The determinants of firms' performance: Empirical evidence from Nigeria's manufacturing sector

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Abstract

Given the importance of manufacturing growth to the economy's development, policy-makers in Nigeria have introduced several reforms, policies, and programmes to improve the sector's performance. Despite the measures taken by successive governments, the sector's performance has not improved over the years. It is evident in the data on indicators of manufacturing sector performance, such as the manufacturing value-added growth rate and the contribution of manufacturing value-added to gross domestic product (GDP), which have downward trends. This has constrained the achievement of most development objectives. Against this background, this study examines the determinants of performance among 55 quoted manufacturing firms in Nigeria from 1999 to 2023. The study employed the System Generalized Method of Moments (GMM) estimating technique. The findings show that capital intensity, vertical integration, management efficiency, gross domestic product growth rate, and oil price are positively related. In contrast, firm size and the inflation rate are negatively related to firm performance. The study recommends that manufacturing firms should plough back their profits to encourage the expansion of their asset. Also, manufacturing firms should encourage on-the-job training programmes for managers and workers to improve their competency and capabilities. Finally, the government should keep inflation within a manageable bound through its monetary and fiscal policies to encourage investors without compromising efficiency and productivity among manufacturing firms.

Keywords: determinants, firm performance, manufacturing sector, firm growth, generalized method of moments, Nigeria

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The Nigerian Journal of Business and Social Sciences, Volume 12, 2025
A Journal of the Faculty of Social Sciences, University of Lagos, Akoka, Lagos, Nigeria

1. INTRODUCTION

The manufacturing sector of an economy is a key driver of economic productivity. This is because of its key contributions to generating income and employment, producing goods and services, and creating wealth and opportunities that improve citizens' welfare.(Yousaf, 2025: United Nations Industrial Development Organization (UNIDO), 2022). Manufacturing firms boost the economy through export contributions (Afin*et al*., 2025). The experiences of most developed and emerging economies attest to a positive correlation between manufacturing-sector growth and economic growth.(Lin *et al*., 2023; UNIDO, 2022).

Moreover, the improved performance of the manufacturing sector is a prerequisite for the economic growth and development of any nation. There is a large and growing gap in manufacturing output between developed and developing countries, a vital policy issue that must be addressed to achieve sustainable development (UNIDO,2022). Understanding this gap entails having comprehensive knowledge of the determinants of manufacturing firms' performance.

The global manufacturing value added (MVA) annual growth rate increased from 0.9% to 3.13% between 1990 and 2020, though it decreased sharply in 2009 due to the global financial recession. Also, MVA's global contribution to gross domestic product (GDP) during this period increased from 15.2% to 16.4%. Regionally, the annual average growth rate of MVA rose by 6.5% in Asia and the Pacific, 2.1% in North America and 3.3% in Sub-Saharan Africa (SSA) between 1990 and 2020. China, the world's largest manufacturing producer, holds the largest share of MVA, with an average annual growth rate of 11.6% between 1990 and 2020. The United States follows this with an annual average growth rate of 2.6% within this period (UNIDO, 2022; World Bank, 2023).

In Nigeria, the manufacturing sector has shown varied performance. Between 1966 75, the MVA growth rate averaged 12.9%. This increased to 18.5% in the period 1976-80 due to the oil boom. The oil industry's breakdown in the early 1980s led to negative MVA growth rates between 1982 and 1986 and between 1993 and 1998. However, between 2004 and 2014, the MVA average growth rate was 7.12%. In 2015, 2017, 2019, and 2020, the sector further experienced negative growth rates of -1.5%, -4.3%, -0.2%, and -2.8%, respectively. Furthermore, MVA's contribution to GDP averaged 4.8% in the 1970s. This peaked at 21.1% in 1983 and fell to 6.6% in 2010 due to the global recession. This later increased to 8.9%, 9.6% and 12.7% in 2012, 2018 and 2020, respectively.(World Bank, 2023).

Productivity enhancement of the manufacturing sector has been One of the measures adopted by many nations that have experienced recessions (Söderbom & Teal, 2002; Truong et al., 2024). This supports the

view that the growth performance and efficiency of manufacturing firms promote the growth and competitiveness of the industrial sector and the economy at large (Olawumi & Ogungbenle, 2018).

Consequently, several governments in Nigeria have made several attempts to improve the performance of the manufacturing sector to achieve the desired economic growth. Such measures include tax reductions, tax holidays for infant industries, the Import Substitution Strategy (ISS), indigenization policy, the privatization and commercialization programme of the Structural Adjustment Program (SAP), import liberalization, export promotion, concessional rates on raw material importation, and incentives for local industries. (NPC, 2004).

Despite these measures, the performance of the manufacturing sector in Nigeria has not improved over the years. This is evident in the data on MVA growth rates and MVA's contribution to GDP, as discussed earlier. The low productivity of this sector is a constraint on job Creation, given its enormous potential for employment generation. This would serve as a palliative measure to the high unemployment rate prevalent in Nigeria. Many investors have gone out of business following the dismal state of their manufacturing firms. This has resulted in the disengagement of workers and loss of means of livelihood, which exacerbates the poverty situation in the country. Furthermore, as a productive sector of the economy, the poor performance of the manufacturing sector means a decline in the output of goods and services, which would have enhanced the living standards and well-being of the citizenry.(UNIDO, 2022). This also makes the Nigerian economy highly import-dependent for consumer and capital goods, thereby rendering it vulnerable to foreign exchange fluctuations and the devaluation of the domestic currency. This has also raised concerns about Nigeria's long-term economic prospects. Most development goals would be challenging to achieve in this situation; hence, this issue must be addressed. This has sparked much debate among scholars over the factors that determine the performance of the manufacturing sector (Tousek, 2021).

The objective of the study is to determine the extent to which the determinants of firm performance affect manufacturing firms in Nigeria. The findings of this study provide important guidelines for the government in formulating and implementing appropriate industrial policies. It also assists firms in achieving faster growth, promoting the development of the manufacturing sector, and subsequently harnessing the benefits for the economy.

The remaining sections of the study are ordered thus: Section two reviews the literature on the determinants of performance in manufacturing firms. Data and methodology are discussed in section three, while section four comprises the presentation, analysis and interpretation of results. Finally, section five presents the policy implications and recommendations.

2. LITERATURE REVIEW

This discussion examines the conceptual relationship between firm performance and the study-relevant determinants. Several metrics can be used to assess a firm's performance, including profit, value-added, assets, sales, turnover, and employment size.(Selvam *et al*., 2016). Value added accounts for a process's capacity to raise a manufacturing firm's output value and is a good indicator of internal activity; hence, its use in the study. Many factors have been identified in the literature that influence firm performance and are classified differently by researchers depending on the study's objective. This study categorizes the determinants into firm characteristics, internal variables, external factors, and macroeconomic factors, in accordance with the works of Aregbeyen (2012) and Tousek *et al*. (2021). These determinants' definitions are developed using past empirical research and theories.

The optimum firm size theory states that One of the main factors influencing a firm's success is its size, a by-product of its growth over a specific period. The theory expresses a negative relationship between firm growth and size.(Becchetti and Trovato, 2002). Studies have shown that larger firms are more prone to higher levels of diversification and bureaucracy, which negatively affects performance.(Porter, 1987; Wernerfelt and Montgomery, 1988). An empirical study of the relationship between firm size and enterprise growth rates in the nations that make up the Organization for Economic Cooperation and Development (OECD) was conducted by Evans (1987) between 1977 and 1985. The study demonstrates an inverse relationship between firm size and firm growth using Ordinary Least Squares (OLS) regression. Further research by Yasuda (2005) and Bottazzi *et al*. (2011) supports the negative association between firm size and firm performance.
Jovanovic's theory of firm learning, which was put forth in 1982, provides the foundation for the negative relationship between firm age and growth. The theory suggests that this negative association can be explained by declining returns to learning over time and decreased efficiency gain as firm age increases. (Aregbeyen, 2012).Gonçalves and Martins (2016) investigated the major determinants of total factor productivity (TFP) growth of manufacturing firms in Portugal from 2010 to 2014. Using panel data and a fixed-effects model, the study concludes that firm age and firm debt negatively influence TFP growth. Also, Senaweera *et al*. (2020) found evidence of a negative relationship between firm age and the performance of manufacturing firms in Sri Lanka.

A firm's asset-use efficiency is measured by capital intensity. In particular, it assesses a firm's ability to obtain the machinery and equipment needed to generate a given level of revenue (Touseket et *al*., 2021). Researchers theoretically believe that capital intensity and firm performance are positively related (Nwosu *et al*., 2025). Using data from 34 manufacturing companies registered on the Dhaka Stock Exchange (DSE)

between 2014 and 2019, Hossain (2020) determined the primary factors influencing the profitability of manufacturing businesses in Bangladesh. The study employed OLS regression and Pearson's correlation to establish that capital intensity, sales growth, and managerial efficiency have a significant positive impact on firm profitability.

The financing constraints hypothesis, which posits a positive relationship between access to finance and firm performance, provides the foundation for analyzing how access to finance affects firm survival and growth. Using cross-sectional data from 384 small businesses in Uganda, Turyakira *et al*. (2019) investigated the impact of access to finance and firm capability on their performance. A structured questionnaire is used to collect primary data, and regression analysis is employed for analysis. The study's findings demonstrate that firm performance is positively related to both financial access and firm capabilities. The results are also consistent with the study of Sleuwaegen & Goedhuys (2002) in Côte d'Ivoire

Vertical integration is a strategy firms use to control their distribution and supply chains and reduce transaction costs. Based on their ability to leverage internationalization, vertically integrated enterprises grew faster, according to the empirical findings of Siddharthan *et al*. (1994). The results conform to the study of Aregbeyen (2012) who examined the determinants of growth among 94 manufacturing firms in Nigeria from 1994 to 2005. The estimation techniques used are descriptive statistics and panel data econometric analysis. The study found that vertical integration, among other factors, is positively and significantly related to firms' growth. Olawumi and Ogungbenle's (2018) results agree with Aregbeyen's (2012

Managerial competence both limits and facilitates the rate of firm expansion (Penrose, 1959). Firm growth is contingent upon managers' experience and their contributions of expertise and talent. Between 1989 and 2008, Sangosanya (2011) investigated the factors contributing to the expansion of 45 manufacturing companies listed on the Nigerian Stock Exchange. The study concludes that capital intensity, government policies, capital reserves, and management efficiency all positively affect firm growth using a system generalized method of moments (GMM) panel model. Aggarwal (2015) and Hossain (2020) are two additional researchers who support the beneficial effect of management efficiency on firm performance.

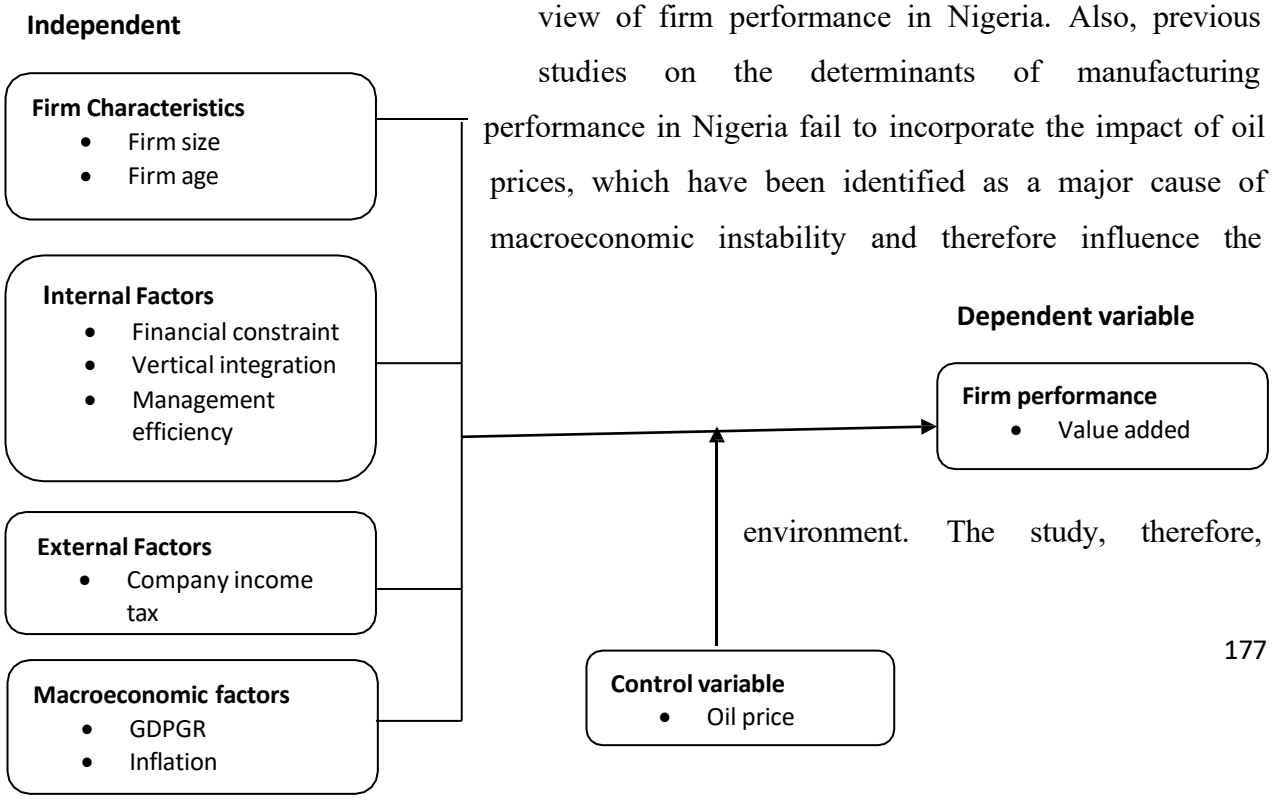
The major external factor identified is the impact of government regulations and policies on firms' legal environment, which can positively or negatively influence their performance. (Hyytinen & Toivanen, 2005). This ranges from government subsidies to tax policies, such as corporate income tax. Harabi (2003) conducted a study on the determinants of growth of 370 manufacturing firms in Morocco. The study used

cross-sectional survey data and multinomial logit regression to conclude that government policy, including tax policy, is a major determinant of the growth of Moroccan firms. Other studies, such as Olawumi and Ogungbenle (2018) and Sangosanya (2011), considered government policies as a veritable determinant of firm performance.

Macroeconomic variables that affect firms' business prospects and, thus, their performance include the GDP growth rate, the inflation rate, monetary policy, and balance-of-payments conditions (Tousek et *al*., 2021). GDP growth rate and inflation rate are included as macroeconomic determinants in this study because they reflect Nigeria's business environment. GDP growth rate has a positive impact on manufacturing firms' performance (Nwosu *et al*., 2025) whereas the inflation rate has proved to hurt firm performance(Loto, 2012).

In a related study, Aiyedogbon and Anyanwu (2015) examine the effect of macroeconomic factors on Nigerian manufacturing productivity from 1981 to 2013. The OLS estimation technique is used in the study. It is concluded that while inflation, credit to the manufacturing sector, and the broad money supply are negatively related to manufacturing performance, real GDP, the exchange rate, and foreign direct investment (FDI) are positively related to it. Due to Nigeria's substantial reliance on the oil sector for income and foreign exchange, which affects all other sectors of the nation, including the manufacturing sector, oil prices are captured as a control variable (Agu & Nyatanga, 2020).

In summary, previous empirical studies (such as Adelowokan *et al*., 2020; Aregbeyen, 2012; Kenny, 2019; Nwosu *et al*., 2025; Onakoya, 2018; Oyelade, 2019; Senaweera *et al*., 2020) examined specific determinants within the same classification without simultaneously considering determinants from different classifications. Incorporating determinants from the different classifications will provide a more holistic view of firm performance in Nigeria. Also, previous studies on the determinants of manufacturing performance in Nigeria fail to incorporate the impact of oil prices, which have been identified as a major cause of macroeconomic instability and therefore influence the business environment. The study, therefore,



bridges the gap by including oil prices as a determinant of firm performance.

Figure 2.1: The Framework of the Determinants of Firm Performance
Source: Authors (2025)

3. METHODOLOGY

3.1 Data Source and Scope

Fifty-five manufacturing firms listed on the Nigerian Stock Exchange (NSE) are examined for the study. The choice of these firms is based on their existence for at least 10 financial years, a private, dominant ownership structure, and the availability of data on the major variables of interest between 1999 and 2023. The period is consistent with Nigeria's return to democratic government and the implementation of various policy measures expected to improve the performance of the manufacturing sector. The choice of the research period is to examine how the manufacturing sector has fared during these policy changes. The Nigerian Stock Exchange Fact Book, the Central Bank of Nigeria Statistical Bulletin, and several editions of the firms' annual reports and statements of accounts provided the data for the study.

3.2 Model Specification

The research adheres to the optimal firm size model as exemplified by Aregbeyen (2012), Geroski (1999), and Harabi (2003). The optimal firm size model assumes that all firms have a reasonable desire to grow. The theory models a steady-state firm size, S*, and views growth as a response to deviations from that equilibrium. The optimum firm size S* depends on several exogenous variables. As a result, S* serves as a benchmark, and any observed variations in firm size are seen as either random fluctuations or a phase in the process of convergence to S* (Geroski 1999). The optimum firm size model is expressed thus;

$$\Delta S_{(t)} = S^* + \beta S_{(t-1)} + \mu_{(t)} \quad (3.1)$$

Where $\Delta S_{(t)}$= firm growth over a given period, S^* = long-run steady-state firm size, $S_{(t-1)}$ = last period firm size, $\mu_{(t)}$ = normally distributed white noise error process. Equation (3.1) is a univariate time series. Other relevant exogenous variables, apart from firm size, were added to the model, lagged by One period, to improve it. Let X_t be a vector of other exogenous variables. Adding a constant (A) to the equation, equation (3.1) becomes:

$$\Delta S_{(t)} = A + S^* + \beta S_{(t-1)} + \propto X_t + \mu_{(t)} \quad (3.2)$$

But S^* is not observable. On the other hand, S^* can be attained if the firm is in a steady state. Equation (3.3) holds in this state, thus,

$$S^* = S_{(t)} = S_{(t-1)} \quad (3.3)$$

Substituting equation (3.3) into equation (3.2) yields equation (3.4), thus;

$$S^* = C - \left(\frac{\propto X_t + \mu_{(t)}}{(1+\beta)}\right) \quad (3.4)$$

Substituting equation (3.4) into (3.2) and solving for $\Delta S_{(t)}$, we have

$$\Delta S_{(t)} = D + \beta S_{t-1} + \alpha X_t + \epsilon_t \quad (3.5)$$

$$where\ \alpha = \frac{\propto \beta}{1+\beta}\ and \epsilon_t = \left(\frac{\beta}{1+\beta}\right)\mu_{(t)}$$

Panel data from 55 listed manufacturing firms in Nigeria, spanning 1999-2023, are used to evaluate the empirical model of optimal firm size. Therefore, equation (3.5) becomes

$$\Delta S_{i(t)} = D + \beta S_{i(t-1)} + \alpha X_{it} + \varepsilon_{it} \quad (3.6)$$

Equation (3.6) can be interpreted as the growth of a firm over time, depending on its size and other determinants. Expressing model (3.6) as a first-order difference equation, we have:

$$\Delta S_{i(t)} = S_{i(t)} - S_{i(t-1)} = D + \beta S_{i(t-1)} + \alpha X_{it} + \varepsilon_{it} \quad (3.7)$$

By collecting like terms and simplifying, model (3.7) yields a simple dynamic equation that expresses the firm size ($S_{i(t)}$) as a function of an arbitrary constant *D, the* first lag of size and other explanatory variables $X_{it,}$ thus:

$$S_{i(t)} = D + (\beta + 1)S_{i(t-1)} + \alpha X_{it} + \varepsilon_{it} \quad (3.8)$$

Equation (3.8) includes the first lag of the dependent variable as a regressor, introducing endogeneity into the model. This is because it is correlated with the error term, and to avoid this, an instrumental variable, which is strictly exogenous, is employed. This therefore suggests adopting a dynamic estimation technique, such as the Generalized Method of Moments (GMM). The standard form of a GMM model based on equation (3.8) can be expressed thus:

$$S_{i(t)} = D + (\beta + 1)S_{i(t-1)} + \alpha X'_{it} + \lambda Z'_{it} + (v_i + \varepsilon_{it}) \quad (3.9)$$

Where S_{it} =dependent variable. $\mathcal{E}_{it}$ = the unexplained factors of S_{it}. S_{it-1} = first lag of the dependent variable. X'_{it} = explanatory variables. α's = unknown parameters. Z'_{it} = instrumental variables(because of the presence of endogeneity in our model). Z must be exogenous, highly correlated with the explanatory variables, and orthogonal to the error term. Moreover, the number of groups *(N)* must be greater than or equal to the instrumental variable (*Z)*. The parameters to be estimated on the lagged-dependent variable and instrumental variables are denoted by (β+*1*) and λ, respectively. The unobserved-firm-specific effect and the unexplained portion of the dependent variable are denoted by vi and Ɛit, respectively.

Taking the first difference of the equation (3.9) yields the standard model for the estimation of a dynamic GMM, which then captures the relative growth rate ($\Delta S_{i(t)}$) of the firms, thus:

$$\Delta S_{it} = D + (\beta + 1)\Delta S_{it-1} + \alpha \Delta X'_{it} + \lambda \Delta Z'_{it} + \Delta \mu_{it} \quad (3.10)$$

Equation (3.10) expresses the relative growth in firms' size as a function of an arbitrary constant (*D*), changes in firms' size, changes in other explanatory variables, and some instrumental variables. Based on equation (3.10), we re-specify the model using its real terms as presented in equation (3.11), thus:

$$\Delta VAGR_{it} = D + (\beta + 1)\Delta VAGR_{it-1} + \alpha\Delta X'_{it} + \lambda\Delta Z'_{it} + \Delta\mu_{it} \quad (3.11)$$

Where $VAGR_{it}$ = Value added growth rate of the ith firm over a given period, $VAGR_{it-1}$= Previous period's Growth rate of ith firm, X_{it}= Vector of other determinants of ith firm growth over a given period, Z_{it} = Vector of instrumental variables, $\mu_{(it)}$ = The error term.

Equation (3.11) is extended to equation (3.12) below.

$$\Delta VAGR_{it} = \beta_0 + (\beta_1+1)\Delta VAGR_{it-1} + \beta_2\Delta AG_{it} + \beta_3\Delta CI_{it} + \beta_4\Delta VI_{it} + \beta_5\Delta ME_{it} + \beta_6\Delta LFC_{it} + \beta_7\Delta GRP_{it} + \beta_8\Delta GRGDP_t + \beta_9\Delta INF_t + \beta_{10}\Delta OILP_t + \Delta\mu_{it} \quad (3.12)$$

A priori Expectation

The a priori expectations for equations 3.12 are given below.

$$\beta_1 < 0, \beta_2 < 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0, \beta_7 > 0, \beta_8 > 0, \beta_9 < 0, \beta_{10} > 0$$

3.3 Description and Measurement of Variables

Table 1 displays the variables used and their corresponding measurements.

Table 1: Definition and measurement of Variables

Variable	Definition	Measurement	Literature
Dependent: Firm performance: VAGR	The growth rate of the firms' value-added	$\frac{VA_{it} - VA_{it-1}}{VA_{it-1}} \times 100$	Aregbeyen (2012). Harabi, 2003
Independent: Firm characteristics: $VAGR_{it-1}$	First lag of value-added growth rate (a proxy for firm size)	$VAGR_{it-1}$	Evans (1987). Sangosanya, 2011
AG	Firm age	Years of the firm's existence since its incorporation date.	Aggarwal, 2015; Senaweera *et al*., 2020
CI	Capital Intensity	$\frac{Total\ assets}{Total\ Sales}$	Aregbeyen (2012). Sangosanya, 2011
Internal factors:			
VI	Vertical Integration	$\frac{value\ added}{sales} \times \frac{100}{1}$	Olawumi and Ogungbenle, 2018

ME	Management Efficiency	$\frac{net\ profit\ after\ taxes}{total\ sales} \times \frac{100}{1}$	Aggarwal (2015). Aregbeyen, 2012
LFC	Log of Financial Constraint	Log of retained profit + log of depreciation	Turyakira *et al*., 2019; Sangosanya, 2011
External factor: GRP	Government Regulations and Policies	$\frac{company\ income\ tax}{gross\ profit} \times \frac{100}{1}$	Harabi (2003). Olawumi and Ogungbenle, 2018
Macroeconomic factors: GRGDP	Growth rate of GDP	$\frac{GDP_{it} - GDP_{it-1}}{GDP_{it-1}} \times 100$	Aiyedogbon and Anyanwu, 2015; Aregbeyen, 2012
INF	Inflation rate	%age change in consumer price index	
OILS	Oil Price	International oil price	Agu and Nyatanga, 2020

Source: Authors' compilation (2025)

3.4 Estimation Technique

First, the study's descriptive statistics for the data are estimated. This is followed by the dynamic panel System GMM estimation technique, which has the advantage of efficiency when the panel's time observations are equal to or less than its individual observations. Since there are twenty-five time observations (T=25) and fifty-five firms (N=55) as the individual unit in this study, a System GMM technique is most appropriate. The overall validity of the instruments and the presence of serial correlation in the models are finally tested using the Sargan/Hansen and AR2 specification tests, as suggested by Arellano and Bond (1991) and Blundell & Bond (1998), respectively.

4. RESULTS AND DISCUSSION

4.1 Result of Descriptive Statistics

Table 2 presents descriptive statistics for the variables included in this study, including the mean, standard deviation, range, skewness, kurtosis, and number of observations. The mean value of firm performance (proxy by VAGR) is 751.99, which is closer to the minimum value (-31608.05) than to the maximum value (855460.8). This outcome is consistent with the presumptions that Nigerian manufacturing firms perform appreciably poorly, sometimes even experiencing negative growth rates.

Table 2: Results of Descriptive Statistics

	VAGR	L_VAGR	AGE	CI	VI	LFC	ME	GRP	GRGDP	INF	OILP
Mean	751.9915	752.0536	42.78728	4.929695	31.35385	-46266.19	-1.367451	16.42529	5.402478	11.79127	61.60795
Median	9.258715	9.258715	43.00000	1.029537	25.16720	11.05481	0.046887	7.861969	6.059428	12.09473	60.86000
Maximum	855460.8	855460.8	97.00000	3589.546	16230.70	16.90911	1.140923	3543.362	15.32916	18.87365	109.4500
Minimum	-31608.05	-31608.05	1.000000	0.028765	-20481.74	-4665161.	-1196.929	-467.0657	-1.616869	5.388008	17.44000
Std. Dev.	25365.31	25365.31	17.90416	106.8345	777.1462	283493.3	36.54118	127.1810	3.529596	3.662502	29.19817
Skewness	33.60340	33.60340	0.065790	33.21414	-8.193327	-9.937139	-31.20638	22.81758	0.441259	0.109865	0.173932
Kurtosis	1132.845	1132.845	2.898301	1113.857	592.4510	122.7876	1010.430	587.3772	4.168864	2.162223	1.797405
Jarque-Bera	60850618	60850619	1.313667	58824730	16516746	700342.7	48393504	16320016	101.8914	35.63223	74.44413
Probability	0.000000	0.000000	0.518490	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	857270.3	857341.1	48777.50	5619.852	35743.39	-52743461	-1558.895	18724.83	6158.825	13442.04	70233.06
Sum Sq. Dev.	7.33E+11	7.33E+11	365116.7	13000104	6.88E+08	9.15E+13	1520859.	18423347	14189.71	15278.45	971035.2
Observations	1306	1306	1306	1306	1306	1306	1306	1306	1306	1306	1306

Source: Authors 'Compilation (2025)

4.2 System GMM short-run results

Table 3 displays the results of the System GMM. The table presents four different models for the short-run estimate. The first model presents the firms' specific determinants, while the second, third, and fourth models, in addition, present the internal, external and macroeconomic determinants of firms' performance, respectively.

In this study, the main focus is on model 4 because it comprises all four categories of firms' determinants. Model 4's results reveal that the primary short-run determinants of a firm's performance are L_VAGR (firm size), capital intensity, vertical integration, managerial efficiency, government regulation, the inflation rate, the GDP growth rate, and the oil price. By contrast, firm age and the log of financial constraints have no significant impact on the performance of Nigerian manufacturing firms. Specifically, the results indicate that firm size (L_VAGR) negatively affects manufacturing firms' performance. A 1% increase in the previous firm size (L_VAGR) dampens its current performance by 0.34% in the short run, at the 1% significance level. This claim is consistent with the optimal firm size theory, which maintains that there is a negative relationship between firm size and performance and some empirical studies such as Aggarwal (2015) and Sleuwaegen & Goedhuys (2002). However, this negates the studies by Oyelade (2019) and Tousek et al. (2021), which found a positive relationship between firm size and firm performance. The negative relationship suggests that a firm's performance declines as its size increases. This may result from firms becoming less flexible as they grow larger, due to high levels of bureaucracy that limit their ability to take advantage of growth opportunities, thereby reducing performance.

Also, capital intensity is positively related to firm performance. A 1% increase in capital intensity leads to a 39.01% increase in firm performance in the short run, at the 1% significance level. The result corresponds to the findings of Aregbeyen (2012). Moreover, Tousek *et al*. (2021) found that capital intensity drives firm performance. However, the findings of Oh *et al*. (2014), which show that capital intensity and firm performance are inversely related, contradict this. The positive relationship suggests that manufacturing firms' assets in Nigeria yield high returns during the period examined, leading to higher performance.

Table 3: The Short-run System GMM Estimate of Equation 3.12

	Firm-Specific Determinants **(Model 1)**	Firm's Specific & Int Determt. **(Model 2)**	Model 2 and Ext Determinant. **(Model 3)**	Model 3 & Control Det. **(Model 4)**
	VAGR	VAGR	VAGR	VAGR
Constant	786.981**	988.577**	880.924***	1,786.4***
	(2.07)	(2.33)	(28.38)	(3.61)
Firm size(L_VAGR)	-0.333***	-0.333***	-0.221***	-0.335***
	(3346.02)	(3079.46)	(3475.42)	(1514.06)
Capital Int. (CI)	2.973***	-7.375***	180.426***	39.010***
	(53.18)	(3.10)	(254.51)	(3.02)
Age of Firm (AGE)	-10.039	-0.685	-32.672***	-16.656
	(1.34)	(0.08)	(191.17)	(1.65)
Vertical Integ. (VI)		-1.160*	21.345***	5.156***
		(1.83)	(361.82)	(3.07)
Log Fin Cons. (LFC)		-42.526	30.833***	4.901
		(1.10)	(50.99)	(0.20)
Mgt. Efficiency (ME)		-2.043	83.009***	26.200*
		(0.30)	(104.81)	(1.98)
Govt. Reg (GRP)			0.335***	0.010*
			(172.49)	(0.04)
Inflation (INF)				-238.9***
				(15.80)
Growth Rate of GDP				46.305***
				(6.32)
Oil Price (OILP)				25.173***
				(5.55)
AR2 Test	0.318	0.317	0.318	0.316
Sargan Test	0.523	0.499	0.401	0.396
Hansan Test	0.490	0.454	0.326	0.196
No of Obs	1141	1141	1141	1141
No of groups (FIRM)	55	55	55	55
No of Instruments	8	11	49	16
Year Dummy	No	No	No	No
The absolute value of the t-statistic in parentheses				
*** significant at 1%; ** significant at 5%; * significant at 10%				

Source: Authors' Estimation (2025)

Moreover, vertical integration has a significantly positive relationship with firm performance in the short run. A 1% increase in vertical integration is associated with a 5.16% increase in firm performance at the 1% significance level. This supports the findings of Aregbeyen (2012) and Sangosanya (2011) that vertical integration is a significant and positive determinant of firm performance in Nigeria. The study can therefore infer that, in the short run, vertical integration positively influences the distribution and supply chain of these manufacturing firms, reducing transaction costs and thereby enhancing firm performance.

Furthermore, the analysis reveals that management efficiency is statistically significant in positively impacting firm performance in Nigeria. A 1% increase in managerial efficiency increases firm performance by 26.20% at the 10% significance level. This assertion is consistent with Penrose's Theory of the Growth of the Firm, which suggests that firms with highly competent management teams outperform those with less effective teams. The outcome supports the findings of Aggarwal (2015) and Hossain (2020) that there is a significant and positive relationship between management efficiency and business performance.

There is also a positive impact of government regulations and policies (proxy with corporate income tax) on manufacturing firms' performance in Nigeria. A 1% increase in GRP improves manufacturing firms' performance by 0.01% at 10% level of significance. This corroborates the findings of Harabi (2003) and Sangosanya (2011), who reported a positive relationship between the two variables.

Finally, oil prices and the GDP growth rate positively impact firm performance, while inflation negatively impacts it. The former conforms to the findings of Nwosu *et al* (2025) and Onakoya (2018). However, the study by Hossain (2020) found a negative relationship between GDP Growth Rate and firm performance. Nevertheless, the outcome for inflation is consistent with the studies of Ojeyinka (2019) and Onakoya (2016) but varies from the findings of Adeyemi & Olufemi (2016)Moreover, Hosain (2020) suggests that inflation has a positive impact on firm performance and an insignificant impact on it. At the 1% level, the F- statistic p-values are significant. This demonstrates the model's fitness and that all independent variables jointly affect the dependent variables.

4.3 Diagnostic tests

The study used the autoregressive (AR2) and Sargan/Hansen tests, as suggested by Arellano and Bond (1991) and Blundell and Bond (1998), to assess the validity and robustness of the outcome. The latter is used to assess the instruments' overall validity, whereas AR2 is used to determine whether autocorrelation exists in the models. This is because the presence of the lagged dependent variable as part of the regressor introduces the endogeneity problem in the model; hence, the Sargan/Hansen and the (AR2) tests become

necessary. From the output in Table 3, we found that for model 4, we cannot reject the null hypothesis for both tests, as their p-values exceed 5%. The p-value for the AR2 test is 31.6%; the Sargan test is 39.6%; and the Hansen test is 19.6%. These suggest that there is no autocorrelation in the model and the parameters are not weakened by poor instrumentation, hence, their instruments are valid.

5. CONCLUSION AND RECOMMENDATIONS

The study examines the factors that determine the performance of 55 manufacturing companies listed on the Nigerian Stock Exchange between 1999 and 2023. It is motivated by the incessant liquidation and relocation of many manufacturing companies in Nigeria to other countries, as well as the negative consequences that follow. The study contributes to the body of knowledge on the factors influencing the performance of Nigerian manufacturing firms by simultaneously exploring determinants across different classifications. It also includes oil price as a control variable to capture the impact of external shocks on manufacturing firms.

Results from the System GMM estimation reveal that capital intensity, vertical integration, managerial efficiency, government regulations and policies, GDP growth rate, and oil price are among the main drivers of firms' performance. These imply that firms in Nigeria maximize and make optimal use of their resources, integrate well with other firms, have efficient management, and report improved performance in their environment. These findings have strong implications for both theory and real-world models, as they promote firms' compatibility with their surrounding environment and macroeconomic aggregates. Moreover, the positive impact of the economic growth rate and oil price suggests that a stable economy is a panacea for the growth of manufacturing firms in Nigeria.

Conversely, negative evidence is found between previous firms' size and the current performance. Whereas this result is consistent with theory (Optimum firm size theory) and most empirical works (Bottazzi *et al*., 2011; Yasuda, 2005It further implies that technical, administrative and structural imbalances impede firms' growth in Nigeria. This explains why the first lag of the autocorrelation diagnostic test is highly significant in most models, thereby suggesting that previous errors in the system are leveraged in the current performance. This is further strengthened by the negative impact of inflation on performance level; hence, it implies that macroeconomic instability limits firms' performance in Nigeria. Furthermore, the strong persistence of firm size (L_VAGR) suggests strong evidence of internal diseconomies of scale among manufacturing firms in Nigeria. These novel areas call for future studies to consider the impact of structural and institutional factors, as well as administrative bureaucracies within firms, on their performance.

This study finds that, based on the aforementioned findings, manufacturing firms' performance is susceptible to both internal and external shocks. Therefore, it recommends that while firms manage and

improve their internal factors, the government should also promote an enabling macroeconomic environment through institutional and infrastructural development. The study also recommends that manufacturing companies use their undistributed corporate profits to reinvest more resources in their operations, thereby enabling them to acquire, consolidate, and expand their capital assets. They should also encourage managers and their whole staff to acquire new skills through a variety of "on-the-job" training programs. This will improve their competency and capabilities in areas such as quality control, leadership, engineering, design, human relations, and cost management, thereby enhancing their performance. In addition, government fiscal, monetary, and supply-side macroeconomic policies should be geared toward enhancing growth and the efficient management of foreign earnings (from oil revenue), as this will promote an enabling macroeconomic environment for firms to thrive. Again, the government should keep inflation within a manageable bound through its monetary and fiscal policies to encourage investors without compromising efficiency and productivity among manufacturing firms.

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