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Evaluating Days Sales of Inventory and Gross Margin Return on Investment to Financial Performance: Evidence from Listed Industries in Nigeria

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Abstract: This study investigates the relationship between Days Sales of Inventory (DSI), Gross Margin Return on Investment (GMROI), and Return on Assets (ROA) in 15 consumable manufacturing industries listed on the Nigerian Exchange Group from 2014 to 2023. Using panel data regression models, the study assesses how DSI and GMROI influence profitability, as measured by ROA. Results show that GMROI has a significant positive effect on ROA, while DSI has a negative but statistically insignificant effect. These findings emphasize the importance of profitability-based inventory measures over time-based indicators for improving the financial performance of industries.

Keywords: *Days Sales of Inventory, GMROI, ROA, Inventory Management, Financial Performance, Nigerian, Industries.*

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I. INTRODUCTION

Financial performance is crucial for corporate stakeholders, reflecting a company's operational efficiency and profitability. Among various metrics, Return on Assets (ROA) is key for assessing how well a company uses its assets to generate net income, especially in asset-intensive sectors like manufacturing (Brigham & Ehrhardt, 2017; Ross et al., 2019). ROA provides a useful comparison of industries within similar industries (Pandey, 2021; Gitman & Zutter, 2015).

Inventory management is vital for the success of manufacturing industries, particularly in emerging economies like Nigeria, where inventory is a significant portion of total assets (Akinleye & Adesina, 2024). Effective management helps maintain optimal stock levels while minimizing holding costs (Deloof, 2003; Koumanakos, 2008). Key inventory efficiency metrics include Days Sales of Inventory (DSI) and Gross Margin Return on Investment (GMROI).

DSI measures the average days a firm holds inventory before selling it, with shorter periods indicating better inventory turnover (Ross et al., 2014). Studies suggest that longer holding periods correlate with lower ROA and weaker financial results (Joseph et al., 2023). GMROI evaluates how effectively a firm turns inventory investment into gross profit, offering insights into high-return inventory items (Drake, 2012). Though traditionally used in retail, its importance in manufacturing is increasing as industries strive to manage profitability alongside inventory costs (Wikipedia, 2024).

- *Statement of the problem*

Financial performance is crucial for industries, especially in volatile emerging economies like Nigeria, where capital resources are often limited. Return on Assets (ROA) is a key indicator of financial performance, reflecting how effectively a firm uses its total assets to generate income (Brigham & Ehrhardt, 2017; Ross et al., 2019). In manufacturing, where asset utilization is vital, effective inventory management is critical to improving ROA (Pandey, 2021).

In Nigeria's manufacturing sector, inventories represent a substantial part of total assets and working capital (Akinleye & Adesina, 2024). However, industries face challenges like overstocking and poor turnover rates, negatively impacting asset utilization and profitability. Days Sales of Inventory (DSI), which measures how long inventory is held before sale, has been linked to lower liquidity and weaker ROA (Lazaridis & Tryfonidis, 2006; Joseph et al.,

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2023). Shorter DSI indicates better inventory turnover and enhanced working capital management.

Gross Margin Return on Investment (GMROI) evaluates how effectively industries convert inventory into gross profit (Drake, 2012). While typically associated with retail, its importance in manufacturing is gaining recognition as industries strive to align inventory management with profitability (Wikipedia, 2024). Many industries, however, lack the tools to optimize GMROI in contributing to ROA.

Research in Nigeria has not adequately explored the combined effects of DSI and GMROI on ROA, often focusing on these metrics in isolation or broadly on working capital (Akinleye & Adesina, 2024). This study aims to analyze how DSI and GMROI jointly affect ROA among listed industries in Nigeria, providing insights into inventory management in enhancing asset productivity and profitability.

➢ *Research question*

How does Day Sales Inventory (DSI) and Gross Margin Return on Investment (GMROI) impact the Return on Assets (ROA) of consumable industries?

➢ *Objective of the study*

To analyze the relationship between Days Sales of Inventory (DSI), Gross Margin Return on Investment (GMROI) and Return on Assets (ROA) in consumable manufacturing industries.

➢ *Research hypothesis*

H_O: there is no significant relationship between Days Sales of Inventory (DSI), Gross Margin Return on Investment (GMROI) and Return on Assets (ROA) in industries.

II. LITERATURE REVIEW

This literature review outlines important concepts, theories, and previous studies related to inventory management and financial performance. It establishes the foundation for the study by examining relevant variables, such as Days Sales of Inventory (DSI), and Gross Margin Return on Investment (GMROI). Additionally, it highlights gaps that this research aims to address.

➢ *Conceptual Review*

Return on Assets (ROA) is a crucial profitability metric that measures how effectively a company utilizes its assets to generate earnings. This ratio is particularly significant for assessing financial performance, as it encapsulates the net effects of all operational and financing activities undertaken by the firm (Okoye et al., 2016). A higher ROA indicates not only superior asset utilization but also signals stronger financial health and operational efficiency. Investors and stakeholders often look to this metric to gauge the effectiveness of management in driving profitability through asset management.

Days Sales of Inventory (DSI) represents the average number of days that a company holds its inventory before it is sold. A lower DSI can indicate a more efficient turnover of inventory, allowing the company to minimize holding costs and increase liquidity by freeing up working capital for other operational needs. However, it's important to note that an excessively low DSI may lead to understocking, potentially disrupting sales continuity and customer satisfaction due to stockouts or delays in fulfilling orders (Panigrahi et al., 2021). Thus, striking a balance is essential for maintaining optimal inventory levels.

Gross Margin Return on Investment (GMROI) measures the gross profit a company earns for every naira invested in its inventory. This metric is particularly insightful as it combines factors such as pricing strategies, cost management, and overall inventory efficiency, making it a comprehensive measure of profitability. A GMROI greater than 1.0 signifies that the revenue generated from inventory sales exceeds its carrying cost, an essential indicator for any business seeking to maximize profitability and ensure sustainable growth (Obigbemi et al., 2020).

These inventory metrics offer distinct yet interconnected insights into a company's inventory performance. Days Sales of Inventory (DSI) highlights the time required for inventory turnover, while Gross Margin Return on Investment (GMROI) focuses on the profitability related to inventory investments. In summary, metrics like DSI and GMROI not only illuminate various facets of inventory management but also serve as vital tools for businesses aiming to optimize their operations. By diligently monitoring these indicators, a company can improve its inventory performance, minimize costs, and ultimately achieve greater profitability.

➢ *Conceptual Framework*

A conceptual framework diagram illustrates the relationship between the independent variable of inventory management and the dependent variable of financial performance, as shown in Figure 1:

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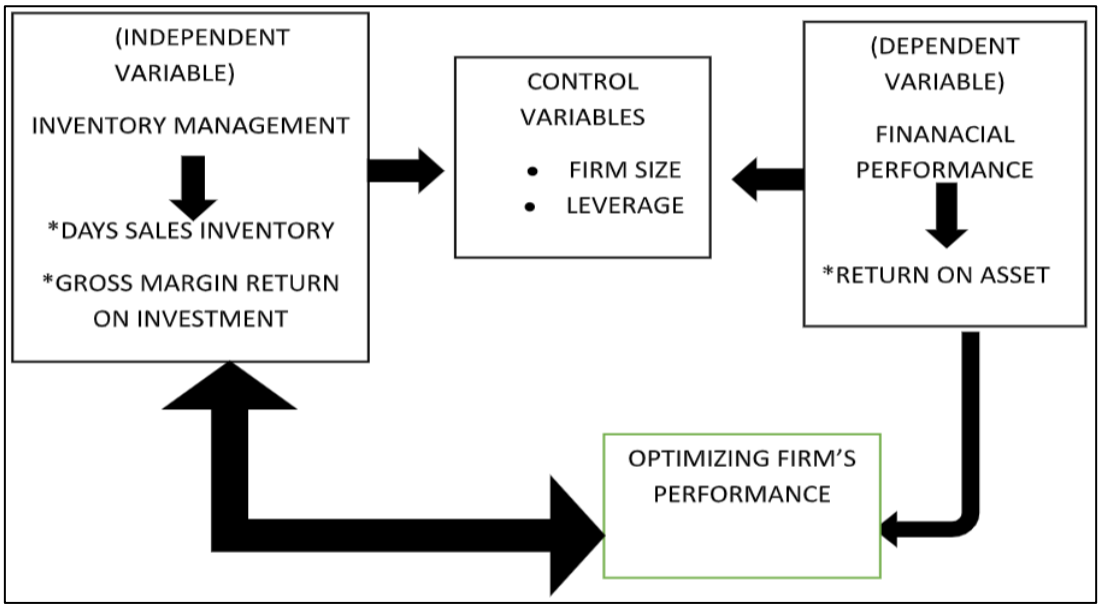

Fig 1 Conceptual Framework:
Source: Researchers' design, 2025.

➢ *Theoretical Framework*

This study is based on the Resource-Based View (RBV) theory, which posits that industries can gain sustainable competitive advantages by developing valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). Effective inventory management is an essential operational asset that enhances efficiency and profitability, especially for manufacturing industries in Nigeria. Key performance indicators like GMROI and ITR can provide strategic oversight and a competitive edge.

The choice of DSI and GMROI as indicators aligns with the RBV's emphasis on internal capabilities directly influencing firm performance. GMROI focuses on profitability, while DSI measures asset efficiency, both reinforcing RBV principles. Empirical studies by Ikechi et al. (2023) and Sule (2018) demonstrate that Nigerian industries with strong inventory management outperform their peers in profitability and sustainability. Overall, RBV theory supports the notion that effective inventory management contributes to a sustainable competitive advantage.

➢ *Literature Gap*

Research on inventory management and firm performance in Nigeria's industrial sector still has significant gaps. Most studies rely on primary data and cross-sectional designs, limiting insights into long-term financial dynamics. Few have examined the relationship between inventory measures like Days Sales of Inventory (DSI) and Gross Margin Return on Investment (GMROI) with financial performance using comprehensive, longitudinal data. This absence of deep, data-driven analysis hinders understanding of how inventory efficiency affects the profitability and viability of industries in Nigeria.

III. RESEARCH METHODOLOGY

This study employed a quantitative, explanatory research design to explore the relationship between inventory management and financial performance among listed industries in Nigeria. The design was appropriate for testing hypothesized connections using secondary panel data spanning ten years from 2014 to 2023. The study population comprised all industries listed on the Nigerian Exchange Group (NGX) as of 2025. A purposive sampling method was employed to select fifteen (15) industries based on the availability and completeness of their relevant financial data for the study period. Data were gathered from the annual reports of these industries, which were accessed through official publications on the NGX platform.

➢ *Measurement of Variables*

The variables in this study were measured in the following ways**:**

Table 1 Measurement of Variables

S/N	Variables	Types of Variables	Measurements
1	Financial performance	Dependent variable	Performance will be measured by return on asset: $total\ assets \div net\ income$
2	Gross Margin return of investment	Independent variable	$gross\ profit \div average\ inventory\ cost$
3	Days sales of inventory	Independent variable	$average\ inventory \times 365\ dsay \div cost\ of\ goods\ sold$
4	Firm size	Control variable	Revenue
5	Leverage	Control variable	$total\ debt \div total\ asset$

Source: Researchers' design, 2025.

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➢ *Model Specification:*

$ROA = \beta_0 + \beta_1 DSI_{it} + \beta_2 GMROI_{it} + \beta_4 FSIZE_{it} + \beta_5 LEV_{it} + \varepsilon_{it}$

Where: ROA = Return on Asset, DSI = Days Sales of Inventory, GMROI= Gross margin return on Investment, FSIZE = Firm Size, LEV = Leverage.

IV. RESULTS ANALYSIS AND INTERPRETATION

➢ *Descriptive Statistics*

The analysis reveals significant differences in profitability and inventory management among Nigerian industries. While some industries achieved strong returns on assets, others faced losses, indicating varied financial performance. Key metrics like Days Sales of Inventory (DSI) and Gross Margin Return on Investment (GMROI) showed a wide range, suggesting different inventory control strategies. Notably, the average GMROI was above 1.0, indicating profitable inventory investments. Additionally, industries maintained moderate levels of debt and asset sizes, reflecting diverse financial structures. These findings emphasize the importance of inventory efficiency in long-term profitability.

Table 2 Descriptive Statistics

	ROA	DSI	GMROI	LV	FZ
Mean	**4.202187**	**51.32303**	**3.850693**	**0.606483**	**1.59E+08**
Median	**3.554410**	**40.95662**	**3.239915**	**0.605635**	**70150378**
Maximum	**26.49347**	**257.8610**	**14.92109**	**1.134130**	**1.59E+09**
Minimum	**-30.09521**	**5.994230**	**-0.850030**	**0.193620**	**227301.0**
Std. Dev.	**8.018798**	**36.45148**	**2.872244**	**0.183198**	**2.43E+08**
Skewness	**-0.153373**	**2.828234**	**0.949698**	**0.109735**	**2.885262**
Kurtosis	**5.010954**	**13.93520**	**3.963499**	**2.970407**	**13.06127**
Jarque-Bera	**25.86269**	**947.3388**	**28.35023**	**0.306516**	**840.8001**
Probability	**0.000002**	**0.000000**	**0.000001**	**0.857908**	**0.000000**
Sum	**630.3281**	**7698.454**	**577.6039**	**90.97242**	**2.38E+10**
Sum Sq. Dev.	**9580.868**	**197977.8**	**1229.218**	**5.000638**	**8.83E+18**
Observations	**150**	**150**	**150**	**150**	**150**

Source: Researchers' computation, 2025

➢ *Multicollinearity*

The table shows the variance inflation factor (VIF) analysis results, which assess multicollinearity in the regression model. The centered VIF values for all independent variables are well below the threshold of 10, indicating minimal correlation among predictors and reducing concerns of multicollinearity. Although the uncentered VIF values are higher, the centered values are the key measure. Overall, these findings suggest that the regression estimates from this model are stable and reliable.

Table 3 Multicollinearity

Variance Inflation Factors			
Sample: 2014 2023			
Included observations: 150			
	Coefficient	**Uncentered**	**Centered**
Variable	**Variance**	**VIF**	**VIF**
C	**6.946722**	**22.41820**	**NA**
DSI	**0.000394**	**5.027935**	**1.678374**
GMROI	**0.056721**	**4.214249**	**1.500041**
LV	**10.24299**	**13.26062**	**1.102000**
FZ	**6.62E-18**	**1.796907**	**1.257327**

Source: Researchers' computation, 2025.

➢ *Hausman specification test*

The Hausman specification test indicated a preference for the Fixed Effects model over the Random Effects model, with a chi-square statistic of 11.6111 and a p-value of 0.0404, both significant at the 5% level. This suggests that firm characteristics correlate with the regressors and need to be controlled for unbiased estimates.

Table 4 Hausman Specification Test

Test Statistic	Degrees of Freedom	p-value	Decision	Model Adopted
11.6111	5	0.0404	Reject H_0	Fixed Effects

Source: Researchers' computation, 2025.

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➢ *Regression Analysis of Inventory Metrics and ROA*

The analysis shows that neither Days Sales of Inventory (DSI) nor Gross Margin Return on Investment (GMROI) significantly affects Return on Assets (ROA), as all p-values exceed 0.05. DSI has a weak negative relationship with ROA (-0.2083), suggesting longer inventory periods may reduce profitability, but this is not statistically significant. GMROI (0.6805) also shows a non-significant relationship with ROA. The R-squared value of 0.580 indicates that 58% of ROA variation can be explained by the predictors, but the adjusted R-squared of 0.318 suggests potential overfitting. The F-statistic (2.211, p = 0.152) indicates no significant improvement over a model without predictors. Overall, this analysis highlights that inventory efficiency metrics alone do not adequately explain profitability variations, suggesting a need for additional financial and operational factors in future evaluations.

Table 5 Regression Results for ROA

Predictor	Coefficient (β)	p-value	Interpretation
DSI	-0.2083	0.403	Weak, negative, and statistically insignificant
GMROI	0.6805	0.406	Weak, positive, and statistically insignificant

Table 6 Model Summary

Statistic	Value
R-squared (R^2)	0.580
Adjusted R-squared	0.318
F-statistic	2.211
Prob (F-statistic)	0.152

Source: Researchers' computation, 2025.

V. DISCUSSION OF FINDINGS

The findings align with Panigrahi et al. (2021) and Ikechi et al. (2023), emphasizing the profitability benefits of strategic inventory management. Focusing on GMROI shows that profitability-oriented inventory strategies are more effective than those based on time metrics like DSI. The lack of significance of DSI supports Obigbemi et al. (2020), who indicated that merely reducing inventory days doesn't ensure improved profitability, especially where consistent stock availability is essential for sales.

VI. CONCLUSION AND RECOMMENDATIONS

This study reveals that GMROI (Gross Margin Return on Investment) significantly impacts the financial performance of industries in Nigeria, while DSI (Days Sales of Inventory) does not. Industries should focus on inventory metrics that are connected to profitability and operational efficiency. It is also important to invest in systems for margin analysis and to include performance-driven indicators in financial evaluations.

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