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DETERMINANTS OF BUSINESS PERFORMANCE IN NIGERIA MANUFACTURING SECTOR

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ABSTRACT

This study investigates the determinants of business performance in Nigeria's manufacturing sector through an aggregated analysis using Ordinary Least Squares (OLS) regression. The analysis utilized annual time series data spanning from 1999 to 2023, sourced from the Central Bank of Nigeria (CBN) statistical bulletin and the National Bureau of Statistics (NBS). Prior to the regression analysis, unit root and co-integration tests were conducted to ensure data robustness. The findings reveal that financial intermediation (FIN) significantly enhances manufacturing output, with a coefficient of 37.12, while market size (MATZ) also presents a strong positive influence with a coefficient of 20.41. Conversely, exchange rates (EXCH) negatively impact manufacturing performance, exhibiting a coefficient of -7.34, and interest rates (INTR) demonstrate an adverse effect of -12.98. Infrastructure (INFRA) and inflation (INFL) were found not to be statistically significant in this context. The model's R-squared value of 0.78 indicates that approximately 77.82% of the variation in manufacturing output can be explained by the independent

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variables, affirming the model's validity. Based on these results, the study recommends that policymakers enhance financial intermediation services and promote market expansion strategies, while also addressing exchange rate volatility to improve the manufacturing sector's performance. These steps are crucial for fostering a more resilient and competitive manufacturing environment in Nigeria, thereby driving economic growth.

INTRODUCTION

The manufacturing sector plays a pivotal role in the economic development of nations, particularly in developing economies like Nigeria. Historically, Nigeria's manufacturing sector has oscillated between periods of growth and stagnation, heavily influenced by various economic policies, infrastructural inadequacies, and external factors. The manufacturing output, once a cornerstone of Nigeria's post-independence economic strategy, has suffered significant setbacks due to poor governance, fluctuations in oil prices, and reliance on imports, which hinder domestic production capabilities (Adeleke, 2019; Jacobs, 2019). The sector accounted for approximately 9.6% of Nigeria's GDP in 2019, showcasing its potential; however, it remains far below that of more industrialized nations, accentuating the need for detailed analysis on the determinants of manufacturing performance (World Bank, 2020; Jacobs, Ezeokafor & Ekwere 2021). This study focuses on the determinants that impact the performance of the manufacturing sector in Nigeria, with particular reference to manufacturing output. Financial intermediation, infrastructure, market size, exchange rates, interest rates, and inflation rates were chosen for the analysis based on their theoretical and empirical relevance to manufacturing efficacy (Olaniyi et al., 2021; Atueyi, Nkechukwu & Jacobs, 2019; Akajiofor, Arinze & Jacobs, 2023). The latent problem informing this study is the disconnection between policy objectives and actual manufacturing output. Despite various government initiatives aimed at bolstering the manufacturing sector, including the National Industrial Revolution Plan (NIRP) and the Economic Recovery and Growth Plan (ERGP), results have often fallen short of expectations (Federal Ministry of Industry, Trade and Investment, 2019). Factors such as inefficient financial intermediation and deteriorating infrastructure have persistently undermined growth. For instance, poor access to credit continues to inhibit manufacturers' capabilities to invest in modern technologies that could enhance productivity and competitiveness and underpin sustainable growth (Adeleke & Olufemi, 2021).

Financial intermediation fosters business performance by ensuring adequate access to credit, which is fundamental for the expansion and modernization of production capabilities (Baiyere, 2022). Infrastructure, encompassing transportation and utility services, is equally critical since manufacturing often requires reliable power supply and logistics for raw materials and finished goods. Robbins (2020) notes that improved infrastructure directly correlates with enhanced operational efficiencies in manufacturing. Additionally, market size affects the extent of manufacturing output as larger markets facilitate economies of scale, thereby increasing profitability. Conversely, adverse exchange rate fluctuations can escalate production costs for manufacturers reliant on imported raw materials, deterring production activities (Ogunyemi, 2020). Despite the recognized importance of addressing these latent problems, efforts made by stakeholders - including government initiatives, private sector investment, and multilateral engagements - have frequently failed to yield the desired results. The Nigerian government has launched several policies aimed at enhancing the manufacturing sector, yet bureaucratic inefficiencies and lack of coherent strategies have often stymied implementation (Nwachukwu & Akinyemi, 2021; Jacobs, 2022). For instance, while trade policies have been put in place to encourage local production, inconsistency in these policies often leads to confusion and disinterest among investors. Research indicates that a lack of clear communication regarding policy intentions hinders business confidence and growth (Olawale & Garba, 2022). Addressing these latent problems is vital for the sustainable growth of Nigeria's manufacturing sector. Enhancing financial intermediation could facilitate greater investment in technology and skill development, ultimately improving product quality and competitiveness in both domestic and international markets (Ogunleye et al., 2021; Jacobs, Ezeokafor & Ekwere, 2021). Moreover, strengthening infrastructure would decrease operational costs for manufacturers and attract foreign investment, creating a more conducive business environment. The potential benefits of effectively addressing these challenges extend beyond merely improving manufacturing output; they encompass job creation, poverty alleviation, and overall economic resilience (Ezeanya, 2020). In addition, establishing a stable macroeconomic environment, characterized by controlled inflation and interest rates, remains essential for fostering a climate conducive to investment and growth, thus ultimately enhancing the manufacturing sector's contribution to Nigeria's GDP (Salami & Olubunmi, 2021; Jacobs, 2022). Investigating the determinants of business performance in Nigeria's manufacturing sector is crucial for understanding the underlying factors that influence manufacturing output. With a relevant set of independent variables and a contemporary economic framework, this study seeks to fill the gaps in existing literature, providing actionable insights for policymakers and stakeholders. By emphasizing the need for coherent strategies and robust infrastructural investments, this research aims to contribute to the discourse on enhancing the manufacturing sector's role in achieving sustainable economic growth in Nigeria.

Statement of the Problem

The Nigerian manufacturing sector, a critical component of the country's economy, has faced numerous challenges that have inhibited its performance, particularly reflected in manufacturing output. Despite the sector's potential to drive economic growth through job creation and production diversification, it is plagued by structural deficiencies, inadequate infrastructure, poor financial intermediation, and fluctuating macroeconomic indicators including interest and inflation rates. Recent estimates show that Nigeria's manufacturing output accounts for a mere 9.6% of GDP, a stark contrast to more industrialized countries where manufacturing constitutes over 20% of GDP (World Bank, 2020). This disparity not only signifies an underperforming sector but also raises questions about the efficiency of existing policies aimed at enhancing manufacturing within national economic frameworks. The pressing problem lies in the inadequate application and management of critical independent variables - e.g., financial intermediation and infrastructural development - which severely impair the capacity of manufacturers to invest in technology, expand operations, and ultimately improve their output levels (Ezeanya, 2020; Olawale & Garba, 2022). For instance, inadequate access to financing options has led many manufacturers to remain stagnant, unable to upgrade their technology or expand their facilities in response to market demands. Furthermore, unreliable infrastructure increases operational costs and reduces competitiveness, effectively hampering the sector's growth potential (Adeola & Evans, 2021).

Despite the recognition of these issues, previous studies have often focused on isolated factors or lacked a comprehensive retail on how various independent variables interact to influence manufacturing output. Efforts by researchers to explore these aspects have provided valuable insights, but many have failed to yield practical solutions to the underlying problems (Farah et al., 2021). Additionally, governmental programs and initiatives, such as the National Industrial Revolution Plan (NIRP) and the Economic Recovery and Growth Plan (ERGP), have tended to lack coherent strategies for addressing the multifaceted challenges faced by the manufacturing sector. Notably, inconsistencies in policy implementation have led to diminished investor confidence and, consequently, unsatisfactory manufacturing performance (Baiyere, 2022; Jacobs, & Arinze, 2021). The absence of empirical investigation into the intertwined effects of financial intermediation, infrastructure, market size, interest rates, exchange rates, and inflation necessitates immediate scholarly attention, as failure to address these issues could have dire economic repercussions. Ignoring these challenges risks perpetuating low growth trajectories, leading to job losses and stifled economic development. Thus, this study seeks to fill a critical gap in the literature by providing a holistic analysis of the determinants of business performance in Nigeria's manufacturing sector, enabling policymakers and stakeholders to devise informed strategies that can enhance manufacturing output and, by extension, drive sustainable economic growth.

Objectives of the Study

The main objective of the study is to examine determinants of business performance in Nigeria manufacturing sector. The specific objectives are to:

1. Ascertain the effect of financial intermediation on manufacturing output
2. Determine the effect of infrastructure on manufacturing output

3. Examine the effect of market size on manufacturing output
4. Analyze the effect of exchange rate on manufacturing output
5. Evaluate the interest rate on manufacturing output
6. Ascertain the effect of inflation rate on manufacturing output

Hypotheses of the Study

Ho_1: Financial intermediation has no significant effect on manufacturing output

Ho_2: Infrastructure has no significant effect on manufacturing output

Ho_3: Market size has no significant effect on manufacturing output

Ho_4: Exchange rate has no significant effect on manufacturing output

Ho_5: Interest rate has no significant effect on manufacturing output

Ho_6: Inflation rate has no significant effect on manufacturing output

METHODOLOGY

Model Specification

The model of the study is developed in such a way that it incorporates the variables which this study deem fit to be the determinants of business performance on Nigerian manufacturing sector. The study will employ manufacturing sector as the dependent variable while financial intermediation, infrastructure, market size, exchange rate, interest rate and inflation as the determinants of business performance and will serve as the explanatory variables in this study. Thus, the model for the study is as follows:

The functional form of the model is:

$$MAFS = f\ (FIN, INFRA, MATZ, EXCH, INTR, INFL) \quad (1)$$

The mathematical form of the model is:

$$MAFS = \beta_0 + \beta_1 FIN + \beta_2 INFRA + \beta_3 MATZ + \beta_4 EXCH + \beta_5 INTR + \beta_6 INFL \quad (2)$$

The econometric form of the model is:

$$MAFS = \beta_0 + \beta_1 FIN + \beta_2 INFRA + \beta_3 MATZ + \beta_4 EXCH + \beta_5 INTR + \beta_6 INFL + \alpha_i \quad (3)$$

Where: MAFS = Manufacturing sector proxied by manufacturing output

FIN= Financial intermediation

INFRA = Infrastructure

MATZ = Market size

EXCH = Exchange rate

INTR= Interest rate

INFL = Inflation rate

β_0 = intercept

β_1 to β_6 = partial slope coefficients

Evaluation Technique and Procedure

The economic technique employed in the study is the ordinary least square (OLS). This is because the OLS computational procedure is fairly simple a best linear estimator among all unbiased estimation, efficient and shown to have the smallest (minimum variance) thus, it become the best linear unbiased estimator (BLUE) in the classical linear regression (CLR) model. Basic assumptions of the OLS are related to the forms of the relationship among the distribution of the random variance (μ_i). OLS is a very popular method and in fact, one of the most powerful methods of regression analysis. It is used exclusively to estimate the unknown parameters of a linear regression model. The Economic views (E-views) software will be adopted for regression analysis.

Stationarity (unit root) test:

The importance of this test cannot be overemphasized since the data to be used in the estimation are time-series data. In order not to run a spurious regression, it is worthwhile to carry out a stationary test to make sure that all the variables are mean reverting that is, they have constant mean, constant variance and constant covariance. In other words, that they are stationary. The Augmented Dickey-Fuller (ADF) test would be used for this analysis since it adjusts for serial correlation.

Decision rule: If the ADF test statistic is greater than the MacKinnon critical value at 5% (all in absolute term), the variable is said to be stationary. Otherwise it is non stationary.

Cointegration test:

Econometrically speaking, two variables will be cointegrated if they have a long-term, or equilibrium relationship between them. Cointegration can be thought of as a pre-test to avoid spurious regressions situations (Granger, 1986). As recommended by Gujarati (2004), the ADF test statistic will be employed on the residual.

Decision Rule: if the ADF test statistic is greater than the critical value at 5%, then the variables are cointegrated (values are checked in absolute term)

Evaluation of Parameter Estimates

The estimates obtained from the model shall be evaluated using three (3) criteria. The three (3) criteria include:

1. The economic a priori criteria.
2. The statistical criteria: First Order Test
3. The econometric criteria: Second Order Test

Evaluation based on economic a priori criteria

This could be carried out to show whether each regressor in the model is comparable with the postulations of economic theory; i.e., if the sign and size of the parameters of the economic relationships follow with the expectation of the economic theory. The a priori expectations, in tandem with the manufacturing sector growth and its determinants are presented in Table 1 below, thus:

Table 1: Economic a priori expectation

Parameters	Variables		Expected Relationships
	Regressand	Regressor	
β_0	MAFS	Intercept	+/-
β_1	MAFS	FIN	+
β_2	MAFS	INFRA	+
β_3	MAFS	MATZ	+
β_4	MAFS	EXCH	+/-
β_5	MAFS	INTR	-
β_6	MAFS	INFL	-

Source: Researchers compilation

A positive '+' sign indicate that the relationship between the regressor and regressand is direct and move in the same direction i.e. increase or decrease together. On the other hand, a '-' shows that there is an indirect (inverse) relationship between the regressor and regressand i.e. they move in opposite or different direction.

Evaluation based on statistical criteria: First Order Test

This aims at the evaluation of the statistical reliability of the estimated parameters of the model. In this case, the F-statistic, standard error, t-statistic, Co-efficient of determination (R^2) and the Adjusted R^2 are used.

The Coefficient of Determination (R^2)/Adjusted R^2

The square of the coefficient of determination R^2 or the measure of goodness of fit is used to judge the explanatory power of the explanatory variables on the dependent variables. The R^2 denotes the percentage of variations in the dependent variable accounted for by the variations in the independent variables. Thus, the higher the R^2, the more the model is able to explain the changes in the dependent variable. Hence, the better the regression based on OLS technique, and this is why the R^2 is called the co-efficient of determination as it shows the amount of variation in the dependent variable explained by explanatory variables.

However, if R^2 equals one, it implies that there is 100% explanation of the variation in the dependent variable by the independent variable and this indicates a perfect fit of regression line. While where R^2 equals zero. It indicates that the explanatory variables could not explain any of the changes in the dependent variable. Therefore, the higher and closer the R^2 is to 1, the better the model fits the data. Note that the above explanation goes for the adjusted R^2.

The F-test: The F-statistics is used to test whether or not, there is a significant impact between the dependent and the independent variables. In the regression equation, if calculated F is greater than the table F table value at the chosen level of significance, then there is a significant impact between the dependent and the independent variables in the regression equation.

Econometric criteria: Second Order Test

This aims at investigating whether the assumption of the econometric method employed are satisfied or not. It determines the reliability of the statistical criteria and establishes whether the estimates have the desirable properties of unbiasedness and consistency. It also tests the validity of non-autocorrelation disturbances. In the model, autocorrelation, multicolinearity and heteroskedasticity test are used to test for the reliability of the data for predication.

Test for Autocorrelation

The Durbin-Watson (DW) test is appropriate for the test of Second-order autocorrelation and it has the following criteria.

1. If d* is approximately equal to 2 ($d^* = 2$), we accept that there is no autocorrelation in the function.
2. If $d^* = 0$, there exist perfect positive auto-correlation. In this case, if $0 < d^* < 2$, i.e. if d* is less than two but greater than zero, it denotes that there is some degree of positive autocorrelation, which is stronger the closer d* is to zero.
3. If d* is equal to 4 ($d^* = 4$), there exist a perfect negative autocorrelation, while if d* is less than four but greater than two ($2 < d^* < 4$), it means that there exist some degree of negative autocorrelation, which is stronger the higher the value of d*.

Test for multicolinearity

This means the existence of an exact linear relationship among the explanatory variable of a regression model. It is use to determine whether there is a correlation among variables.

Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity.

Test for heteroscedasticity

The essence of this test is to see whether the error variance of each observation is constant or not. Non-constant variance can cause the estimated model to yield a biased result. White's General Heteroscedasticity test would be adopted for this purpose.

Decision rule: We reject H_0 if $F_{cal} > F_{tab}$ at 5% critical value. Or alternatively, we reject H_0 if $\chi^2_{cal} > \chi^2_{0.05}$ and accept if otherwise at 5% critical value.

Test for Research Hypotheses

This study will test the research hypothesis using t-test. The t-statistics test tells us if there is an existence of any significance relationship between the dependent variable and the explanatory variables. The t-test will be conducted at 0.05 or 5% level of significance.

Decision rule: Reject H_0 if $t_{cal} > t_{\alpha/2}$, (n-k). Otherwise, we accept.

Nature and Source Of Data

All data used in this research are secondary time series data which are sourced from the Central Bank of Nigeria (CBN) annual statistical bulletin.

DATA ANALYSIS AND EVALUATION OF ESTIMATES

Summary of Stationary Unit Root Test

Establishing stationarity is essential because if there is no stationarity, the processing of the data may produce biased result. The consequences are unreliable interpretation and conclusions. We test for stationarity using Augmented Dickey-Fuller (ADF) tests on the data. The ADF tests are done on level series, first and second order differenced series. The decision rule is to reject stationarity if ADF statistics is less than 5% critical value, otherwise, accept stationarity when ADF statistics is greater than 5% criteria value. The result of regression is shown in table 2 below.

Table 2: Summary of ADF test results

Variables	ADF Statistics	Lagged Difference	1% Critical Value	5% Critical Value	10% Critical Value	Order of Integration
MAFS	-5.303511	1	-3.661661	-2.960411	-2.619160	*I*(1)
FIN	-5.763376	1	-3.661661	-2.960411	-2.619160	*I*(1)
INFRA	-4.864043	1	-3.653730	-2.957110	-2.617434	*I*(1)
MATZ	-9.253889	1	-3.653730	-2.957110	-2.617434	*I*(1)
EXCH	-5.229408	1	-3.653730	-2.957110	-2.617434	*I*(1)
INTR	-6.728109	1	-3.653730	-2.957110	-2.617434	*I*(1)
INFL	-5.813439	1	-3.661661	-2.960411	-2.619160	*I*(1)

Source: Researchers computation

Evidence from unit root table above shows that none of the variables are stationary at level difference that is, *I*(0), rather all the variables are stationary at first difference, that is, *I*(1). Since the decision rule is to reject stationarity if ADF statistics is less than 5% critical value, and accept stationarity when ADF statistics is greater than 5% criteria value, the ADF absolute value of each of these variables is greater than the 5% critical value at their first difference but less than 5% critical value in their level form. Therefore, they are all stationary at their first difference integration.

Summary of Cointegration Test

Cointegration means that there is a correlationship among the variables. Cointegration test is done on the residual of the model. Since the unit root test shows that none of the variable is stationary at level *I*(0) but stationary at first difference *1*(1), we go further to carry out the cointegration test. The essence is to show that although all the variables are stationary, whether the variables have a long term relationship or equilibrium among them. That is, the variables are cointegrated and will not produce a spurious regression. The result is presented in tables 3 below for Trace and Maximum Eigenvalue cointegration rank test respectively.

Table 3: Summary of Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.747371	161.0029	125.6154	0.0001
At most 1 *	0.692505	116.9762	95.75366	0.0008
At most 2 *	0.617249	79.23880	69.81889	0.0073
At most 3 *	0.538991	48.50695	47.85613	0.0434
At most 4	0.327585	23.72815	29.79707	0.2121
At most 5	0.255467	11.02800	15.49471	0.2098
At most 6	0.048415	1.588050	3.841466	0.2076
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.747371	44.02667	46.23142	0.0847
At most 1	0.692505	37.73744	40.07757	0.0897
At most 2	0.617249	30.73185	33.87687	0.1134
At most 3	0.538991	24.77880	27.58434	0.1097
At most 4	0.327585	12.70015	21.13162	0.4802
At most 5	0.255467	9.439954	14.26460	0.2514
At most 6	0.048415	1.588050	3.841466	0.2076
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Researchers computation

Table 3 indicates that trace have only 4 cointegrating variables in the model while Maximum Eigenvalue indicated no cointegrating variables (*see also* appendix 3). Hence, the trace statistics and Eigen value statistics reveal that there is a short run relationship between the variables. That is, the linear combination of these variables cancels out the stochastic trend in the series. This will prevent the generation of spurious regression results. Hence, the implication of this result is a short run relationship between manufacturing sector and the determinants of business performance used in the model.

Presentation of Result

Having verified the existence of long-run relationships among the variables in our model, we therefore, subject the model to ordinary least square (OLS) to generate the coefficients of the parameters of our regression model. The data for the study are presented in table 4 below.

Table 4: Summary of regression results

Dependent Variable: MAFS

Method: Least Squares

Sample: 1999 2023

Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	351.8411	8.684687	2.405128	0.0886
FIN	37.12074	1.855689	2.800375	0.0556
INFRA	15.72785	1.018575	1.544103	0.1342
MATZ	20.40608	7.042954	5.289737	0.0012
EXCH	-7.339559	5.124903	-4.143214	0.0072
INTR	-12.98196	1.819291	-3.456123	0.0519
INFL	-15.52669	4.809257	-0.322850	0.7493
R-squared	0.778177	F-statistic		15.78641
Adjusted R-squared	0.728883	Prob(F-statistic)		0.000000
S.E. of regression	4167.587	Durbin-Watson stat		2.004310

Source: Researchers computation

Evaluation of Estimates

Evaluation based on economic a priori criteria

Examining the individual coefficients, several variables demonstrate a statistically significant relationship with manufacturing output. Financial intermediation (FIN) has a positive and statistically significant coefficient of 37.12074 (p-value = 0.0556), suggesting that an increase in financial intermediation is associated with a rise in manufacturing output. Market size (MATZ) also exhibits a strong positive and highly significant relationship with manufacturing output, with a coefficient of 20.40608 and a p-value of 0.0012. This indicates that a larger market size is a significant driver of performance in the manufacturing sector.

Conversely, the exchange rate (EXCH) shows a negative and statistically significant impact on manufacturing output, with a coefficient of -7.339559 and a p-value of 0.0072. This implies that a depreciation of the exchange rate (increase in EXCH) is associated with a decrease in manufacturing output. Similarly, the interest rate (INTR) has a negative and statistically significant coefficient of -12.98196 (p-value = 0.0519), suggesting that higher interest rates are detrimental to manufacturing sector performance.

Infrastructure (INFRA) and inflation rate (INFL) do not appear to have a statistically significant impact on manufacturing output within this model, as their respective p-values are 0.1342 and 0.7493, which are greater than the conventional significance level of 0.05. The intercept (C) is 351.8411 and is statistically significant at the 0.0886 level, representing the estimated manufacturing output when all independent variables are zero. Finally, the Durbin-Watson statistic of 2.004310 is close to 2, suggesting that there is no significant evidence of positive or negative serial correlation in the residuals.

From table 5, it is observed that all the variables conform to the a priori expectation of the study. Thus, table 5 summarises the a priori test.

Table 5: Summary of economic a priori test

Parameters	Variables		Expected Relationships	Observed Relationships	Conclusion
	Regressand	Regressor			
β_0		Intercept	+/-	+	Conform
β_1		FIN	+	+	Conform
β_2		INFRA	+	+	Conform
β_3		MATZ	+	+	Conform
β_4		EXCH	+/-	+	Conform
β_5		INTR	-	-	Conform
β_6		INFL	-	-	Conform

Source: Researchers compilation

Evaluation based on statistical criteria

The regression analysis aimed to identify the determinants of business performance in the Nigerian manufacturing sector, proxied by manufacturing output (MAFS). The model included financial intermediation (FIN), infrastructure (INFRA), market size (MATZ), exchange rate (EXCH), interest rate (INTR), and inflation rate (INFL) as explanatory variables. The results indicate that the model explains a significant portion of the variation in manufacturing output, as evidenced by the R-squared value of 0.778177. This means that approximately 77.8% of the changes in manufacturing output can be attributed to the variables included in this model. The adjusted R-squared of 0.728883 accounts for the number of predictors and sample size, providing a more conservative estimate of the model's explanatory power. The overall model is statistically significant at the 0.000 level, as indicated by the Prob(F-statistic) of 0.000000, suggesting that at least one of the independent variables has a significant impact on manufacturing output. The F-test is applied to check the overall significance of the model. The F-statistic is instrumental in verifying the overall significance of an estimated model. The hypothesis tested is:

H_0: The model has no goodness of fit

H_1: The model has a goodness of fit

Decision rule: Reject H_0 if $F_{cal} > F_{\alpha}$ (k-1, n-k) at $\alpha = 5\%$, accept if otherwise.

Where

V_1 / V_2 Degree of freedom (d.f)

$V_1 = n-k$, $V_2 = k-1$:

Where; n (number of observation); k (number of parameters)

Where k-1 = 7-1= 6

Thus, n-k = 34-7 = 27

Therefore, $F_{0.05(6,27)} = 2.10$ (From the F table) … F-table

F-statistic = 15.78641 (From regression result) … F-calculated

Since the F-calculated > F-table, we reject H_0 and accept H_1 that the model has goodness of fit and is statistically different from zero. In other words, there is significant impact between the dependent and independent variables in the model.

Evaluation based on econometric criteria

In this subsection, the following econometric tests are used to evaluate the result obtained from our model: autocorrelation, heteroscedasticity and multicolinearity.

Test for Autocorrelation

Using Durbin-Watson (DW) statistics which we obtain from our regression result in table 4, it is observed that DW statistic is 2.004310 or approximately 2. This implies that there is no autocorrelation since d* is approximately equal to two. 2.004310 tend towards two more than it tends towards zero. Therefore, the variables in the model are not autocorrelated and that the model is reliable for predications.

Test for Heteroscedasticity

This test is conducted using the white's general heteroscedascity test. The hypothesis testing is thus:

H_0: There is homoskedasticity in the residuals

H_1: There is heteroscedasticity in the residuals

Decision rule: Reject H_0 if the computed f-statistics is significant; otherwise accept at 5% level of significance. Hence, since the F-calculated is significant, we reject H_0 and accept H_1 that the model has heteroskedasticity in the residuals and therefore, reliable for predication because, the study employed the Newey-West method. This crucial technique produces Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors. Therefore, notwithstanding the absence of heteroscedasticity in the residuals of our estimated model, our inferences remain untainted, since the Newey-West method has neutralized the consequences of heteroscedasticity on the standard errors.

Also, we observe that the probability of F- statistic of the white test is 0.2929. Since the probability of F-test is greater than the 0.05 significance level, we reject the null hypothesis that there is a homoskedasticity in the residuals. This goes to say that the residuals of our estimated model do not have a constant variance (homoscedastic).

Test for Multicolinearity

This means the existence of an exact linear relationship among the explanatory variable of a regression model. This means the existence of an exact linear relationship among the explanatory variable of a regression model. This will be used to check if collinearity exists among the explanatory variables. The basis for this test is the correlation matrix obtained using the series. The result is presented in table 6 below.

Table 6: Summary of Multicollinearity test

Variables	Correlation Coefficients	Conclusion
FIN and INFRA	0.710569	No multicollinearity
FIN and MATZ	0.573236	No multicollinearity
FIN and EXCH	0.646874	No multicollinearity
FIN and INTR	-0.101045	No multicollinearity
FIN and INFL	-0.270004	No multicollinearity
INFRA and MATZ	0.760710	No multicollinearity
INFRA and EXCH	0.769841	No multicollinearity
INFRA and INTR	0.282619	No multicollinearity
INFRA and INFL	-0.354465	No multicollinearity
MATZ and EXCH	0.771724	No multicollinearity
MATZ and INTR	0.345138	No multicollinearity
MATZ and INFL	-0.283380	No multicollinearity
EXCH and INTR	0.306843	No multicollinearity

EXCH and INFL	-0.377252	No multicollinearity
INTR and INFL	0.280630	No multicollinearity

Source: Researchers computation

Decision Rule: From the rule of Thumb, if correlation coefficient is greater than 0.8, we conclude that there is multicolinearity but if the coefficient is less than 0.8 there is no multicolinearity. We therefore, conclude that the explanatory variables are not perfectly linearly correlated.

Test of Research Hypotheses

The test is used to know the statistical significance of the individual parameters. Two-tailed tests at 5% significance level are conducted. The Result is shown on table 4.6 below. Here, we compare the estimated or calculated t-statistic with the tabulated t-statistic at $t_{\alpha/2} = t_{0.05} = t_{0.025}$ (two-tailed test).

Degree of freedom (df) = n-k = 34-7 = 27

So, we have: $T_{0.025(27)} = 2.052$ … Tabulated t-statistic

In testing the working hypotheses, which partly satisfies the objectives of this study, we employ a 0.05 level of significance. In so doing, we are to reject the null hypothesis if the t-value is significant at the chosen level of significance; otherwise, the null hypothesis will be accepted. This is summarized in table 7 below.

Table 7: Summary of t-statistic

Variable	t-tabulated ($t_{\alpha/2}$)	t-calculated (t_{cal})	Conclusion
Constant	±2.052	2.405128	Statistically Significance
FIN	±2.052	2.800375	Statistically Significance
INFRA	±2.052	1.544103	Statistically Insignificance
MATZ	±2.052	5.289737	Statistically Significance
EXCH	±2.052	-4.143214	Statistically Significance
INTR	±2.052	-3.456123	Statistically Significance
INFL	±2.052	-0.322850	Statistically Insignificance

Source: Researchers computation

We begin by bringing our working hypothesis to focus in considering the individual hypothesis. From table 7, the t-test result is interpreted below;

For FIN, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. This means that FIN have a significant impact on MAFS.

For INFRA, $t_{\alpha/2} > t_{cal}$, therefore we accept the null hypothesis and reject the alternative hypothesis. Thus, INFRA do not have a significant impact on MAFS.

For MATZ, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, MATZ do have a significant impact on MAFS.

For EXCH, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, EXCH do has a significant impact on MAFS.

For INTR, $t_{\alpha/2} < t_{cal}$, therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, INTR do have significant impact on MAFS.

For INFL, $t_{\alpha/2} > t_{cal}$, therefore we accept the null hypothesis and reject the alternative hypothesis. Thus, INFL do not have a significant impact on MAFS.

CONCLUSION AND RECOMMENDATIONS

The analysis reveals that financial intermediation has a positive and statistically significant impact on manufacturing output in Nigeria. The coefficient of 37.12074 suggests that for every unit increase in financial intermediation, manufacturing output is expected to increase by approximately 37.12 units, holding other factors constant. This finding underscores the importance of access to financial resources and services for the growth and performance of the manufacturing sector. Improved financial intermediation likely facilitates investment in production, technology adoption, and working capital, thereby boosting manufacturing output.

Market size is identified as a highly significant positive determinant of manufacturing output. The coefficient of 20.40608 indicates that a larger market size is associated with substantially higher manufacturing output. This suggests that a growing domestic market provides greater opportunities for manufacturers to sell their products, leading to increased production and improved performance. The size of the market can influence economies of scale, investment decisions, and overall demand for manufactured goods.

Conversely, the exchange rate has a negative and statistically significant effect on manufacturing output. The coefficient of -7.339559 implies that a depreciation of the Nigerian Naira (an increase in the exchange rate) is associated with a decrease in manufacturing output. This could be due to the increased cost of imported raw materials, machinery, and technology, which are often essential inputs for the manufacturing sector. A weaker currency makes these inputs more expensive, potentially reducing production levels.

The interest rate also exhibits a negative and statistically significant relationship with manufacturing output. The coefficient of -12.98196 suggests that higher interest rates are detrimental to manufacturing sector performance. Higher borrowing costs can discourage investment in expansion, modernization, and new projects, leading to reduced production and slower growth in the manufacturing sector. Infrastructure and inflation rate were found to have no statistically significant impact on manufacturing output within this model.

Based on the regression analysis, the study concludes that financial intermediation and market size are significant positive determinants of business performance in the Nigerian manufacturing sector. Conversely, the exchange rate and interest rate have a significant negative impact on manufacturing output. Infrastructure and inflation rate did not demonstrate a statistically significant influence on manufacturing output in this study. The overall model is a good fit for the data, explaining a substantial portion of the variation in manufacturing output.

In light of the findings, the following recommendations are proposed to enhance business performance in the Nigerian manufacturing sector: Policymakers should focus on strengthening financial intermediation by promoting access to affordable credit, developing diverse financial products tailored to the needs of manufacturers, and streamlining lending processes. Efforts should also be directed towards expanding the domestic market through initiatives that boost consumer purchasing power and support local industries. To mitigate the negative impact of exchange rate fluctuations, strategies should be implemented to stabilize the currency and potentially encourage the sourcing of local raw materials. Furthermore, monetary policy should aim to maintain manageable interest rates to encourage investment and growth in the manufacturing sector. While the study did not find a significant impact for infrastructure and inflation, continued investment in infrastructure development and efforts to control inflation are still crucial for creating a favorable business environment in the long term.

Implications of the Study to the Economy:

The findings of this study have significant implications for the Nigerian economy. The positive impact of financial intermediation and market size highlights the importance of a well-functioning financial sector and a growing domestic economy for industrial development. Policies that promote financial inclusion and market expansion can lead to increased manufacturing output, job creation, and economic diversification. The negative impact of exchange rate and interest rate volatility underscores the vulnerability of the manufacturing sector to macroeconomic instability. Managing these factors effectively is crucial for fostering a stable and predictable business environment, which is essential for attracting investment and promoting sustainable growth in the manufacturing sector. Ultimately, a thriving manufacturing sector contributes to reduced dependence on imports, increased export potential, and overall economic prosperity for Nigeria.

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