need for the government to enact policies that help entrepreneurs, which creates new businesses and new jobs, and Investments should also be made to improve infrastructure and manufacturing processes in order to achieve innovation in production. Also, the provide Intellectual property rights, such as copy rights and patents, are incentives for businesses to expand their operations. Given the above assumptions, the endogenous growth theory was first created due to deficiencies and dissatisfaction with the idea that exogenous factors determined long term economic growth. In particular, the theory was established to refute the neoclassical exogenous growth models, as it made predictions about economic growth without factoring in technological change.

Empirical Review

Musa (2025) examined effect of manufacturing output on economic growth in Nigeria, the investigation focused on Nigeria's annual data across multiple years and employed the Autoregressive Distributive Lag (ARDL) methodology to examine the relationship between manufacturing output and overall

economic performance. The study 1990 - 2024, with the ARDL estimation technique establishing crucial short-run and long-run linkages between output and growth. The findings revealed robust evidence of cointegration, indicating a stable long-run relationship, and showed that manufacturing output had a strong positive impact on economic growth both in the short and long run, aligning with theoretical expectations that greater industrial production contributes directly to national output and performance. The study emphasised the need for stronger collaboration among stakeholders in the manufacturing sector to improve capacity utilisation and performance in order to stimulate sustainable economic expansion.

Akpokorie and Egbon (2025) examined manufacturing output growth in a panel of West African countries over the period 2000 to 2023. The study adopted a fully modified ordinary least squares (FMOLS) estimation method to evaluate how industrial policies, including exchange rate regime, credit to the private sector, and trade openness, influenced manufacturing performance. The findings showed that a well-managed exchange rate positively affected manufacturing output growth, while domestic credit to the private sector had varied effects across countries, sometimes limiting output growth. Trade openness exhibited a negative but statistically insignificant influence on manufacturing output growth in the region, suggesting that integration into global markets alone may not guarantee performance improvements without supportive domestic policies. The study underscored the need for strengthened industrial sector policies, improved credit access, and coherent trade and exchange rate frameworks to foster manufacturing output growth and, by extension, broader economic performance.

3. Nature and methods of data analysis

The study employed balanced panel data to examine the relationship between manufacturing sector output and economic performance in 15 West African countries over a 33-year period, from 1990 to 2023. This period is significant because it captures key phases in the region's economic history, including the post-Structural Adjustment era, the rise of regional integration efforts (such as ECOWAS industrial policies), the 2008 global financial crisis, the COVID-19 pandemic, and recent economic recovery efforts.

The model specification is guided by the specific objectives stated in Chapter One. Functional and linear regression models are fundamental to every econometric analysis. Therefore, this study adapted the framework used by Ajaegbe et al (2021) to reflect the choice of variables relevant to manufacturing and economic performance in West African countries.

The initial model is specified as:

$$ECPF = f(MFO, CF, TO, INF) \quad \text{.....(3.1)}$$

The explicit form of the model is shown in equation (3.2):

$$ECPF_{it} = \beta_0 + \beta_1 MFO_{it} + \beta_2 CF_{it} + \beta_3 TO_{it} + \beta_4 INF_{it} + U_{it} \quad \text{.....(3.2)}$$

Where:

ECPF is economic performance, proxied by GDP growth and employment rate

MFO = Manufacturing output

CF = Gross capital formation

TO = Trade openness

INF = Inflation rate

U = Error term

T = Time frame

i denotes countries and t denotes time

A modified version of the above model, which is applied in the current study to better reflect structural changes and sectoral impacts, is expressed in equation (3.3):

3.2 Methods of Data Analyses

3.2.1Pre-Estimations

In the course of the study, the second-generation panel data techniques were adopted in analyzing the data. These techniques include:

3.2.2 Cross-Sectional Dependence Test

It is usually accepted that disturbance in the panel data Cross-sectional Dependence occurs mainly when the cross-sections are large in number. Nonetheless, there is significant evidence that CD is frequently present in panel data models. Overlooking diagnostic checking of CD can have severe consequences, as Unaccounted-for residual dependence may result in inefficient estimates and invalid insights from tests. Given this fact, it becomes necessary to assess whether there are variables that are cross-sectional dependent or independent. To check for the presence of cross-sectional dependence, the study made use of the Cross-Sectional Dependence Test by(Pesaran, 2004).

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N} P_{ij}\right) \quad \text{.....(3.7)}$$

CD = Cross Dependence

T= time

N= total number of countries

Pij= Correlation of residuals of the i and j

Panel Unit Root Tests

In a long-run estimation analysis, the stationary of variables is very important to avoid spurious regression. The panel unit root test was carried out to check whether variables are trend stationary at levels or not. This is because a standard empirical analysis may be rendered invalid if the regressor is non-stationary. For that purpose, this study tends to use the second-generation unit root test proposed by (Pesaran, 2007) for investigating the existence of a unit root in a cross-sectionally dependent panel data set. The proposed test statistic can be formulated as follows:

$$\text{CIPS}\ (N,T) = N^{-1}\sum_{i=1}^{N} \text{ti}\ (N,T) \quad \text{.....(3.8)}$$

Where ti (N, T) is the cross-sectionally augmented Dickey-Fuller statistic for the ithcross-section unit.

And the individual effects are assumed to be fixed in the time dimension. It is assumed that the lag orders of Kare are identical for all cross-section units of the panel. It also allows the autoregressive parameters and the regression coefficients to vary across groups. Under the null hypothesis, it is assumed that there is no causality relationship for any of the units of the panel.

Hausman Test

The Hausman specification test was used to choose between the fixed effects and random effects models. The null hypothesis of the test states that the preferred model is the random effects model. If the null hypothesis is rejected, the fixed effects model will be considered more appropriate. This test guides the selection of the most efficient and consistent estimator for the panel data analysis.

3.3.4 Panel Autoregressive Distributed Lag Model

Panel ARDL model was conducted to analyze the short-run and long-run relationships among variables. The ARDL model possesses several econometric advantages compared to other traditional panel models. The ARDL model can solve endogeneity, heteroscedasticity, autocorrelation, and multi-collinearity problems econometrically. The panel ARDL also contains both short-run and long-run relationships in a single equation and is applicable in cases of stationary variables at level (I (0)), the first difference (I (1)), or the mix of I (0) and I (1). The Panel Auto Regressive Distributed Lagmodel can be formulated as shown below:

$$y_{it} = a_i + \sum_{j=1}^{p} \lambda_{ij}\, y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij}\, x_{i,t-j} + V_{it} \quad \text{.....(3.9)}$$

Where x_{it} is a vector of explanatory variables (regressors) for group *i*, a_i represents fixed effects, λ_{ij} are the coefficients of the lagged dependent variables, and δ_{ij} are coefficient vectors.

Panel ARDL model for Manufacturing output and economic performance....,.....,.....(3.10)

Pool Mean Group

The study used an intermediate procedure referred to as the pool mean group (PMG) estimator which constrains the long run coefficients to be identical but allows the short run coefficients and error variances to differ across groups. The pool mean group (PMG) was carried out based on the assumptions of Panel A

3.4 Post Estimation Test

Autocorrelation: This is used to verify whether the residuals of the regression model are normally distributed, ensuring that the assumptions underlying classical regression are not violated.

Multicollinearity Test: This test will diagnose the presence of multicollinearity among the explanatory variables. If multicollinearity exists, it could distort the estimation of regression coefficients.

Heteroscedasticity Test: The study carried out this test to check whether the variance of the error terms is constant across observations. If heteroscedasticity is present, it may lead to inefficient and biased estimates.

3.5 Model Justification

The choice of model in this study is theoretically and empirically justified. First, the specification is anchored on structural transformation theory and endogenous growth theory, which emphasize the role of manufacturing, capital accumulation, trade integration, and macroeconomic stability in driving economic performance. Manufacturing output is included as the core explanatory variable because it enhances value addition, productivity, export capacity, and employment generation. Capital formation is incorporated to capture the effect of investment on productive capacity, while trade openness reflects the degree of integration with the global market. Inflation and exchange rate are included to account for macroeconomic stability, which influences competitiveness, production costs, and overall growth outcomes.

Second, the use of panel data covering 15 West African countries over 19902023 allows the study to control for unobserved country-specific heterogeneity and to increase the degrees of freedom and efficiency of estimation. Given the likelihood of cross-sectional dependence due to regional integration and common economic shocks, second-generation panel techniques are appropriate.

The Panel ARDL framework is particularly suitable because the variables exhibit a mixture of I(0) and I(1) integration orders. The ARDL model enables simultaneous estimation of short-run dynamics and long-run equilibrium relationships. The Pooled Mean Group (PMG) estimator is preferred because it allows short-run coefficients and adjustment speeds to differ across countries while constraining long-run coefficients to be homogeneous, which is consistent with regional economic convergence assumptions within West Africa.

PRESENTATION OF RESULTS

This study employs panel series data to manufacturing sector output and economic performance in west Africa. When using panel series data in analysis, regression results might provide a spurious regression if the data series are non-stationary and cross-sectional dependences. Thus, the data must obey the panel series properties that is, the data should be stationary, meaning that, the mean and variance should be constant over time. The presence of unit root indicates that the panel series data is non-stationary. This study therefore will conduct test such as panel unit root test, cross sectional dependence test, westerlund co-integration and dynamic panel ARDL estimation.

Table 4.1: Descriptive Statistics Results

Variable	Obs	Mean	Std. Dev.	Min	Max
Exchange Rate	170	110.111	35.143	49.776	273.01
Capital formation	170	1.440e+10	3.077e+10	-20612328	2.067e+11
Inflation	170	11.59	12.057	-1.107	72.836
Manufacturing Output	170	7.443e+09	1.389e+10	17533969	6.490e+10
Economic growth	170	6.751e+10	1.271e+11	3.171e+08	5.742e+11

Sources: Author' s Computation using Stata 17

Table 4.1 present the descriptive figures for the variables used in analyzing the relationship between manufacturing sector output and economic growth in West Africa. The figures provide a quantitative snapshot of the data structure and reveal important macroeconomic characteristics that shape the region' s economic performance.

The exchange rate has an average value of 110.111 with a high standard deviation of 35.143, and a wide range between 49.776 and 273.01. These figures point to substantial exchange rate volatility across the region. From an economic perspective, this level of volatility introduces uncertainty into the manufacturing sector by affecting the cost of imported raw materials and capital goods as well as export competitiveness. Such instability can weaken manufacturing performance and reduce its effectiveness as a driver of economic growth.Capital formation exhibits a mean value of 14.4 billion USD and a very large standard deviation 3.077, with values ranging from negative investment to as high as 2.067. These figures indicate extreme volatility in investment levels within the region. Negative minimum values suggest periods of capital decumulation, likely associated with economic crises or political instability such as 2008 financial crisis and the covid-19. Since capital accumulation is essential for expanding manufacturing capacity and improving productivity, this instability poses a significant challenge to sustained manufacturing led growth in West Africa.

Inflation records an average rate of 11.59 percent with a standard deviation of 12.057, reflecting considerable price instability. The presence of both negative inflation and very high inflation rates indicates episodes of deflation as well as severe inflationary pressures. Economically, such instability increases production costs, reduces consumer purchasing power, and discourages long term investment, all of which can undermine the growth contribution of the manufacturing sector.

Manufacturing output has a mean value of 74.43 million USD with a standard deviation of 1.389, indicating wide disparities in industrial production across countries and time periods. The large gap between the minimum and maximum values suggests that manufacturing activity is heavily concentrated in a few economies, while many countries maintain very low levels of industrial output. This uneven industrial structure implies that the contribution of manufacturing to economic growth in West Africa is not uniform and is driven largely by a limited number of countries.

Economic growth shows a mean value of 67.51 billion USD and a very large standard deviation of 1.271, indicating a substantial difference in economic size and performance across the region. The wide range between the minimum and maximum values confirms that growth outcomes vary significantly over time and across countries. This variation is essential for econometric analysis, as it provides the necessary contrast to examine how changes in manufacturing output and macroeconomic conditions influence economic performance.

Table 4.2: Cross-Sectional Dependence (CD) Test Results

Variable	CD Statistic	p-value	N	T	Remark
Gross Domestic Product	16.640	0.000	5	33	CD
Manufacturing Output	10.270	0.000	5	33	CD
Inflation Rate	2.630	0.009	5	33	CD
Capital Formation	14.270	0.000	5	33	CD
Exchange Rate	2.490	0.013	5	33	CD

Source: Authors Computation using Stata 17

The cross-sectional dependence (CD) test in Table 4.2 assesses whether the variables in the panel dataset exhibit interdependence across countries, an important consideration in regional studies such as this one, where economic structures, trade patterns, and policy environments are often interconnected. The results indicate that several of the variables display statistically significant cross-sectional dependence, implying that shocks or fluctuations in one West African country tend to spill over to others except trade openness which do not have spill over effect on among the countries this could be high tariff as on of the plausible reason.

For GDP, manufacturing output, capital formation, inflation, and the exchange rate, the CD statistics are large and highly significant, with p-values of 0.000 for most of the variables. This shows strong evidence that these macroeconomic indicators move together across the West African region, reflecting the

presence of shared regional dynamics such as trade integration, common exposure to global commodity prices, regional monetary linkages, and similar policy responses. The strong dependence in manufacturing output is particularly revealing, as it suggests that industrial performance in one country is not isolated but shaped by regional supply chains, market flows, and synchronized industrial disruptions. Similarly, the presence of dependence in GDP and capital formation underscores the interconnected nature of economic growth and investment behaviour in the region.

Inflation and the exchange rate also exhibit significant dependence, which is consistent with the region's exposure to shared inflationary pressures, imported inflation, and exchange rate contagion effects, often driven by global commodity price movements, monetary policy responses, and external sector vulnerabilities.

Table 4.3: Panel Unit Root Test Result

	CADF Test			
	Levels	**First Diff**	**P-value**	**Remark**
Gross Domestic Product	-0.822	-5.821	0.000	I(1)
Manufacturing Output	-0.490	-4.725	0.000	I(1)
Inflation Rate	-2.038	-	0.000	I(0)
Capital Formation	-2.434.	-	0.000	I(0)
Exchange Rate	-1.467.	-3.481	0.000	I(1)
Critical Values 10% 5% 1%				
	-2.730 -2.840 -3.060			

Source: Author's Computation using stata 17

Table 4.3 panel unit root results based on the CADF test provide important insights into the time-series properties of the variables and guide the appropriate econometric technique for the panel analysis. The critical values indicate the threshold at which the null hypothesis of a unit root can be rejected. When the test statistic is greater (in absolute terms) than the critical value, the variable is stationary; otherwise, it is non-stationary and becomes stationary only after differencing.

In contrast, inflation and capital formation are stationary at levels, meaning they are I(0) variables. Their CADF statistics surpass the critical boundaries, supported by highly significant p-values, indicating that these two variables revert to a stable mean over time and do not exhibit trending behaviour. This is plausible because inflation, despite being volatile, often follows policy-driven stabilization cycles that re-anchor it to a long-run target, while capital formation can reflect more short-term investment adjustments rather than sustained trends.

able 4.4: Hausman Test Result

Objective	F-statistic	P-Value.	Decision
i. manufacturing sector output on GDP growth.	449.489	0.0000	FE

Note: *** = p-value < 0.5% implies strong Fix Effect (FE).

To (RE) specifications within the pdetermine the most appropriate estimator between the Fixed Effects (FE) and Random Effectsanel framework, the Hausman (1978) test was conducted for the study. The test evaluates the null hypothesis that the individual-specific effects are uncorrelated with the regressors, in which case the Random Effects estimator would be consistent and efficient. Rejection of the null hypothesis implies that the Fixed Effects estimator is preferred, as the Random Effects estimator would be inconsistent.

The results of the Hausman test are highly conclusive across all models. For the economic growth model (manufacturing output on GDP growth), the test yields an F-statistic of 449.489 with a p-value of 0.0000, leading to a decisive rejection of the null hypothesis.

Table 4.5: Westerlund ECM Panel Cointegration Tests
Result for manufacturing sector output and economic performance.

Statistic	Value	Z-value	P-value
Gt	-2.148	-1.635	0.051
Ga	-5.605	0.089	0.536
Pt	-4.469	-1.786	0.037
Pa	-5.960	-1.579	0.057

Source: Author's Computation using Stata 17

The updated Westerlund ECM results provide sufficient justification for cointegration. The Pt statistic (p = 0.037) is significant at the 5% level, leading to rejection of the null hypothesis of no cointegration for the panel. This confirms the existence of a long-run equilibrium relationship among the variables.Although the Gt statistic (p = 0.051) is slightly above 5%, it is significant at the 10% level, indicating that at least some countries in the panel exhibit long-run adjustment dynamics.Therefore, the combined evidence from Pt and Gt supports the presence of long-run equilibrium adjustment in the panel, justifying the estimation of the long-run model using Panel ARDLPMG.

The negative Z-values for Gt, Pt, and Pa further support the notion that deviations from long-run equilibrium tend to correct over time for part of the panel. However, the Ga statistic, with a p-value of 0.536, indicates no evidence of cointegration using that criterion, reflecting that not all tests strongly support long-run co-movement.

Taken together, the results suggest partial but meaningful evidence of cointegration. In practical terms, this indicates that the variables such as manufacturing output, GDP, employment, capital formation, inflation, and trade exhibit a tendency to move together over the long run for the majority of countries, even though the strength of this relationship varies across the different test statistics. This outcome aligns with expectations for West African economies, where structural linkages exist but are sometimes weakened by macroeconomic instability, policy inconsistencies, and external shocks.

4.3 Effect of Manufacturing Sector Output on Economic Growth in West Africa

The table presented discusses the dynamics of how economic growth responds through the manufacturing sector.

Table 4.6 Panel ARDL result for Manufacturing sector output and economic Growth
Dependent Variable: Economic Growth

lnGDP	Coef.	Std.Err.	Z	P>z	[95%Conf.	Interval]
Short Run Est.						
Mean Group:						
L.lnGDP	0.265	0.046	5.810	0.000	0.176	0.355
EMP	-0.001	0.003	-0.280	0.780	-0.007	0.005
lnCF	0.134	0.144	0.930	0.354	-0.149	0.416
lnMFO	0.224	0.108	2.070	0.039	0.011	0.436
EXCR	0.003	0.001	2.210	0.027	0.000	0.005
Adjust. Term						
Mean Group:						
lr_lnGDP	-0.735	0.046	-16.120	0.000	-0.824	-0.645
Long Run Est.						
Mean Group:						
lr_EMP	-0.001	0.005	-0.240	0.814	-0.010	0.008
lr_EXER	0.004	0.002	2.220	0.026	0.000	0.007
lr_lnCF	0.187	0.193	0.960	0.335	-0.193	0.566
lr_lnMFO	0.292	0.130	2.250	0.025	0.037	0.546

Note: lnGDP = Log of Gross Domestic Product proxy for economic performance, lnCF= Log of Capital Formation, lnMFO= Log of Manufacturing Output, EXCR= Exchange Rate

Source: Author's Computation using Stata 17.

Cross Sectionally Augmented Autoregressive Distributed Lag Mean Group estimation provides robust evidence on both the short run and long run relationships between GDP and the selected macroeconomic variables across West African countries, while explicitly accounting for cross sectional dependence. By controlling for unobserved common factors and spillover effects among countries, the CS ARDL framework produces more reliable and policy relevant estimates for a region characterized by strong economic integration, similar structural features, and exposure to common. The short run dynamics reveal that GDP is strongly influenced by its own past realizations. The coefficient of the lagged GDP variable is 0.265 with a probability value of 0.000, indicating a highly significant and positive relationship. This finding confirms the presence of substantial output persistence across West African economies. From an economic standpoint, this implies that economic growth follows a path dependent process. In practical terms, when an economy experiences expansion in one period, the effects tend to be carried forward into subsequent periods through mechanisms such as accumulated capital stock, learning by doing, improving business confidence, and increased consumption demand. Similarly, periods of contraction may also have lingering negative effects due to reduced investment, weakened fiscal capacity, and lower productivity. Developing economies often exhibit such persistence because structural rigidities, limited diversification, and slow institutional adjustments make rapid structural transformation difficult. The result therefore reinforces the broader empirical literature that growth in developing regions evolves gradually rather than instantaneously.

4.2 Test of Hypotheses

Hypothesis One (H01)

H01: Manufacturing sector output has no significant effect on economic growth in West Africa.

H1: Manufacturing sector output has a significant effect on economic growth in West Africa.

The CS-ARDL results show that manufacturing output has a positive and statistically significant effect on economic performance in both the short run and the long run. The long-run coefficient is positive, and the associated probability value is below 5%, indicating statistical significance.

Decision: Reject H01.

Conclusion: Manufacturing sector output has a significant positive effect on economic performance in West Africa. This supports the theoretical expectation that manufacturing serves as an engine of growth and confirms the existence of a stable long-run relationship.

4.3 Discussion of Finding

This chapter presents an integrated discussion of the empirical findings from the CS-ARDL estimation and interprets them in relation to theoretical expectations and empirical literature.

ct of manufacturing output on employment, and the effect of manufacturing output on trade openness in West Africa. The discussion highlights how the results reflect regional structural characteristics, how they compare with existing evidence, and what they imply for industrial development and policy.

the effect of manufacturing output on economic growth. The CS-ARDL estimates demonstrate that manufacturing output exerts a positive and significant effect on Economic Performance in both the short run and the long run, indicating that increases in manufacturing value added generate immediate and lasting gains in West African economic performance. This finding is strongly supported by the empirical literature reviewed in the thesis. Nigerian studies such as Ajayi and Adepoju (2013) show that a one-percent increase in manufacturing output increases Economic Performance by approximately 0.44 percent, confirming the growth-enhancing nature of industrial expansion in developing economies. Adediran and Oni (2012) likewise document a positive long-run impact of manufacturing output on Economic Performance using VECM techniques, reinforcing the durability of this relationship across methodological approaches and time periods

Broader African evidence strengthens this perspective. Clement (2017), applying a system-GMM framework to 19902017 data, finds that manufacturing value added significantly promotes economic growth across African economies and recommends policy attention to the industrial sector as a means of strengthening output resilience. These findings are complemented by those of Ogundipe (2022), who reports that manufacturing output is an important driver of Nigerias economic growth and is closely linked to capital accumulation, thereby supporting the idea that manufacturing contributes to sustained growth via investment and productivity channels

The positive long-run elasticity found in this study reinforces theoretical arguments embedded in Kaldors growth model, which posits manufacturing as the primary engine of growth owing to its increasing returns to scale and capacity to stimulate productivity improvements across the economy. The adjustment term in the CS-ARDL model confirms the existence of a stable long-run equilibrium relationship between manufacturing and Economic Performance, implying that deviations from the manufacturing-growth path are corrected over time. Although some international studies report mixed or negative effects for countries such as Indonesia and the United Kingdom, as noted by Kim (2022) and others, these exceptions reflect specific structural conditions rather than universal trends. The West African evidence presented here aligns much more closely with the African empirical record, confirming that manufacturing remains a central pillar for long-term economic expansion despite persistent structural challenges

5. Conclusion

The study concludes that manufacturing output remains a significant driver of economic growth in West Africa, thereby providing empirical support for Kaldor’s growth laws within the regional context.

However, the sector has not translated output growth into commensurate employment generation, resulting in persistent jobless growth. In addition, manufacturing expansion appears to be associated with declining trade openness, suggesting a structural bias towards import substitution rather than export-oriented industrialisation. These outcomes reflect underlying structural constraints, including high capital intensity, technological limitations, inadequate infrastructure, exchange rate volatility, policy inconsistency, and weak integration into global and regional value chains. Without deliberate and sustained policy interventions, the manufacturing sector is unlikely to achieve its full potential as a catalyst for inclusive and sustainable economic development.

6. Recommendations

1. Promote Industrial Expansion and Value Addition

Governments should strengthen policies that support manufacturing growth by encouraging value addition, diversification of industrial output, and development of downstream industries. This will enhance productivity and broaden the sector's contribution to GDP.

2. Enhance Access to Industrial Finance

There is a need to improve access to affordable and long-term credit for manufacturers, particularly small and medium-sized enterprises (SMEs). Development finance institutions and targeted credit schemes should be expanded to support industrial investment.

3. Prioritise Infrastructure Development

Investment in critical infrastructure, especially electricity supply, transportation networks, and industrial parks should be intensified to reduce production costs and improve competitiveness of the manufacturing sector.

4. Promote Employment-Intensive Industrialisation

Policies should encourage labour-intensive manufacturing activities to address jobless growth. Incentives can be designed to support firms that generate employment, particularly in sectors with high labour absorption capacity.

5. Stabilise Macroeconomic Environment

Exchange rate stability and consistent macroeconomic policies are essential to reduce uncertainty and improve planning for manufacturing firms. This will enhance investor confidence and long-term industrial growth.

6. Strengthen Technological Capability and Innovation

Governments should invest in technological upgrading, skills development, and research and development (R&D) to improve productivity and reduce reliance on outdated production methods.

7. Enhance Trade Openness and Export Competitiveness

Policies should shift from inward-looking import substitution strategies towards export-oriented industrialisation. This includes improving trade facilitation, reducing export barriers, and integrating into global and regional value chains.

8. Improve Policy Coordination and Institutional Frameworks

Effective coordination between industrial, trade, and macroeconomic policies is necessary to ensure consistency and long-term impact. Strengthening institutions will enhance policy implementation and monitoring.

REFERENCES

Adekola, I. A., & Adeyemi, O. O. (2017). The impact of manufacturing sector output on economic growth in Nigeria: An empirical analysis. International Journal of Economics, Commerce and Management, 5(8), 111.

Adeniyi, A. (2021). Manufacturing output growth and employment in Nigeria. International Journal of Finance & Banking Studies, 10(2), 111119.

Adofu, I., Taiga, U., & Tijjani, Y. (2015). Manufacturing sector and economic growth in Nigeria. Journal of Economics and International Finance, 7(1), 1216.

African Development Bank Group. (2024). African Economic Outlook 2024: Africas economic performance.

Ajeigbe, O. M., Olomola, P. A., & Adeleke, O. K. (2021). Dynamics of manufacturing sector development and youth unemployment in Africa. International Journal of Research and Innovation in Social Science, 5(4), 4249.

Akpokorie, A. G., & Egbon, P. C. (2025). Industrial policies and manufacturing sector output growth in selected West African countries. International Journal of Research in Social Sciences. 9(1), 200-213.

Amakom, U. (2012). Manufactured exports in Sub-Saharan African economies: Econometric tests for the learning-by-exporting hypothesis. American International Journal of Contemporary Research, 2(4), 195206.

Awad, M. (2010). The role of manufacturing in promoting sustainable economic growth in the GCC. Institution for Social and Economic Research, Working Paper No. 4.

Balassa, B. (1965). Trade liberalisation and revealed comparative advantage. The Manchester School, 33(2), 99123. https://doi.org/10.1111/j.1467-9957.1965.tb00050.x

Banjoko, S. A. (2009). The Nigerian manufacturing sector: Bumpy past and shaky futureWhat options for survival? University of Lagos Inaugural Lecture Series.

Beveridge, W. (1944). Full employment in a free society. George Allen & Unwin.

Bhagwati, J. (1978). Foreign trade regimes and economic development: Anatomy and consequences of exchange control regimes. Ballinger.

Brookings Institution. (2018). Global economy and development. Brookings Institution.

Brookings Institution. (2023). Nigerias industries without smokestacks are delivering better economic opportunities than traditional sectors.

Chukwuedo, O. S., & Ifere, E. O. (2017). Manufacturing subsector and economic growth in Nigeria. British Journal of Economics, Management and Trade, 17(4), 111.

Deloitte. (2024). Africa economic outlook: Ghanas industrial growth. Deloitte Insights.

Felipe, J., Mehta, A., & Rhee, C. (2019). Manufacturing mattersbut its the jobs that count. Cambridge Journal of Economics, 43(1), 139168.

Financial Times. (2024). Benins manufacturing ambitions: The Glo-Djigbé Industrial Zone.

Friedman, M. (1968). The role of monetary policy. The American Economic Review, 58(1), 117.

Gwartney, J., Skipton, A., & Lawson, R. (2001). Economic freedom of the world: 2001 annual report. Fraser Institute.

Haraguchi, N., Cheng, C. F. C., & Smeets, E. (2017). The importance of manufacturing in economic development: Has this changed? World Development, 93, 293315.

Harrod, R. F. (1939). An essay in dynamic theory. The Economic Journal, 49(193), 1433. https://doi.org/10.2307/2225181

Ishola, S. A. (2012). Government expenditure in the manufacturing sector and economic growth in Nigeria. International Journal of Scientific and Engineering Research, 3(11), 19.