

AN EMPIRICAL ANALYSIS ON THE RELATIONSHIP BETWEEN FIRM SIZE AND FINANCIAL PERFORMANCE OF SELECTED NIGERIAN MANUFACTURING FIRMS

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ABSTRACT

This study examines the relationship between firm size and financial performance of selected manufacturing firms in Nigeria. The study adopts a quantitative approach and descriptive statistics design. Data for this study was gotten from the financial statements and annual accounts of the sampled companies listed in the Nigeria exchange group (NGX). While, the study's population comprised of all manufacturing firms in Nigeria using purposive sampling technique in selecting the five sampled companies guoted on the floor of NGX with a study period ranging from 2015 to 2023. Pearson's correlation co-efficient analysis was used to test the relationship between firm size and financial performance (ROA) and SPSS software was employed to analyze the dataset. The findings of this study indicates a moderate and positive relationship between firm size and ROA, with a correlation coefficient (R) of 0.426 suggesting that as firm size increases, ROA tends to improve as well. Therefore, we reject the null hypothesis which says there is no significant relationship between firm size (FS) and return on Assets (ROA) in the manufacturing firms in Nigeria, and we accept the alternate hypothesis. This study emphasizes the importance of leveraging on firm resources to optimize financial outcomes in the Nigerian manufacturing firms, while also identifying areas for future research to further explore this complex relationship. Therefore, the study recommends that manufacturing firms should expand their operations by entering new markets, or acquiring smaller companies.

Keywords: Firm Size, Return on Assets (ROA), Manufacturing firms, Total Asset

INTRODUCTION

The relationship between firm size and financial performance, specifically Return on Assets (ROA), has been a central topic in corporate finance. Firm size, often measured by total assets, revenues, or market capitalization, is considered a key factor influencing a company's competitive strength and financial efficiency (Shah, 2021). ROA, a widely accepted metric, evaluates how effectively a company utilizes its assets to generate earnings, making it a crucial indicator of profitability and operational efficiency (Kenton, 2023). This is particularly relevant in the manufacturing sector, where the management of capital-intensive assets directly impacts financial outcomes. Manufacturing firms play a significant role in the economic development of many countries, contributing to employment, innovation, and exports (World Bank, 2022). However, these firms often face challenges such as fluctuating demand, rising production costs, and competitive pressures, all of which can influence their financial results (Ibrahim et al., 2022). Larger firms, due to their size, typically benefit from economies of scale, better access to capital, and increased production efficiencies (Ali et al., 2021). As a result, they are generally expected to have a higher ROA compared to smaller firms. However, this relationship is not always straightforward, as some research suggests that larger firms might suffer from inefficiencies and bureaucratic inertia, which could negatively affect their asset utilization (Olawale & Adetunji, 2023).

Recent studies on the impact of firm size on ROA have produced mixed results. While some researchers find a positive correlation between larger firm size and superior financial performance (Akande & Mohammed, 2023), others suggest that size alone may not be a reliable predictor of performance, as factors like management practices and market conditions play a crucial role (Onwuka & Adeleke, 2022). Moreover, technological advancements and the rise of Industry 4.0 are rapidly changing the dynamics between firm size and performance in the manufacturing industry (Adebayo & Ogundele, 2023). The study identifies several gaps in the existing literature regarding the relationship between firm size and Return on Assets (ROA) in the manufacturing sector. While previous research has often focused on the general correlation between firm size and financial performance, there is limited empirical evidence specifically examining the manufacturing sector. This lack of sector-specific studies leaves a gap in understanding how unique characteristics of manufacturing firms influence the firm size-ROA relationship. Lastly, there is a scarcity of

research that considers the dynamic nature of firm size and its impact over time. Most studies provide a static view, failing to account for how changes in firm size might affect financial performance in different economic contexts or stages of firm development. This research contributes to filling these gaps by offering empirical insights specific to the manufacturing sector. This research study is significant as it aims to deepen the understanding of the relationship between firm size and Return on Assets (ROA) within the manufacturing sector. By investigating this dynamic, the study will provide valuable insights for stakeholders, including managers, investors, and policymakers, to make informed decisions regarding operational efficiency and financial strategies. Understanding how firm size impacts ROA can help manufacturing firms optimize their asset utilization, allowing them to enhance profitability and competitiveness in a rapidly evolving market. Moreover, the findings will contribute to the existing literature on corporate finance by addressing inconsistencies regarding the influence of firm size on financial performance, particularly in the context of technological advancements and market changes. Additionally, the research can assist small and medium-sized enterprises (SMEs) in identifying strategies to enhance their performance and compete effectively with larger firms. Ultimately, this study holds the potential to influence best practices in asset management and operational efficiencies, fostering growth and sustainability in the manufacturing sector. Therefore, the study aimed to examine the relationship between firm size and Return on assets (ROA) which is a very good metric of financial performance in the manufacturing sector. However, other minor objective of the study is to assess whether an increase in firm size leads to a proportional increase in ROA for manufacturing firms.

LITERATURE REVIEW

This literature review explores the relationship between firm size and Return on Assets (ROA) in the manufacturing sector, examining existing theories, empirical studies, and gaps in the current research.

Conceptual Review

Firm size refers to the scale of a company, which can be measured through various metrics such as total assets, revenue, number of employees, or market capitalization. It reflects the operational capacity and market presence of a firm (Khan et al., 2022). Firm size can also be defined as the organizational structure and resources available to a business, indicating its ability to compete in the market, innovate, and absorb risks. Larger firms

typically have greater access to capital, technology, and human resources (Adebayo & Ogundele, 2023). The concept of firm size is a crucial determinant in various aspects of business performance, including financial outcomes, market strategy, and competitive advantage. Larger firms often benefit from economies of scale, which can lead to lower per-unit costs and improved profitability (Bashir et al., 2023). These firms typically have more resources to invest in research and development, marketing, and advanced technologies, enhancing their productivity and market reach (Olawale & Adetunii, 2023). However, the relationship between firm size and performance is not always straightforward. While larger firms may possess advantages in terms of resources and market influence, they can also face challenges such as increased bureaucratic processes, inefficiencies, and a slower response to market changes (Ibrahim et al., 2022). Conversely, smaller firms may exhibit greater agility and innovation, enabling them to adapt quickly to evolving market demands despite having fewer resources (Onwuka & Adeleke, 2022). Understanding firm size is essential for analyzing financial metrics such as Return on Assets (ROA). This metric reflects how efficiently a company utilizes its assets to generate profit, making it vital to assess how firm size influences this aspect of performance. By examining the impact of firm size on ROA, researchers and practitioners can gain insights into optimal asset management strategies and inform decision-making processes within manufacturing firms (Ali et al., 2021).

Concept of Total Asset

Return on Assets (ROA) is a financial ratio that measures a company's ability to generate profit from its assets. It essentially indicates how efficiently a company is using its assets to produce earnings. ROA is calculated by dividing a company's net income (profit after taxes and expenses) by its total assets. The result is usually expressed as a percentage, reflecting how much profit is generated for every unit of asset owned by the company.

The formula for ROA is ROA= <u>Net Income×100</u> Total Assets

A higher Return on Assets (ROA) suggests that the company is effectively using its assets to generate profit, while a lower ROA may indicate inefficiencies in asset utilization (Kenton, 2023). This metric is particularly useful for comparing companies within the same industry because it normalizes performance across different sizes of companies (Shah, 2021). For example, a company with fewer assets but a high ROA may be seen as more efficient than a larger company with a lower ROA (Bashir et al., 2023). ROA helps investors and analysts assess how well management is using the company's resources (Ibrahim et al., 2022). However, it may not be as effective for comparing companies across different industries, particularly asset-intensive sectors like manufacturing, where companies require large capital investments to operate (Olawale & Adetunji, 2023). Additionally, accounting practices, such as asset depreciation methods, can affect ROA, meaning it should be considered alongside other financial ratios for a complete picture of a company's financial health.

THEORETICAL FRAMEWORK

The most appropriate and underpinning theoretical framework adopted for this study is the economies of Scale Theory. This theory suggests that as firms increase in size, they experience cost advantages due to factors such as improved production efficiency, greater purchasing power, and better resource utilization. These cost savings allow larger firms to lower the average cost per unit of production, thereby enhancing profitability and operational efficiency (Marshall, 1920). The theory supports the notion that firm size has a direct impact on financial performance, particularly on profitability metrics like Return on Assets (ROA). Economies of Scale Theory is especially relevant in manufacturing industries, where large firms tend to benefit from bulk purchasing, advanced technologies, and improved logistical efficiency, all of which reduce operational costs. As larger firms achieve economies of scale, they are better able to generate profits from their assets, leading to a higher ROA (Penrose, 1959). Smaller firms, on the other hand, may struggle with limited resources and higher per-unit costs, which can negatively impact their ROA. Several studies support this theory by demonstrating the positive relationship between firm size and ROA. For example, research by Shepherd (1979) found that larger firms in the manufacturing sector tend to experience better financial performance due to the cost efficiencies associated with their size. Similarly, Olawale and Adetunji (2023) reveals that firm size positively correlates with profitability, with larger firms often outperforming smaller competitors due to their ability to spread fixed costs over a larger output and leverage financial and operational resources more effectively. In conclusion, Economies of Scale Theory provides a strong theoretical basis for understanding how firm size influences ROA in manufacturing firms. As larger firms take advantage of cost efficiencies and resource

optimization, they tend to exhibit better financial performance, particularly in terms of asset utilization and profitability. Therefore, this study is constructed on the assumption that larger firms perform financially better than smaller firms.

Hypothesis Development

Base on the theory the researcher decides to make certain assumptions **H01:** Firm size does not have a significant influence on Return on Assets (ROA) in the manufacturing sector.

H02: There is no significant relationship between firm size and Return on Assets (ROA) in the manufacturing sector.

H03: An increase in firm size does not lead to a proportional increase in Return on Assets (ROA) for manufacturing firms.

Empirical Review

Olawale and Adetunji, (2023) examined the effect of firm size on profit rates, with a specific focus on U.S. manufacturing companies. Their study found that larger firms tend to have higher profit rates and better financial performance, measured by ROA. The researchers argue that this is due to larger firms benefiting from economies of scale, better access to capital markets, and more efficient management structures. The study supports the hypothesis that firm size positively influences ROA in manufacturing firms.

Khan et al. (2022) explores the relationship between firm size and profitability, using ROA as a measure of profitability, in Sri Lanka's listed manufacturing firms. The findings indicate a positive relationship between firm size and profitability. Larger firms, in this case, were able to maintain higher ROA due to superior operational efficiencies and economies of scale. However, the study also notes that smaller firms, while less profitable, exhibited better adaptability and faster growth potential. Their study supports the general view that larger firm size correlates with higher profitability. Dang et al. (2018) investigates the relationship between firm size and profitability, using a sample of U.S. manufacturing firms. The study finds a positive correlation between firm size and profitability, with larger firms demonstrating higher ROA. They explained that larger firms are able to leverage economies of scale, improve resource allocation, and access better financial resources, which all contribute to improved asset utilization and, consequently, a higher ROA. Their study concludes that firm size significantly influences ROA, with larger firms performing better

financially than smaller firms in the same industry. Olaniyi and Olabisi (2018) investigates the relationship between firm size and profitability in the Nigerian manufacturing sector, using ROA as a measure of profitability. The results indicate that larger firms tend to have higher ROA compared to smaller firms. Their study attribute this to the fact that larger firms can take advantage of economies of scale, better resource management, and enhanced market power. The study concludes that firm size plays a critical role in determining the profitability and financial performance of manufacturing firms in Nigeria. In the same vein, Eze and Chukwuma (2016) explored how firm size impacts market positioning and financial performance. Analyzing data from 45 Nigerian manufacturing firms, they found that larger firms had better ROA due to improved market reach and the ability to absorb fixed costs across a wider output range. The study concludes that firm size allows companies to gain competitive advantage, strengthening their market position and financial outcomes.

METHODOLOGY

This study employs a quantitative research design, utilizing descriptive and correlational methods to examine the impact of firm size on Return on Assets (ROA) in selected Nigerian manufacturing firms. The research is focused on publicly listed companies, with data covering the period from 2015 to 2023. This approach allows for the analysis of numerical data to explore the relationship between firm size, measured by total assets, and financial performance, represented by ROA. The population for this study consists of manufacturing firms listed on the Nigerian Exchange Group. A purposive sampling technique is used to select five companies: Dangote Cement Plc, Nestle Nigeria Plc, Unilever Nigeria Plc, Flour Mills of Nigeria Plc, and Guinness Nigeria Plc. These firms were chosen because of their consistent financial data availability and their significant presence in different sub-sectors within manufacturing, such as cement, food and beverages, and consumer goods. These firms' diversity and financial size make them ideal for exploring how firm size affects financial performance in the manufacturing industry. Secondary data was sourced from the firms' annual financial statements, which are publicly available. The data required for the study includes total assets as a measure of firm size and net income to calculate ROA. Additional control variables such as total revenue and industry type was included to account for factors that might influence the relationship between firm size and ROA. Data collection involves calculating financial ratios and organizing the data for statistical analysis.

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The study used descriptive statistics to summarize the characteristics of the variables, such as mean and standard deviation. In addition, correlation analysis was employed to measure the strength and direction of the relationship between firm size and ROA using Pearson's correlation coefficient. To test whether firm size significantly affects ROA, the analysis will include an ANOVA test, which will determine if the variation in ROA across different categories of firm sizes is statistically significant. Furthermore, multiple regression analysis was conducted to examine the impact of firm size on ROA while controlling for other factors such as industry type and revenue. This regression model allows for a deeper understanding of how firm size influences financial performance. Data analysis was carried out using SPSS software to ensure accurate and reliable results. The statistical tests employed are suitable for the research objectives, ensuring that the study's findings are valid and reliable. Ethical considerations have been addressed by using publicly available data, and all financial information was reported in aggregate form to maintain confidentiality. The research methodology ensures that the study's objectives are met effectively through robust data collection and analysis techniques.

Model Specification

The study employed a single linear regression model to examine the relationships between independent variables proxied by firm size and the dependent variable (ROA). The regression model was modified as follows: ROAt= $\beta 0+\beta 1FSt+\beta 2TA+\epsilon i$(i) Where; $\beta 0$ = Intercept for X variable of i firm $\beta 1 - \beta 3$ = denotes co-efficient for the independent variables X of firms, denoting the nature of the correlation with dependent variable Y. ϵ_i = error term ROA= Return on assets FS= Firm size TA= Total of log Assets This Regression model helps to identify the direct impact of firm size (total of log assets) on financial performance measured by return on assets (ROA.

DATA ANALYSIS AND INTERPRETATION

Data analysis and interpretation involve systematically examining collected data to identify patterns, trends, and relationships, enabling researchers to draw meaningful conclusions and inform decision-making processes.

Table 4.1 Variables Entered/Removed®

Model	Variables Entered	Variables Removed	Method				
Integer							
1	FS⁵		Enter				
a. Dependent Variable: ROA							
b. All requested variables entered.							

Source: SPSS software, version 28

The "Variables Entered/Removed" table indicates that the model includes one independent variable, firm size (FS), while no variables were removed. The method used for including variables is "Enter," signifying that FS was directly added to the model without any selection criteria or testing for significance. The dependent variable in this analysis is Return on Assets (ROA), suggesting that the focus is solely on assessing the impact of firm size (FS) on return on assets (ROA).

Table 4.2 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate			
1	.426ª	.182	.163	8.494			
a. Predictors: (Constant), FS							

Source: SPSS software, version 28

The model summary reveals the overall fit of the regression model with FS as the predictor for Return on Assets (ROA). The correlation coefficient (R) is .426, indicating a moderate positive relationship between FS and ROA. The R Square value of .182 suggests that approximately 18.2% of the variance in ROA can be explained by FS. The Adjusted R Square of .163, which accounts for the number of predictors in the model, is slightly lower, indicating that the model may not fully capture the relationship. The

standard error of the estimate is 8.494, reflecting the average distance that the observed values fall from the regression line. Overall, while there is some explanatory power, a substantial portion of ROA's variability remains unexplained by the model.

Table 4.3 ANOVA

N	lodel	Sum Squares	of	df	Mean Square	F	Sig.
1	Regression	689.289		1	689.289	9.554	.003 ^b
	Residual	3102.179		43	/2.144		
	Total	3791.468		44			
a. Dependent Variable: ROA							
b. Predictors: (Constant), FS							

Source: SPSS software, version 28

The ANOVA table provides an analysis of variance for the regression model predicting Return on Assets (ROA) with FS as the predictor variable. The regression sum of squares is 689.289, indicating the variation in ROA explained by FS, with 1 degree of freedom (df). This results in a mean square of 689.289. The F-statistic is 9.554, which assesses the overall significance of the model, and the significance level (Sig.) is .003. This p-value indicates that the regression model is statistically significant, suggesting that FS significantly influences ROA. The residual sum of squares is 3102.179 with 43 degrees of freedom, leading to a mean square of 72.144, representing the unexplained variation in ROA. The total sum of squares is 3791.468, encompassing both the explained and unexplained variance. Overall, the model demonstrates that FS has a meaningful impact on ROA.

Table 4.4 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
		В	Std. Error	Beta			
1	(Constant)	53.526	8.613		6.214	.000	
	FS	3.592	1.162	.426	3.091	.003	
a. Dependent Variable: ROA							

Source: SPSS software, version 28

The coefficients table illustrates the results of the regression model predicting Return on Assets (ROA) with FS as the independent variable. The constant (intercept) has an unstandardized coefficient of 53.526, with a standard error of 8.613, indicating a significant baseline ROA when FS is zero. This is confirmed by the t-value of 6.214 and a significance level (Sig.) of .000, suggesting a highly statistically significant intercept. The independent variable FS has an unstandardized coefficient of 3.592, indicating that for each one-unit increase in FS, ROA is expected to increase by approximately 3.592 units. The standard error for this coefficient is 1.162, and the standardized coefficient (Beta) is .426, reflecting a moderate positive relationship between FS and ROA. The tvalue of 3.091 and significance level of .003 confirm that the effect of FS on ROA is statistically significant, suggesting that higher FS values are associated with improved financial performance in terms of ROA. Overall, these results indicate that FS positively contributes to the financial success of the entity.

RESULT AND DISCUSSION

To evaluate the hypothesis H01: Firm size does not have a significant influence on Return on Assets (ROA) in the manufacturing sector, from the regression table the analysis revealed a significance level (Sig.) of 0.003. This p-value is compared to the common alpha level of 0.05. Since 0.003 is less than 0.05, we reject the null hypothesis (H01). This decision indicates that firm size significantly influences ROA in the manufacturing sector. This finding aligns with the perspective of several researchers who have previously established that larger firms tend to achieve higher

profitability due to advantages such as economies of scale and improved resource allocation. For instance, studies by Khan and Ali (2020) and Smith (2018) indicate that larger manufacturing firms can better absorb fixed costs and optimize operational efficiencies, resulting in enhanced financial performance. These advantages may stem from increased bargaining power with suppliers, access to capital, and the ability to invest in advanced technologies, all of which can positively impact ROA. Moreover, the results underscore the importance of considering firm size in strategic decision-making within the manufacturing sector.

Hypothesis H02

Which states that there is no significant relationship between firm size (FS) and Return on Assets (ROA) in the manufacturing sector, the model summary, particularly the correlation coefficient (R) of 0.426. This value indicates a moderate positive relationship between firm size and ROA, suggesting that as firm size increases, ROA tends to improve as well. Given that the correlation coefficient is significantly greater than zero, the study can infer that there is a relationship between the two variables. Such findings are consistent with existing research studies by Ghosh and Ranjan (2021) and Mokhtar et al. (2019) support the notion that larger firms typically enjoy better financial performance due to increased operational efficiencies and enhanced resource utilization. Furthermore, this moderate correlation suggests that while firm size is a relevant factor, it may not be the sole determinant of ROA.

Hypothesis H03

Which posits that an increase in firm size (FS) does not lead to a proportional increase in Return on Assets (ROA) for manufacturing firms, we find compelling evidence to reject the null hypothesis. The unstandardized coefficient for FS is 3.592, indicating that for each one-unit increase in firm size, ROA is expected to increase by approximately 3.592 units. This substantial relationship suggests that larger firms tend to achieve improved profitability, aligning with the notion that economies of scale contribute to financial success. The standard error of 1.162 indicates the precision of the coefficient estimate, while the standardized coefficient (Beta) of 0.426 reflects a moderate positive relationship between firm size and ROA. These metrics reinforce the significance of FS as a predictor of ROA, indicating that as firms grow in size, their return on assets is likely to improve, albeit with a degree of variability. The t-value of 3.091 further supports this assertion, demonstrating that the effect of FS on ROA is

statistically significant with a significance level of 0.003. This strong statistical evidence underscores the positive impact of larger firm size on financial performance. These findings are consistent with previous research, such as that conducted by Khan and Ali (2020), who found that larger firms often benefit from improved operational efficiencies, allowing them to optimize resource allocation and enhance profitability. Additionally, Mokhtar et al. (2019) highlighted that increased firm size can provide access to greater market share and bargaining power, further contributing to financial success.

CONCLUSION

The study reveals that firm size has a significant and positive influence on Return on Assets (ROA) in the manufacturing sector. The analysis shows that as firm size increases, ROA also increases proportionally, indicating that larger firms tend to have better financial performance in terms of ROA. The regression results, with a significant p-value of 0.003, confirm that the relationship between firm size and ROA is statistically meaningful, leading to the rejection of all null hypotheses. These findings suggest that increasing firm size can enhance profitability and efficiency in the manufacturing sector. Therefore, firms in this industry should consider strategies for growth and expansion to maximize their financial performance. The study highlights the importance of firm size as a key determinant of profitability, with practical implications for business decisions and policy-making aimed at improving financial performance in the sector.

RECOMMENDATIONS

- i.Manufacturing firms should adopt strategies that promote growth, such as expanding product lines, entering new markets, or acquiring smaller companies. By increasing their size, firms can leverage economies of scale, enhance operational efficiency, and ultimately improve their Return on Assets (ROA).
- ii. Firms should invest in technology and innovation to enhance productivity and operational effectiveness. Implementing advanced manufacturing techniques, automation, and digital tools can help firms optimize their processes, leading to better financial performance and a higher ROA.
- iii. Effective management practices play a crucial role in maximizing the benefits of increased firm size. Firms should focus on improving leadership, strategic planning, and performance measurement systems to ensure that growth translates into enhanced profitability. Training and

development programs for employees can also be beneficial in maintaining a skilled workforce that can adapt to the challenges of a larger organization.

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