IMPACT OF FISH PRODUCTION ON ECONOMIC GROWTH IN NIGERIA

Nurudeen Ahmed Tijani
Department of Economics,
Nigerian Defence Academy,
Kaduna State.
annurtijani@gmail.com

Prof. Zakari Saheed
Department of Economics,
Nigerian Defence Academy,
Kaduna State.

Mosses Danpome *(PhD)*
Department of Economics,
Nigerian Defence Academy,
Kaduna State.

Abstract

This study investigates the impact of fish production on economic growth in Nigeria, using annual time series data from 1985 to 2025. The Augmented Dickey-Fuller (ADF) test confirmed that gross domestic product (GDP), labour productivity, and fishery production are integrated of order one, justifying the application of Johansen co-integration and Vector Error Correction Model (VECM). The co-integration results revealed a stable long-run relationship among the variables, while the VECM indicated that approximately 25.7% of short-run disequilibrium is corrected annually. Findings show that fish production exerts a positive and significant influence on GDP in the long run, underscoring its role as a driver of sustainable growth. However, labour productivity displayed a negative short-run effect on GDP, reflecting inefficiencies in Nigeria's labour market. Diagnostic tests confirmed the robustness of the model, with no evidence of autocorrelation, heteroskedasticity, or non-normality. The study concludes that fisheries are structurally tied to Nigeria's economic growth, though short-run volatility persists. It recommends expanding aquaculture, improving labour efficiency, and adopting sustainable practices to fully harness the sector's potential for long-term development.

INTRODUCTION

Fisheries comprise all economic activities related to the cultivation and harvesting of fish and aquatic resources, primarily to meet human food demand, though secondary objectives such as recreational fishing and the extraction of by-products (fish oil) also exist (Fletcher, 2002). Women play a significant role in the sector's labour force, constituting over 10% of global employment (OECD, 2020). Nigeria's domestic fish market continues to face a demand–supply deficit. As of 2026, annual consumption requirements are estimated at 3.6 million tonnes, while local output stands at only 1.4 million tonnes, leaving a shortfall of 2.2 million tonnes (FAO, 2026; Federal Ministry of Marine and Blue Economy, 2026). Despite its growing popularity, Nigeria's aquaculture industry remains in an early stage of development, with catfish production accounting for more than half of aquaculture output (Nwiro, 2012; Adewumi & Olaleye, 2024). Fish supply originates from four major sources: aquaculture, large-scale farmers, subsistence fisheries, and imports of frozen fish (Akinrotimi, Abu, & Aranyo, 2011).

***Corresponding Author:**
Nurudeen Ahmed Tijani
Department of Economics,
Nigerian Defence Academy,
Kaduna State.
annurtijani@gmail.com

The Niger Delta region, endowed with diverse marine ecosystems, contributes almost 60% of domestic fish output (Akankali & Jamabo, 2011).

Statement of the Problem

Nigeria's fisheries sector remains a critical component of national food security and economic development, yet it continues to face structural challenges that undermine its potential contribution to growth. Despite being endowed with vast aquatic resources, the country suffers from a persistent demand–supply deficit. As of 2026, national fish consumption requirements are estimated at 3.6 million metric tonnes annually, while domestic production stands at only 1.4 million metric tonnes, leaving a shortfall of 2.2 million metric tonnes (FAO, 2026; Federal Ministry of Marine and Blue Economy, 2026). This deficit has forced Nigeria to rely heavily on imports exceeding USD 1 billion annually, thereby exerting pressure on foreign reserves and exporting potential employment opportunities that could otherwise be generated locally (Adewumi & Olaleye, 2024). The problem is further compounded by post-harvest losses, with approximately 420,000 tonnes of fish wasted annually due to inadequate cold chain infrastructure, poor storage facilities, and inefficient distribution systems (Oyetola, 2026). These losses represent nearly 30% of total domestic production, aggravating the supply gap and reducing affordability for low-income households. Moreover, aquaculture, which has been identified as a viable pathway to bridging the deficit, remains underdeveloped, with catfish production dominating output but limited diversification into other commercially viable species (Nwiro, 2012)

Research Questions:

i. What is the long-run relationship between fisheries production and GDP growth in Nigeria from 1985 to 2025? Labour in fisheries sector:
ii. How does labour participation in the fisheries sector contribute to Nigeria's GDP growth?

Objectives of the Study:

i. To Assess fisheries production; assess the extent to which fisheries production contributes to GDP growth in Nigeria between 1985 and 2025
ii. Evaluate labour participation: To evaluate the impact of labour participation in the fisheries sector on Nigeria's GDP growth.

Research Hypotheses

Based on the research problem, questions, and objectives, and considering fisheries production and labour participation in the fisheries sector as the independent variables with GDP growth as the dependent variable, the following hypotheses are proposed:

1. Fisheries production hypothesis

H_{01} (Null Hypothesis): Fisheries production has no significant long-run relationship with GDP growth in Nigeria.

H_{11} (Alternative Hypothesis): Fisheries production has a significant long-run relationship with GDP growth in Nigeria.

2. Labour participation hypothesis

H_{02} (Null Hypothesis): Labour participation in the fisheries sector has no significant impact on GDP growth in Nigeria.

H_{12} (Alternative Hypothesis): Labour participation in the fisheries sector has a significant impact on GDP growth in Nigeria.

The significance of the study

The significance of this study is rooted in its ability to provide updated empirical evidence on the relationship between fisheries production, labour participation, and GDP growth in Nigeria, particularly at a time when the country faces a widening demand–supply deficit of 2.2 million metric tonnes as of 2026 (FAO, 2026). By focusing on production and labour as independent variables, the study addresses a critical gap in existing literature, where most prior works have emphasized food security and employment without rigorously quantifying their macroeconomic impact. This research therefore advances scholarly understanding of the sector's role in national development. From a policy perspective, the study is highly relevant as Nigeria continues to spend over USD 1 billion annually on fish imports, a dependence that drains foreign reserves and limits domestic job creation (Federal Ministry of Marine and Blue Economy, 2026). By quantifying the impact of fisheries production and labour on GDP, the findings will provide evidence-based insights for designing policies that strengthen aquaculture, improve cold chain infrastructure, and enhance labour productivity in the sector. Such interventions are crucial for reducing import dependence and stimulating local economic growth.

The scope of the study

The scope of this study covers the period from 1981 to 2025, focusing on the relationship between fisheries production, labour participation in the fisheries sector, and Gross Domestic Product (GDP) growth in Nigeria. This timeframe was selected to capture long-term trends in fisheries output, labour dynamics, and economic performance, allowing for a comprehensive analysis of structural changes in the sector and their macroeconomic implications. By spanning over four decades, the study incorporates periods of policy reforms, economic shocks, and sectoral interventions, thereby providing a robust basis for examining the causal relationship between fisheries and GDP.

Literature review

Introduction

Theoretical reviews

Endogenous Growth Theory

Endogenous Growth Theory, advanced by Paul Romer (1986) and Robert Lucas (1988), argues that growth is driven by internal factors such as human capital, innovation, and knowledge spillovers rather than external forces. Unlike the Solow Model, it emphasizes that investments in education, research, and technology can generate sustained growth without diminishing returns. For Nigeria's fisheries, this theory highlights the importance of training workers, adopting modern aquaculture techniques, and improving labour efficiency.

In practice, Nigeria's reliance on imports despite having vast water resources reflects underinvestment in endogenous drivers of growth. By focusing on innovation such as developing high-yield fish breeds, improving feed quality, and enhancing cold chain logistics the fisheries sector can become a self-sustaining engine of growth. Endogenous Growth Theory therefore provides a framework for understanding how internal improvements in fisheries production and labour can reduce import dependence and strengthen GDP growth.

2.3 Theoretical Framework

Theoretical Framework (Endogenous Growth Theory Adaptation)

This study adopts the **Endogenous Growth Theory** as its guiding framework because it emphasizes internal drivers of growth such as capital, labour, and knowledge (technology). Unlike the neoclassical Solow model, which treats technological progress as exogenous, the endogenous model integrates innovation and human capital as continuous sources of growth. Romer (2009) argues that economies expand when knowledge and innovation are combined with capital and labour to generate output. This makes the model particularly suitable for Nigeria's fisheries sector, where production and labour participation are the independent variables under study.

The basic endogenous production function is expressed as:

$$Y(t) = K(t)^{\beta} \cdot (A(t)L(t))^{\gamma}$$

Where:

$Y(t)$ = output at time t, proxied by GDP
$K(t)$ = capital stock at time t
$L(t)$ = labour input, proxied by fisheries workforce and human capital development
$A(t)$ = knowledge or technological advancement

In this framework, knowledge and labour enter multiplicatively, meaning that $A(t)L(t)$ represents effective labour. Technological progress occurs when the stock of knowledge $A(t)$ increases, thereby enhancing labour productivity and sustaining long-run growth.

To extend the analysis to agriculture, specifically fisheries, the production function is modified to include fisheries output as a sectoral determinant of growth:

$$Y(t) = K(t)^{\beta} \cdot FISH(t)^{\lambda} \cdot (A(t)L(t))^{\gamma}$$

Where:

Y(t) = economic growth (GDP)
K(t) = capital at time t
L(t) = labour, proxied by education and human capital development
A(t) = knowledge or technological advancement (aquaculture innovation, cold chain logistics, feed technology)
FISH(t) = fisheries production (aquaculture + capture fisheries)

This expanded endogenous growth model highlights fisheries as an important driver of economic growth. By analyzing fisheries separately, the framework allows us to measure its specific contribution to GDP and national income. It also emphasizes that sustained growth in Nigeria depends not only on capital accumulation but also on improvements in labour productivity and technological innovation within the fisheries sector.

2.4 Empirical literature

Empirical literature provides the evidence base upon which theoretical arguments are tested and validated. In the context of fisheries and economic growth, empirical studies are particularly important because they reveal the actual dynamics between fish production and macroeconomic performance, using time-series data, econometric models, and policy evaluations. While theoretical frameworks often emphasize the potential of fisheries to drive economic growth, empirical investigations allow researchers to measure the extent of this contribution, identify structural constraints, and evaluate the effectiveness of government interventions.

Adewumi and Olaleye (2024) examined aquaculture development and food security in Nigeria. Their study revealed aquaculture now accounts for over 54% of domestic fish output, but productivity is constrained by high feed costs and poor financing. They recommended government-backed credit schemes and private sector partnerships to scale aquaculture.

Esin, Evans, and Ndekhedehe (2025) analyzed the performance of capture and aquaculture fisheries in Nigeria's Blue Economy. Their findings showed aquaculture contributed more significantly to GDP growth (6.67%) compared to capture fisheries (4.19%). They recommended investment in aquaculture technology, feed quality improvement, and cold chain infrastructure.

Elezuo, Bello, and Aladetohun (2024) examined Nigeria's fisheries sector within the Blue Economy framework. Their study revealed vast potential for mariculture in Nigeria's EEZ but highlighted constraints such as overfishing, environmental degradation, and IUU fishing. They recommended ecosystem-based management, science-driven quotas, and satellite monitoring.

Adamu and Sani (2025) investigated the role of fisheries cooperatives in enhancing labour productivity. Their study revealed that cooperative membership improved access to inputs and markets, thereby increasing output. They recommended strengthening cooperative societies and providing government support.

Chukwu and Bello (2025) examined the impact of fisheries labour productivity on GDP growth. Their study revealed that improvements in labour efficiency directly enhanced fisheries' contribution to GDP. They recommended investment in human capital development and modern fishing equipment.

Adamu and Sani (2025) investigated the role of fisheries cooperatives in enhancing labour productivity. Their study revealed that cooperative membership improved access to inputs and markets, thereby increasing output. They recommended strengthening cooperative societies and providing government support.

Chukwu and Bello (2025) examined the impact of fisheries labour productivity on GDP growth. Their study revealed that improvements in labour efficiency directly enhanced fisheries' contribution to GDP. They recommended investment in human capital development and modern fishing equipment.

Gap in the literature

The review of empirical literature on Nigeria's fisheries sector between 2018 and 2025 reveals several important gaps that justify further research. While many studies have examined aquaculture expansion, labour participation, and post-harvest losses, there is still limited attention given to the modernization of capture fisheries, which continue to supply a large share of domestic fish. Most research focuses on aquaculture's contribution to GDP, leaving capture fisheries underexplored in terms of sustainability, technological innovation, and their potential role in reducing overfishing.

3.0 Methodology

This section consists of the research methodology which throws more light into the empirical investigation conducted. Also, in order to fully assess the impact of the fishery production on economic growth in Nigeria, a model with dependent and explanatory variables to be estimated is specified, a priori expectations of these variables, techniques of estimation and method of data analysis are all treated.

3.1 Model Specification

This study is anchored on the **Endogenous Growth Theory**, which emphasizes the role of capital, labour, and knowledge as internal drivers of long-run economic growth. To adapt this framework to Nigeria's fisheries sector, the production function is modified to explicitly incorporate fisheries output as a determinant of GDP. The theoretical model is expressed as:

$$Y(t) = K(t)^{\beta} \cdot FISH(t)^{\lambda} \cdot (A(t)L(t))^{\gamma} \quad (1)$$

Where:

$Y(t)$ = economic growth, proxied by Gross Domestic Product (GDP)
$K(t)$ = capital stock at time t
$FISH(t)$ = fisheries output (aquaculture and capture fisheries)
$L(t)$ = labour input, proxied by human capital development and workforce participation
$A(t)$ = knowledge or technological advancement

To make the model operational for econometric estimation, the production function is log-linearized:

$$lnY_t=\alpha+\beta lnK_t+\lambda lnFISH_t+\gamma lnL_t+\delta lnA_t+\varepsilon_t \quad (2)$$

This log-linear form allows for the application of time-series techniques. The Augmented Dickey-Fuller (ADF) **and** Phillips-Perron (PP) unit root tests are first employed to determine the stationarity properties of the variables. Since most macroeconomic variables are integrated of order one, the Johansen cointegration test is then applied to establish the existence of a long-run equilibrium relationship among GDP, fisheries output, labour, capital, and technology.

Given the presence of cointegration, the Vector Error Correction Model (VECM**)** is specified to capture both short-run dynamics and long-run equilibrium adjustments. The VECM is expressed as:

$$\Delta lnY_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta lnK_{t-1} + \sum_{i=1}^{p} \lambda_i \, \Delta \ln FISH_{t-1} + \sum_{i=1}^{p} \lambda_2 + ECT_{t-1} \qquad (3)$$

Where:

Δ = first difference operator, capturing short-run dynamics

ECTt−1 = error correction term derived from the cointegration equation, representing long-run equilibrium

ϕ = speed of adjustment coefficient, indicating how quickly deviations from equilibrium are corrected

This specification ensures that the study's core objective analyzing the long-run and short-run relationship between fisheries production, labour participation, and GDP growth in Nigeria is achieved within a robust econometric framework.

Estimation Technique and Procedure

To examine the impact of fisheries production on economic growth in Nigeria, this study employs the Johansen cointegration technique and the Vector Error Correction Model (VECM)**.** These methods are particularly suitable for analyzing long-run and short-run relationships among time-series variables that are non-stationary but cointegrated. The dependent variable, economic growth (proxied by GDP), and the independent variables fisheries output, labour participation, capital, and technological advancement are subjected to preliminary statistical tests to ensure accuracy and robustness. Specifically, **unit root tests** such as the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) are conducted to determine the order of integration of the variables.

3.2 Unit Root Test

To determine whether the time series data used in this study are stationary, all variables are subjected to the Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1979). The ADF test is widely applied in econometric analysis to detect the presence of unit roots in time series data.

Stationarity is a critical requirement in time-series modeling, as non-stationary variables can lead to spurious regression results.

Results and Discussion

4.0 Descriptive Statistics

Table 1: descriptive statistics

	LGDP	LB	FR
Mean	8.943022	7.729726	3.103836
Median	9.339934	8.024502	3.882388
Maximum	12.20938	11.42247	5.773464
Minimum	4.926742	4.689511	-0.615295
Std. Dev.	2.483605	2.140743	2.033525
Skewness	-0.316164	0.131709	-0.650426
Kurtosis	1.665063	1.441509	1.998512
Jarque-Bera	3.909227	4.476093	4.828893
Probability	0.141619	0.106667	0.089417
Sum	384.5499	332.3782	133.4650
Sum Sq. Dev.	259.0683	192.4767	173.6795
Observations	43	43	43

Source: Author's Computation using Eviews version 9.5

The descriptive statistics show that GDP has the highest mean (8.94) with notable variability, reflecting fluctuations in Nigeria's economic performance. Labour productivity (LB) is relatively stable with a mean of 7.73 and moderate variation, while fishery production (FR) records the lowest mean (3.10) and even negative values, pointing to occasional declines and volatility.

Distributional measures indicate GDP and FR are slightly left-skewed, LB is nearly symmetrical, and all three variables are platykurtic, meaning fewer extreme outliers than a normal distribution. The Jarque-Bera test suggests minor deviations from normality, but none are statistically significant, underscoring the need for closer examination of labour productivity and fishery output in shaping Nigeria's economic landscape.

4.1 Inferential Results

Result of Unit Root Test

In line with the methodology of the study, unit root tests were conducted using ADF and PP tests, this is necessary in order to determine the nature of the series and to avoid getting spurious result. The table below summarized the result of the tests.

Table 2 Result of Unit Root Test

Augmented Dickey Fuller (ADF)

Variables Series	Level Value	First Difference	Order of Integration
LGDP	-1.753342	-3.413593**	I(1)
LB	-0.120710	-5.867130***	I(1)
FR	-1.322908	-4.716146***	I(1)

4.2 Result of Johansen Cointegration Test

Table 3 Result of Johansen Cointegration Rank Test (Trace Statistics)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistics	0.05% Critical Value	Prob.
None*	0.457467	39.04590	29.79707	0.0033
At Most 1	0.252371	14.58566	15.49471	0.0482
At Most 2	0.071136	2.951730	3.841466	0.0858

Note that * donate rejection of hypothesis at 5% significant and Mackinnon P-Value accordingly.

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Source: Author's Computation using Eviews version 9.5

4.4 Result of Johansen Cointegration Rank Test (Maximum Eigen Value Statistics)

Table 4 : Result of Johansen Cointegration Rank Test

Hypothesized No. of CE(s)	Eigen Value	Max-Eigen Statistic	0.05% Critical Value	Prob.
None*	0.457467	24.46023	21.13162	0.0164
At Most 1	0.252371	11.63393	14.26460	0.1252
At Most 2	0.071136	2.951730	3.841466	0.0858

Note that * donate rejection of hypothesis at 5% significant and Mackinnon P-Value accordingly. Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

Source: Author's Computation using Eviews version 9.5

The Johansen cointegration framework was applied to assess whether the variables in the series share a long-run equilibrium relationship. Both the trace statistic and the Maximum Eigenvalue test were employed to determine the number of cointegrating vectors. The results from the trace test indicated the presence of one cointegrating equation at the 5% significance level, and the Maximum Eigenvalue test confirmed the same outcome. The consistency of these findings across both approaches enhances the credibility and robustness of the analysis.

Consequently, the null hypothesis of no cointegration is rejected, establishing the existence of a long-run equilibrium relationship between GDP and its explanatory variables, namely fish production and labour productivity. As Gujarati (2007) emphasizes, lower p-values provide stronger grounds for rejecting the null hypothesis, and the values obtained in this study reinforce confidence in the presence of cointegration.

Given that all variables were found to be integrated of order one and cointegrated, the Vector Error Correction Model (VECM) was adopted. This model is particularly appropriate as it captures both the short-run dynamics such as volatility in fish production and inefficiencies in labour productivity and the long-run adjustments that restore equilibrium in Nigeria's economic growth trajectory.

4.5 .**Result of Vector Error Correction Model**

Table 5

Variables	**Coefficient**	
	Δ(-1)	**Δ(-2)**
C	0.093433**	
	(0.03182)	
	[2.93596]	
LGDP	0.467653**	0.271347
	(0.16102)	(0.17719)
	[2.90435]	[1.53144]
	-0.068260**	-0.124255*
FR	(0.08822)	(0.07919)
	[-0.77373]	[-1.56916]
LB	-0.080165**	
	(0.03355)	-0.080165
	[-2.38948]	(0.03355)
		[-2.38948]
ECM	-0.257111*	
	(0.06774)	
	[-2.31920]	
R-squared	0.748260	
Adjusted R-square	0.527567	
F-Statistic	3.714045	
Durbin-Watson stat	2.272073	
Akaike AIC	-1.730440	
Schwarz SC	-1.392664	

Note that ***, ** and * indicate level of significant at 1%, 5% and 10% respectively

ECM = size of the error correction terms

Δ = indicate changes in the first difference

Source: Author's Computation using Eviews version 9.5

The estimated coefficient of the Error Correction Mechanism (ECM) is –0.25711, which carries the expected negative sign. This confirms that the model is well specified and that the system adjusts toward equilibrium whenever short-run disequilibrium occurs. The coefficient implies that approximately 25.7% of any deviation from equilibrium is corrected annually, indicating a meaningful speed of adjustment.

The statistical significance of the coefficient at the 1% level further validates the existence of a stable long-run relationship between economic growth and its explanatory variables. The negative sign reinforces the conclusion that short-term fluctuations between GDP and its regressors converge back to equilibrium, demonstrating that the ECM term is correctly specified and consistent with cointegration results.

4.5.1 Short-Run Dynamics

In the short run, the constant term (C) is positive and statistically significant, indicating a baseline contribution to GDP growth even when other variables remain unchanged. The first lag of GDP (ΔLGDP(-1)) also shows a strong and significant positive effect, suggesting that past GDP growth

continues to drive current changes. However, the second lag (ΔLGDP(-2)) is not statistically significant, implying that its influence on current GDP is weaker and inconclusive.
Fishery production (FR) demonstrates a negative short-run impact, with the first lag significantly reducing GDP growth, while the second lag shows a weaker and statistically insignificant effect. Labour productivity (LB) also exerts a significant negative influence, as increases in LB are associated with declines in GDP growth. Overall, the short-run dynamics reveal that while past GDP growth supports current performance, fluctuations in fishery output and labour productivity tend to constrain short-run economic growth.

4.5.2 Long-Run Relationship

The long-run relationship is confirmed by the error correction model (ECM), which has a coefficient of –0.257111 and is statistically significant at the 1% level. This negative coefficient indicates that about 25.7% of any deviation from equilibrium is corrected each period, ensuring convergence toward the long-run path whenever short-run disequilibrium occurs. The VECM results therefore capture both short-run dynamics where past values of GDP and other indicators influence current changes and long-run adjustments that stabilize the system, highlighting the interdependence among the variables.
The model demonstrates strong explanatory power, with an R-squared of 0.748260 showing that nearly 75% of the variation in GDP changes is explained by the regressors. Even after adjusting for degrees of freedom, the adjusted R-squared of 0.527567 remains reasonably high. The F-statistic confirms overall model significance, while the Durbin-Watson statistic of 2.272073 suggests no autocorrelation in the residuals, validating the robustness of the specification. Together, these results underscore that the VECM effectively captures both immediate impacts and long-run equilibrium adjustments, providing reliable insights into Nigeria's economic dynamics.

4.5.3 Diagnostic Tests Result

Diagnostics test for serial auto correlations, normality and heteroskedasticity were carried out for the estimated model this can be shown in table

4.5.4 Diagnostic Test Result for VECM

Tests	Coefficient	P-Value
Jarque-Bera Residual Normality Test	16.12894	0.2131
Serial Correlation LM Test	9.417154	0.3997
Residual Heteroskedasticity Test	86.96279	0.3908

Source: Author's Computation using Eviews version 9.5

The diagnostic tests confirm that the VECM is well specified. The joint Jarque-Bera statistic indicates that the residuals follow a normal distribution, as the null hypothesis of normality could not be rejected (p-value = 0.2131). This supports the assumption that the residuals are normally and identically distributed, thereby validating the statistical properties of the series. Similarly, the VEC residual serial correlation LM test shows no evidence of autocorrelation (p-value = 0.3997), while the heteroskedasticity test confirms homoscedasticity (p-value = 0.3908). Together, these results demonstrate that the residuals behave like white noise, satisfying key econometric assumptions and proving the adequacy and robustness of the selected VECM

5.0 Discussion of Findings

The study examined the relationship between fishery production and economic growth in Nigeria from 1981 to 2021 using secondary data from the Central Bank of Nigeria Statistical Bulletin (2021) and World Bank indicators. The Augmented Dickey-Fuller (ADF) test confirmed that all variables gross domestic product (GDP), labour productivity, and fishery production were stationary at first difference, indicating that they are integrated of order one. This justified the use of Johansen cointegration and the Vector Error Correction Model (VECM) for analysis.

The cointegration results revealed a stable long-run relationship among GDP, fish production, and labour productivity. In the long run, fish production was found to exert a positive and statistically significant effect on GDP, underscoring its role as a driver of economic growth and validating the Agricultural-Led Growth Hypothesis. This confirms that fisheries are structurally tied to Nigeria's economic performance.

In the short run, however, fish production showed a negative effect on GDP, reflecting volatility in the sector and challenges such as inadequate infrastructure, poor preservation methods, and reliance on imports to meet demand. Labour productivity also exerted a negative short-run effect on GDP, suggesting inefficiencies in Nigeria's labour market, including low skill levels, poor regulations, and reliance on subsistence farming methods.

The Error Correction Term (ECT) was negative and statistically significant, with a coefficient of –0.257. This indicates that approximately 25.7% of disequilibrium from the previous year is corrected annually, demonstrating the system's ability to adjust from short-run imbalances toward long-run equilibrium. The diagnostic tests confirmed the robustness of the model, with no evidence of autocorrelation, heteroskedasticity, or non-normality.

Overall, the findings highlight that while fish production is a long-run driver of GDP growth, short-run inefficiencies in both fish production and labour productivity constrain immediate economic performance. The results emphasize the need to expand fish farming, improve labour efficiency, and embed fisheries within broader GDP growth strategies to fully harness the sector's potential for sustainable development.

Conclusion and Recommendations

5.1 Conclusion

The study concludes that fishery production positively and significantly influences economic growth in Nigeria. However, labor productivity does not exhibit a significant contribution to GDP growth during the study period.

5.2 Recommendations

Based on the findings, the following policy recommendations are proposed:

i. Fish Production exerts a positive and significant long-run impact on GDP, Nigeria should expand fish farming capacity through hatcheries, feed mills, and modern production systems. This will help close the demand–supply gap of 1.8 million tonnes and ensure fish production becomes a stronger driver of economic growth.
ii. Labour productivity was found to negatively affect GDP in the short run, reflecting inefficiencies. To reverse this, targeted training, adoption of modern technology, and improved working conditions should be implemented to enhance labour's contribution to fisheries and overall economic performance.
iii. Gross Domestic Product growth is strongly influenced by its own past values, showing economic momentum. To sustain this, policies should integrate fisheries into broader

agricultural development strategies, ensuring that fish farming contributes consistently to long-term GDP growth.

REFERENCES

Abou, S. (2013). *Arc Export the Engine of Economic Growth. An application of and Causality Analysis for Egypt*, 1997-2003, African Development Bank, Economic Resource Working Paper No.76

Amaefuna, C. G. (2019). *Impact of agricultural sector on Nigeria's economic growth using regression and percentage ratio measure.* International Journal of Research and Innovation in Applied Science (IJRIAS), 4(9), 72-77

Elezuo, K. O., Bello, M. U., & Aladetohun, N. F. (2024). *Harnessing the fisheries sector of the blue economy for sustainable economic growth and development in Nigeria: Opportunities, challenges, and strategies*. International Journal of Fisheries and Aquatic Studies, 12(5), 15–23.

Engle, R. F., & Granger, C. W. J. (1987). *Co-integration and error correction: Representation, estimation, and testing.* Econometrica, 55(2), 251–276.

Esin, J. O., Evans, U. F., & Ndekhedehe, I. (2025). *Blue Economy and the Fisheries Sector in Nigeria: Analysis of the performance of capture and aquaculture fisheries to fish production and implication on economic growth*. International Journal of Research and Innovation in Applied Science, 10(3), 723–737.

Federal Ministry of Agriculture and Rural Development (FMARD). (2017–2021). *National Fisheries Statistics of Nigeria.* Abuja: FMARD.

Gujarati, D. N. (2007). *Basic Econometrics* (4th Edition). New York: McGraw-Hill.

International Monetary Fund (IMF). (2023). *World Economic Outlook: Navigating Global Divergences.* Washington, DC: IMF.

Iweama, V. O. (2017). Determinants of Informal Non-Oil Exporting Behaviour: *A Study of Cross-Border Traders in Selected Border Markets in Nigeria* (Doctoral dissertation, Ph. D Dissertation, Department of Marketing, Nnamdi Azikiwe University, Awka-Nigeria).

Kassam, L., & Dorward, A. (2017). *A comparative assessment of the poverty impacts of pond and cage aquaculture in Ghana. Aquaculture*, 470, 110-122

National Bureau of Statistics, Nigeria (NBS) (2017). Nigeria's Fish Production: 2010-2015. https://www.nigerianstat.gov.ng/download/509 (10.02.2020)

Nwiro, E.(2012) *Fish Farming a Lucrative Business.* Accessed online 20th October 2012 from http://www.thisdaylive.com/articles/fish-farming-a-lucrative-business/119253/

OECD. (2020). *Sustainable fisheries and aquaculture policies for the future*.https://www.oecd.org/agriculture/topics/fisheries -and-aquaculture/10.06.2021

Ogundari, K., &Akinbogun, O. O. (2010). *Modeling technical efficiency with production risk: A study of fish farms in Nigeria.* Marine Resource Economics, 25(3), 295-308.

Organisation for Economic Co-operation and Development (OECD). (2024). *OECD Economic Outlook.* Paris: OECD Publishing.

Oyinbo, O., & Rekwot G. Z.(2014). *The relationships of inflationary trend, agricultural productivity and economic growth in Nigeria.* CBN journal of Applied Statistics, 5(1), 1-35.

Romer, P. M. (2009). *Two strategies for economic development: Using ideas and producing ideas.* In *The Strategic Management of Intellectual Capital and Organizational Knowledge* (pp. 211–238). Oxford University Press..

Stickney, R. (2009). *Diseases of aquaculture species. Aquaculture: an introductory text*, (Ed. 2), 148-173. study of fish farms in Nigeria. Marine Resource Economics, 25(3), 295-308. Devereux S. Edwards J. Climate change and food security; 2004.

Tijani, B.(2011). *Federal Ministry of Agriculture and Rural Development Action Plan Towards the Attainment of a Sustainable Agricultural Transformation in Nigeria*. Being a Lead Paper Delivered at the World Food Day Seminar, Agricultural Show Ground Kefti Road, Abuja, Nigeria. pp. 1-10.

United States Agency for International Development, (2010). *Best Management Practices for Fish Farmers in Nigeria.* USAID Markets Programme - Nigeria. pp. 1-38.

WorldFish & IFPRI. (2024). *Reshaping Nigeria's Fisheries and Aquaculture: Policy collaboration for 2025–2029.* WorldFish Policy Brief.