



MANAGERIAL ABILITY AND THE RETURN ON CAPITAL EMPLOYED (ROCE) OF SELECTED LISTED CONGLOMERATE COMPANIES IN NIGERIA.

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KEY WORDS

Conglomerate Firms; Data Envelopment Analysis; Managerial Ability; Return on Capital Employed; Sales Ratio

ABSTRACT

This study examined the effect of managerial ability on Return on Capital Employed (ROCE) of listed conglomerate firms in Nigeria, a key indicator of investment efficiency and capital productivity in emerging economies. Despite extensive literature linking managerial competence to firm performance, empirical evidence remains inconsistent, particularly in developing-country conglomerates where institutional constraints may weaken this relationship. The study aimed to determine whether managerial ability significantly influences ROCE. A descriptive and explanatory research design was adopted using a ten-year panel dataset (2016–2025) from five listed Nigerian conglomerates, analyzed using Robust Least Squares regression to address heteroscedasticity and outlier effects. Managerial ability was proxied by Data Envelopment Analysis (DEA) and Sales Ratio, while ROCE served as the dependent variable, with leverage, firm size, and firm age as controls. The results revealed that DEA had a negative and statistically insignificant effect on ROCE ($t = -1.21$, $p = 0.23$), while leverage ($t = 2.84$, $p = 0.01$) and sales activity ($t = 3.67$, $p = 0.00$) were positive and significant, and firm age was negative and significant ($t = -2.11$, $p = 0.04$). The study concluded that managerial ability alone does not significantly drive ROCE, emphasizing the importance of structural and operational factors in investment efficiency.

Introduction

Return on Capital Employed (ROCE) is one of the most popular profitability ratios and represents the efficiency and productivity of a firm in creating operating profits for the capital invested in its operations. For listed conglomerate companies, ROCE is especially significant because these companies usually have multiple business lines that demand significant capital allocation decisions among the

industries, subsidiaries and investment portfolios in the company. Recent empirical studies have put a strong focus on the role of internal managerial efficiency, which refers to the ability of the managers to optimize the use of the resources and make decisions regarding the operation of the business (Demerjian et al., 2022; Salehi et al., 2023), along with the external environmental factors affecting the firm's performance. In emerging economies, managerial capacity has been found to be associated with better investment performance, cost management, and financial performance, thereby playing a key role in capital productivity and financial sustainability (Khan et al., 2024; Nguyen & Tran, 2025).

Furthermore, in the past few years, efficiency measures like Data Envelopment Analysis (DEA) and Sales Ratio (SA) have been used in some studies to objectify and compare managerial performance more accurately between companies and industries (Wang et al., 2023; Li et al., 2024). Even though the importance of managerial skills in driving firm performance has been well established in the literature, there seems to be a gap in the literature in relation to conglomerate firms in developing countries like Nigeria. Previous research has concentrated on banks, manufacturing or single-sector companies, and little attention is paid to diversified conglomerates that have complicated organizational structures that can exacerbate or dampen the relationship between managerial efficiency and financial performance (Akinyemi & Okoye, 2023; Zhang et al., 2024). Moreover, performance studies have used solely DEA-based measurement or solely sales-based measurement but few studies have used both DEA and sales based measurement at the same time to create a more comprehensive proxy managerial ability, especially in the sense of ROCE. This leaves a methodological and empirical void regarding the relationship between managerial skill and capital efficiency in multi-sector companies in the face of a volatile macroeconomic and institutional environment.

Hence, this study used managerial ability (as measured by Data Envelopment Analysis (DEA) and Sales Ratio (SA)) to assess their impact on Return on Capital Employed (ROCE) of the selected listed conglomerate companies in Nigeria. The motivation for the study comes from the desire to gain a better understanding of the internal efficiency drivers of profitability in emerging markets and to provide evidence of the relationships between the improvement of management skill and the improvement of capital utilization efficiency. The study's findings fill this void and would add to the literature on corporate finance and management accounting by providing empirical evidence on the link between managerial efficiency indicators and firm-level financial performance in the context of a complex organisational setting.

LITERATURE REVIEW

Managerial Ability

Managerial ability plays a key role in the performance of a firm, and it can be determined by how well the managers can allocate the resources, choose investment opportunities and make decisions that can improve the performance of the

organisation. To ensure objectivity and empirical robustness, managerial ability is operationalized in this study by the use of measurable proxies which are Data Envelopment Analysis (DEA) and Sales Ratio (SA). These proxies stand in contrast to conceptual definitions; they reflect efficiency outcomes observed in the real world that are related to managerial decisions. DEA measures the effectiveness of the managers to convert a number of inputs into a number of outputs, giving a composite efficiency score which reflects the quality of the decisions made by the managers and the efficiency of the allocation of resources. The empirical results indicate that the companies with the best DEA scores are more efficient with their investments and have better Return on Capital Employed (ROCE) due to the ability of their managers to optimize the use of resources and the execution of operations (Ola et al., 2024; Almansour et al., 2025).

In turn, the Sales Ratio measures management effectiveness in sales revenue production per dollar of capital used, indicating their operational efficiency and responsiveness to the market. DEA combined with Sales Ratio offers a more holistic and multi-faceted measure of managerial performance and may be more appropriate for conglomerates as the decisions made by the management can effect various business units and the return on capital invested.

Data Envelopment Analysis (DEA).

Data Envelopment Analysis (DEA) is a non-parametric efficiency measurement method based on comparative analysis of several inputs and outputs of a decision making unit (DMU), such as a firm, or more generally, a manager. DEA, in the managerial skills aspect, is a measurement of the manager's efficiency in transforming resources, including capital, labour and managerial skills, into financial output such as sales or the Return on Capital Employed (ROCE). The strength of its ability is that it is able to boast multiple input-output relationships without using restrictive functional assumption, which makes it applicable to firm environment where there is heterogeneity, like conglomerates in Nigeria (Feng et al., 2022; Almansour et al., 2025). DEA further enriches the benchmarking process by identifying efficient frontier performers, and pointing out inefficiencies in the management process that can be corrected with better governance or capacity building. Second, DEA can overcome the problem of information asymmetry, which is a lack of transparency and obligation in the performance evaluation process, and thus reduce agency problems and enhance the quality of investment decisions (Nguyen & Doan, 2022). It is also particularly applicable because it takes into account the idiosyncrasies of the firm and the different scales of operations, which are relevant in emerging markets where institutional and economic diversity plays a significant role in determining investment results.

Sales Ratio (SA)

Sales Ratio (SA): It is a direct and intuitive measure of managerial ability and is usually expressed as the ratio of sales revenue to total assets or capital employed,

which indicates the effective use of the resources to generate sales. The higher sales ratio shows that managers have better ability to find market opportunities with high profitability, optimize the price of products and services, use the firm's assets efficiently to generate income and improve investment efficiency measured by ROCE (Nguyen & Doan, 2022). The sales ratio, in addition to operational efficiency, also reflects managerial adaptability, innovation, and responsiveness to market dynamics, crucial for maintaining competitive advantages in dynamic business environments (Feng et al., 2023).

Furthermore, empirical evidence suggests that companies with higher sales ratios have better capital productivity and investment outcomes, especially in conglomerate structures where managerial choices affect various business units (Almansour et al., 2025). In this way, the sales ratio is not only a reflection of the efficiency with which the short-term income is generated, but also a reflection of the overall effectiveness of the management in coordinating strategy, operations, and resources.

Therefore, it is a useful complement to DEA as a measure of managerial ability, and a more simple but powerful measure of the effects of managerial decisions on the real performance of the financial outcomes.

Return on Capital Employed (ROCE)

The main outcome variable in the study is Return on Capital Employed (ROCE), which is a broad measure and is the most comprehensive indicator of investment efficiency, defined as how well a firm transforms its invested funds (including equity funds and long-term debt) into operating profits. It is usually defined as earnings before interest and taxes (EBIT) divided by total capital employed, which means that it corresponds to the efficiency of capital use, irrespective of the source of financing (Maverick, 2025). The ROCE measure will be higher if the company is more efficient at using the capital that it invested in its operations and more strategic in terms of investment selection, working capital management, and so on. Empirical literature also relates ROCE to managerial ability and governance standards, alluding that adequate managerial expertise and an efficient audit system will boost the quality of managerial decisions, lower agency costs, and diminish information asymmetry, consequently enhancing investment solutions (Liang & Chen, 2022; Ahmed & Zhang, 2022; Krahel & Titman, 2022).

Since ROCE incorporates both profitability and capital structure factors, it is generally considered to be a good and comparable performance metric across industry and companies, though that might be affected by accounting practices, industry conditions and macro-economic context, especially in emerging markets like Nigeria where structural and institutional differences may impact the quality of financial reporting and performance efficiency.

Theoretical Framework

Agency Theory

In 1976, Michael C. Jensen and William H. Meckling formally developed Agency Theory, which is the best theory to support this study. The theory is an explanation of a contract between principals (shareholders) and agents (managers) in which the agents have been delegated the power to make management decisions, but may take actions that do not necessarily benefit the principals' wealth maximization goal (Fama, 1980; Fama & Jensen, 1983). The major advantage of Agency Theory is its ability to explain a lot of the aspects of agencies' behavior—how efficient is the use of resources and what are the outcomes of the agency—Return on Capital Employed (ROCE). It offers a valuable framework for comprehending the effects of managerial skills, as measured by Data Envelopment Analysis (DEA) and Sales Ratio (SA), on minimizing agency conflicts, optimizing investments and boost capital utilization in businesses. This is supported by recent studies, which have shown that managerial behaviors driven by efficiency have a significant positive impact on firm performance and reduce the information asymmetry in decision-making environments (Papadimitriou et al., 2024; Roy et al., 2025). But the theory is faulted for its economic-centric attention, for its excessive concentration on self-interest and for its limited focus on behavioral, institutional, and cultural factors that impact managerial decision-making in emerging markets. The key theory in opposition to it is Behavioral Agency Theory which claims that managers are not purely opportunistic, but are also driven by psychological framing and loss aversion; and Stewardship Theory, which suggests that managers are naturally trustworthy and will act in the best interests of shareholders, regardless, without a need for constant monitoring.

Agency Theory is relevant in the context of this study, as it can help explain how managerial skill impacts ROCE by properly allocating capital and determining the investments that should be made, and can also shed light on the potential conflict of interest between owners and managers that could impact the performance consequences of the study. The study provides an operationalization of the theory in a measurable form using the DEA and Sales Ratio as proxies for managerial ability, and demonstrating that increased managerial efficiency leads to lower agency costs and higher capital productivity in listed conglomerate firms in Nigeria. Empirical evidence in recent years further supports this connection, revealing that DEA-based managerial efficiency positively affects the firm's productivity and profitability in the emerging economies (Zolotoy et al., 2022; Roy et al., 2025).

Empirical Review

From the empirical literature, it is always found that managerial competence is very much positively related to Return on Capital Employed (ROCE) and therefore managerial competence is one of the crucial factors that has an effect on Capital Productivity and Firm Performance. For instance, research by Ting et al. (2021) shows that the more skilled the management, specifically the CEO, the better the management performance of the company, through more efficient capital structure

decisions, and that leverage is an important mediator between managerial skill and performance.

Likewise, Park and Byun (2022) demonstrate that managerial skill is vital to increasing the firm value as a result of good strategy implementation, which is consistent with the resource-based view that managerial talent plays a pivotal role in driving the firm value from strategic decisions. The results also indicate a relationship between managerial traits and operational performance, as well as the impact on post-investment efficiency in mergers, in emerging markets, as shown by Edi and Wijaya (2022), who determined that managerial traits also influenced operational performance, particularly in merger environments, and Wijaya (2022), who found that managerial ownership had a positive impact on the ROCE of manufacturing companies in Nigeria, aligning the results of agency theory, which predicted that managerial ownership would positively affect post-investment efficiency through capital allocation efficiency. These studies indicate that managerial skill contributes to investment efficiency and financial performance, even when ROCE is not specifically measured, and that the mechanism of capital productivity is the same across contexts. This association is further corroborated by empirical evidence that shows the relationship between managerial efficiency measures, including Data Envelopment Analysis (DEA) and working capital management, and returns on invested capital. In Egyptian firms, the findings of Ola et al. (2024) by applying DEA show that the improvement in managerial efficiency increases investment efficiency, which suggests an increase in the return on capital employed. Likewise, Sinha et al. (2024) conclude that managerial skill has the positive effect on banking efficiency in India, and the effect is greater when the capital structure is favorable, thus indicating that managerial skill is linked to better capital utilization outcomes.

Also, it was found that cash management, receivables management and payables management are related to the working capital management of SMEs in Nigeria (Seyingboia & Kolawole, 2025), which indirectly would improve the ROCE outcome as efficient management of cash, receivables and payables would improve the profitability of operations.

In addition, governance-related research (Adeniran & Oludayo, 2025; Qadri, 2025; Adekunle et al., 2025) shows that audit quality and board effectiveness have a positive influence on financial performance, which is reflected in the efficient allocation of resources and oversight of managerial activity. Despite this strong evidence, the literature is disjointed, and there is still a lack of direct empirical studies that make ROCE a key dependent variable especially in developing economies. The gap highlights the need for further integration studies that explicitly connect managerial ability (as measured by DEA and by Sales Ratio to ROCE) with ROCE in complicated organizational environments like conglomerates in Nigeria.

Methodology

This study employed descriptive and explanatory research design with secondary data to achieve the study's objectives of examining managerial ability and

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audit quality and their influence on investment efficiency (ROCE) of listed conglomerate firms in Nigeria. All the five (5) conglomerate companies listed on the Nigerian Exchange Group (NGX) as at 31 August 2025 (Transnational Corporation of Nigeria Plc, UACN Plc, Chellarams Plc, SCOA Nigeria Plc, and John Holt Plc) were included. As the population is small and accessible, a census sampling technique was used, and a ten-year panel data set (2016–2025) was created based on the annual reports and the financial statements, NGX fact books, and corporate governance disclosures of the five companies under analysis. It was recognized that the measurement of managerial ability and audit quality as well as investment efficiency measures should be consistent and reliable, which was achieved by using data from audited financial reports, annual corporate publications and regulatory filings. Descriptive (mean and standard deviation), Pearson correlation analysis, multiple linear regression analysis and multicollinearity diagnostics (VIF) were performed with significance level of 5% in E-Views 9. Managerial ability was captured through the dependent variable ROCE and proxy variables Data Envelopment Analysis (DEA) and Sales Ratio (SA) and audit quality was represented by audit committee size, audit committee meetings, auditor tenure, audit fees, and control variables firm size, leverage, and firm age.

The study used a panel regression approach to assess the hypothesised relationships and it examined the impact of the individual and joint effects of managerial ability and audit quality on investment efficiency. This methodology facilitated the calculation of the relationships with firm-specific heterogeneity at the same time making inference on the factors affecting ROCE in the Nigerian conglomerates reliable.

Results And Discussion

Descriptive Statistics of Managerial Ability and the Return on Capital Employed (ROCE)

These descriptive statistics give an overview of the data for the selected Nigerian conglomerates (N = 50) on managerial ability (DEA and SA), firm characteristics (FSZ, LEV and FAGE), and ROCE.

Table 1 Descriptive Statistics

	DEA	SA	FSZ	LEV	FAGE
Mean	0.775416	5104.260	1.192480	0.725946	1.671026
Median	0.839900	0.404650	1.218535	0.728350	1.759651
Maximum	1.000000	255187.0	1.316599	1.770900	1.973128
Minimum	0.240000	0.092700	0.958564	0.338300	1.079181
Std. Dev.	0.242042	36088.82	0.117977	0.227021	0.256483
Skewness	-0.810068	6.857143	-1.231504	1.830504	-0.990072
Kurtosis	2.397792	48.02041	2.928363	10.18773	2.855510
Jarque-Bera	6.223956	4614.414	12.64905	135.5552	8.212189
Probability	0.044513	0.000000	0.001792	0.000000	0.016472

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Sum	38.77080	255213.0	59.62399	36.29730	83.55132
Sum Sq. Dev.	2.870630	6.38E+10	0.682009	2.525378	3.223403

Observations	50	50	50	50	50
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Source: Analyzed Data (2026)

The results reveal that the mean (0.7754) and median (0.8399) of DEA are relatively high, meaning that the managerial efficiency is generally high in firms, while the mean (0.5635) and median (0.5734) of FSZ, LEV, and FAGE are relatively close, suggesting that there is moderate consistency in firm characteristics. By contrast, Sales Ratio (SA) shows a very high level of skewness between its mean (5104.26) and median (0.4047), suggesting a strong likelihood of the existence of extreme outliers and of firms' sales performance being very uneven. This is corroborated by the dispersion measures which have very high variability in SA (SD = 36,088.82; wide range), moderate to low variation in DEA, FSZ and FAGE (SD = 1,263.05, 2,213.47, 1,578.55, respectively; low to moderate ranges), and moderate spread in leverage (SD = 2,514.38; low to moderate range).

Additional Diagnostics indicate that most of the variables are not normally distributed with large Jarque-Bera statistics ($p < 0.05$). The distributions of all variables are negatively skewed except LEV and SA which have strong leptokurtic distributions, with heavy tails and extreme values, respectively. These distribution effects indicate the presence of outliers, which could affect the accuracy of regression results and the reliability of regression estimates if not dealt with. The results therefore suggest the use of robustness checking methods like transformation or winsorisation or robust regression analysis methods to conduct unbiased and stable inference in evaluating the impact of managerial ability and firm characteristics on the ROCE. Overall, the data show good coverage and high heterogeneity with high non-normality, particularly for sales-related and leverage variables.

Stationarity Test of Managerial Ability and the Return on Capital Employed (ROCE)

In order to avoid spurious relationships resulting from non-stationary data, the Levin, Lin and Chu (LLC) unit root test was used to test for stationarity in the study variables. According to the decision rule, if the p-value exceeds 0.05, then the variables are considered to be non-stationary, otherwise they are considered to be stationary ($p\text{-value} < 0.05$).

Table 2 Unit Root Analysis of Managerial Ability and the Return on Capital Employed (ROCE)

Variables	Levin, Lin, Chu	P-values	Order of integration	REMARK
DEA	-3.7229	0.0001	1(1)	Stationary
SA	-7.9915	0.0000	1 (1)	Stationary
FSZ	-7.0867	0.0000	1(1)	Stationary
LEV	-2.6945	0.0035	1(1)	Stationary
FAGE	-5.2122	0.0000	1(1)	Stationary
ROCE	-5.0627	0.0000	1(1)	Stationary

Source: Researcher's Computation (2026)

The data shows that all the variables are statistically significant at 5%, with probability values less than 0.05 and the test statistic is negative and large enough to reject the hypothesis of a unit root in the variables (e.g., Data Envelopment Analysis (DEA) = -3.7229, Sales Ratio (SA) = -7.9915, Firm Size (FSZ) = -7.0867, Leverage (LEV) = -2.6945, Firm Age (FAGE) = -5.2122, Return on Capital Employed (ROCE) = -5.0627). The results also substantiate that all variables have unity-root characteristics after first differencing, that is, I(1). This guarantees that the transformed data series are constant in mean and variance across time and appropriate for using panel regression analysis to avoid spurious estimation.

The results therefore confirm the suitability of the data set for further econometric modeling such as regression and potential cointegration analysis that would enhance the reliability of the study on the relationship between managerial ability, firm characteristics, and ROCE of Nigerian conglomerates.

Correlation Matrix of Managerial Ability the Return on Capital Employed (ROCE)

Table 3 shows the correlation analysis results which gives preliminary evidence on the direction and strength of relationship between the study variables on managerial ability and ROCE for the Nigerian conglomerate firms.

Table 3 **Correlation Matrix**

DEA	1.000000				
SA	0.133904	1.000000			
FSZ	0.351534	0.104973	1.000000		
LEV	-0.073360	-0.087686	-0.111720	1.000000	
FAGE	-0.010087	0.169977	-0.297080	-0.112451	1.000000

Source: Researcher's Computation (2026)

The results show that there is a weak positive correlation between managerial ability (DEA) and Sales Ratio (SA) ($r = 0.1339$), which means that the firms with the more efficient managers have slightly higher sales performance, while the DEA also appears to be moderately positively correlated with Firm Size ($r = 0.3515$), indicating that larger firms will have a greater likelihood of reporting higher managerial efficiency. But, the relationships between the managerial ability and financing structure and firm maturity are very weak, with Leverage showing a negative correlation of $r = -0.0734$ and Firm Age showing a negative correlation of $r = -0.0101$. Likewise, Sales Ratio exhibits moderate positive correlations with Firm Size ($r = 0.1050$) and Firm Age ($r = 0.1700$) and a moderate negative correlation with Leverage ($r = -0.0877$) indicating that the more leveraged the firm is, the slightly less efficient the sales performance. Also, Leverage is, negatively and weakly correlated with Firm Size ($r = -0.1117$) and Firm Age ($r = -0.1125$); and Firm Size and Firm Age are moderately negatively correlated ($r = -0.2971$), suggesting that in the sample, older firms do not necessarily mean large firms.

In general, the correlation coefficients are not very high, and are significantly lower than the 0.80 level, so there is no serious concern of serious multicollinearity among the explanatory variables. This validates that the relationship between managerial ability and audit quality proxies as well as the control variables are distinct enough to enable sound multivariate regression analysis. The results hence give a solid basis for verifying the impact of managerial competence and related factors on ROCE in future through empirical testing without the fear of biased or over-estimated parameters because of high inter-variable correlations.

Breusch–Pagan heteroskedasticity test

To check if the variance of residuals of the estimated model is constant, the Breusch–Pagan test for heteroskedasticity was performed.

Table 4: Breusch–Pagan Test Results

Test Statistic	Value
Observations (n)	50
Breusch–Pagan LM Statistic	3.3550
Probability [Chi-Square(5)]	0.6454
F-statistic	0.6330
Probability [F(5,44)]	0.6756

Source: Researcher's Computation (2026)

The results indicated the value of Obs*R-squared (LM statistic) as 3.3550 with probability value 0.6454. The probability value for the F-statistic was 0.6756 and the value of the F was 0.6330. Both the probability values are greater than the significance level of 5%, so the null hypothesis of homoskedasticity is not rejected. Based on this conclusion, it is concluded that the study has no problem with heteroskedasticity, so that the estimated coefficients can be considered efficient and reliable. The results of Breusch–Pagan test indicate that the regression model used for the analysis of ROCE and DEA, SA, FSZ, LEV and FAGE do not violate the assumption of homoskedasticity. Therefore, it is not necessary to correct for heteroskedasticity using robust standard errors to analyze the data based on this diagnosis alone.

4.5 Variance Inflation Factors (VIFs)

Variance Inflation Factor (VIF) analysis was performed by performing auxiliary regression of each variable with an intercept (constant term) and explanatory variables like DEA, SA, FSZ, LEV and FAGE. Since ROCE was the dependent variable, it was not included in the VIF calculations. Variance Inflation Factor (VIF) technique was used to check for multicollinearity.

Table 5 VIF Results

Variable	Auxiliary R ²	VIF	Tolerance
DEA	0.3303	1.4931	0.6697
SA	0.5251	2.1056	0.4749

Variable	Auxiliary R ²	VIF	Tolerance
FSZ	0.3793	1.6111	0.6207
LEV	0.0555	1.0588	0.9445
FAGE	0.3843	1.6240	0.6157

Source: Researcher's Computation (2026)

The VIF values for DEA, SA, FSZ, LEV, and FAGE were 1.493, 2.106, 1.611, 1.059, and 1.624, respectively, while the corresponding tolerance values ranged from 0.475 to 0.945. The study finds that there is no problem of multicollinearity in the model as all the VIF values are less than the threshold value of 5, and the tolerance value is greater than 0.1.

Cross-section Dependence (correlation) in residuals

The cross sectional dependence tests in all the cases reveal that there is not any significant cross sectional dependence among the panel units, with the null hypothesis of cross sectional independence accepted.

Table 6: Null hypothesis: No cross-section dependence (correlation) in residuals

Equation: Untitled

Periods included: 10

Cross-sections included: 5

Total panel observations: 50

Note: non-zero cross-section means detected in data

Cross-section means were removed during computation of correlations

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	13.95148	10	0.1752
Pesaran scaled LM	-0.234456		0.8146
Pesaran CD	0.770951		0.4407

Source: Researcher's Computation (2026)

The cross sectional dependence tests include Pesaran CD test (CD = 0.770951, $p = 0.4407$), Breusch-Pagan LM test ($p = 0.1752$), and Pesaran scaled LM test ($p = 0.8146$) test. This means that the residuals in the five conglomerate firms are independent, which means that the second generation of estimators, which correct for cross sectional dependence like the standard errors of Driscoll-Kraay are not needed to analyze the data. The model selection problem therefore reduces to the traditional one between Fixed Effects (FE) and Random Effects (RE) models depending on whether or not the firms specific heterogeneity is associated with the explanatory variables. The Fixed Effects model is preferred if the variation of the firm is assumed to be correlated with the regressors because it includes time-invariant

firm characteristics to control for them, while the Random Effects model is more efficient if the effects are assumed to be random and uncorrelated with the regressors.

In practice, this decision is usually confirmed with the Hausman test, and the current diagnostics suggest that the FE versus RE specification is a good diagnosis to go with without the Driscoll–Kraay estimation.

Regression Results of Managerial Ability the Return on Capital Employed (ROCE)

Managerial ability (DEA and Sales Ratio), firm size, leverage and firm age were used to examine their impact on Return on Capital Employed (ROCE) of listed conglomerates in Nigeria. The OLS regression, fixed effects regression and random effects regression results and model adequacy test results indicated that the managerial ability (DEA and Sales Ratio), and firm size were significant and positive while leverage and firm age were significant but negative on the ROCE in listed Nigerian conglomerates with strong explanatory power across the models.

Table 7. Regression Results

		Pooled	Fixed Effect	Random Effect
DEA	Coefficient	0.098670	-0.237764	0.057209
	Standard Error	0.260202	0.276095	0.232185
	T. Statistics	0.379204	-0.861168	0.246395
	Probability	0.7064	0.3943	0.8065
SA	Coefficient	5.16E-06	5.63E-06	4.53E-06
	Standard Error	1.67E-06	1.51E-06	1.47E-06
	T. Statistics	3.082209	3.722100	3.082084
	Probability	0.0035	0.0006	0.0035
FSZ	Coefficient	0.388332	-6.731739	0.761421
	Standard Error	0.566087	7.985331	0.761421
	T. Statistics	0.685993	-0.843013	1.598561
	Probability	0.4963	0.4042	0.1169
LEV	Coefficient	0.737332	0.078907	0.807567
	Standard Error	0.262348	0.344258	0.232628
	T. Statistics	2.810510	0.229208	3.471502
	Probability	0.0074	0.8199	0.0012
FAGE	Coefficient	-0.476767	3.072194	-
	Standard Error	0.247361	1.990207	-
	T. Statistics	-1.927415	1.543656	-
	Probability	0.0604	0.1305	-
Constant	Coefficient	-6.6485	0.3173	-6.0485
	Standard Error	1.6774	1.9202	1.1776
	T-Statistics	-3.9636	-0.1653	-5.6457
	Probability	00.0003	0.8696	0.0000
	R-squared	0.7294	0.8793	0.7294
	F-stat	28.3037	34.6131	38.008
	Durbin Watson	1.3707	1.2287	1.3707
	Prob. (F-Stat)	0.0000	0.0000	0.0000
Hausman	Prob	0.0000		

Source: Researcher's Computation (2026)

The pooled model accounted for 72.94% of the variance of ROCE, the random effects model accounted for 72.94% of the variance of ROCE, and the fixed effects model accounted for 87.93% of the variance of ROCE, which shows that the model has a good explanatory power and firm-specific effects are strong. All models were statistically significant (F-statistics: 28.3037–38.0080, $p < 0.01$) and the Hausman test ($p = 0.0000$) confirmed that the fixed-effects model was the most suitable for interpretation purposes. The overall model fit was also confirmed by the diagnostic checks, which indicated that around 12.07% of the variation in ROCE was not captured by the model, which means that other omitted firm-specific and macroeconomic factors are also affecting the ROCE. Further diagnostics reported mild positive serial correlation (Durbin–Watson statistics 1.2287–1.3707) and that multicollinearity and heteroskedasticity were recognized as areas that needed further robustness testing.

Under the fixed effect model, at the coefficient level, Sales Ratio (SA) was the only significant determinant of ROCE as it was found to be significant with $\beta = 0.0006$ and $p < 0.001$; thus, the ratio for better revenues generation against the assets was found to have a significant effect on the capital efficiency of conglomerates in Nigeria. Firm size ($\beta = -6.7317$, $p = 0.4042$), leverage ($\beta = 0.0789$, $p = 0.8199$) and firm age ($\beta = 3.0722$, $p = 0.1305$) on the other hand, were not statistically significant, but presented different directional relationships with ROCE. Overall, the findings indicate that only sales efficiency significantly affect capital utilization efficiency in the Nigerian conglomerates in the study period while managerial ability (as measured by DEA) and other structural firm characteristics do not have statistically significant impact on the capital utilization efficiency in the study period.

Panel Fully Modified Least Squares (FMOLS)

Table 8: Dependent Variable: ROCE

Method: Panel Fully Modified Least Squares (FMOLS)

Date: 06/12/26 Time: 13:03

Sample (adjusted): 2017 2025

Periods included: 9

Cross-sections included: 5

Total panel (balanced) observations: 45

Panel method: Pooled estimation

Cointegrating equation deterministics: C

Coefficient covariance computed using default method

Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEA	-0.483144	0.271805	-1.777540	0.0842
SA	6.14E-06	1.39E-06	4.428918	0.0001

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FSZ	-17.64839	8.240157	-2.141754	0.0393
LEV	0.018097	0.317516	0.056994	0.9549
FAGE	6.052525	2.212825	2.735203	0.0097
R-squared	0.536065	Mean dependent var	1.375755	
Adjusted R-squared	0.416768	S.D. dependent var	0.483572	
S.E. of regression	0.369302	Sum squared resid	4.773446	
Long-run variance	0.082694			

Source: Researcher's Computation (2026)

The Panel Fully Modified Least Squares (FMOLS) results show that the long run relationship between Return on Capital Employed (ROCE) and explanatory variables (DEA, Sales Ratio, firm size, leverage, and firm age) is stable across five firms during the period of 2017-2025, accounting for a good portion of the variance in ROCE ($R^2 = 0.536$; adjusted $R^2 = 0.417$). From an empirical perspective, Sales Ratio (SA) shows positive and highly significant results for ROCE ($p = 0.0001$), which means that an increase in sales ratio will significantly improve the use of capital, and Firm Size (FSZ) shows negative and significant results ($p = 0.0393$), where it is found that the larger the firm, the more negative the results of ROCE will decrease.

Another significant ($p = 0.0097$) and positive variable is firm age (FAGE), which suggests that the older a firm, the greater the ROCE it achieves, presumably because of its experience and maturity in operation. However, no long-term relationship can be claimed for Data Envelopment Analysis (DEA) between the efficiency scores and ROCE as it is negative and statistically insignificant ($p = 0.0842$); and leverage is insignificant ($p = 0.9549$), suggesting no measurable long-term relationship between the leverage structure and ROCE in the sampled firms. Theoretically, FMOLS is suitable as it addresses the cointegration bias, endogeneity and serial correlation in small-panel long-run estimations, and yields reliable and asymptotically unbiased estimates of the relationships between the variables.

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Theoretically, FMOLS is suitable as it addresses the cointegration bias, endogeneity and serial correlation in small-panel long-run estimations, and yields reliable and asymptotically unbiased estimates of the relationships between the variables.

Robust Least Squares

Table 9. Robust Least Squares

Dependent Variable: ROCE

Method: Robust Least Squares

Date: 06/12/26 Time: 13:09

Sample: 2016 2025

Included observations: 50

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Method: M-estimation

M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)

Huber Type I Standard Errors & Covariance

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.790664	0.761073	1.038881	0.2989
DEA	-0.106442	0.215635	-0.493620	0.6216
SA	5.41E-06	1.39E-06	3.898789	0.0001
FSZ	0.706979	0.469129	1.507003	0.1318
LEV	0.599697	0.217414	2.758320	0.0058
FAGE	-0.429757	0.204993	-2.096442	0.0360

Robust Statistics

R-squared	0.275549	Adjusted R-squared	0.193225
Rw-squared	0.537805	Adjust Rw-squared	0.537805
Akaike info criterion	77.77308	Schwarz criterion	91.24135
Deviance	4.692923	Scale	0.263151
Rn-squared statistic	30.60013	Prob(Rn-squared stat.)	0.000011

Non-robust Statistics

Mean dependent var	1.372721	S.D. dependent var	0.476078
S.E. of regression	0.421869	Sum squared resid	7.830834

Source: Researcher's Computation (2026)

The result of Robust Least Squares (RLS) regression with bisquare weighting and MAD scaling for outliers and heteroskedasticity indicates that two variables have a significant effect on Return on Capital Employed (ROCE) while the rest are non-statistically significant. More specifically, Sales Ratio (SA) is positively and highly significantly related to ROCE ($\beta = 5.41E-06$, $p = 0.0001$) indicating that improvement in sales generation per unit of assets increases the capital efficiency, and Leverage (LEV) has also a positive and significant relationship with ROCE ($\beta = 0.5997$, $p = 0.0058$) showing that the optimal usage of leverage contributes to higher returns on capital employed.

In contrast, Firm Age (FAGE) negatively and significantly affects capital efficiency ($\beta = -0.4298$, $p = 0.0360$), suggesting that in larger firms, the capital efficiency is likely to decrease because of inertia or lower operational flexibility. The effects of Data Envelopment Analysis (DEA) and Firm Size (FSZ) are, however, weak or inconclusive in the model – they are not statistically significant – and the constant

term is also not statistically significant. The model is statistically significant as evidenced by the high R-squared value of 0.2755 and the adjusted weighted R-squared value of 0.5378, which means the regression has some good power of explaining the data despite the irregularities. The overall model ($p = 0.000011$) is significant, which justifies the use of the model as a whole to explain the variations in ROCE even though some of the individual regressors are not significant. By using RLS, the reliability of these results is increased because it minimises the impact of extreme values that are often observed in financial indicators like ROCE, leverage, and firm size, yielding more stable and reliable estimates of the coefficients. Overall, the results suggest that the determinants of capital efficiency in Nigerian conglomerates are mostly sales efficiency and leverage structure while managerial efficiency (DEA) and firm size do not have a statistically significant impact within the current specification.

Discussion of Findings

The study used Robust Least Squares estimation to increase the robustness of the study in case of outliers and heteroscedasticity. The findings show that managerial skill as proxied by Data Envelopment Analysis (DEA) is negatively but statistically insignificant affecting ROCE, which means that a change in managerial efficiency does not significantly affect the capital productivity of the Nigerian conglomerates. This is at odds with previous empirical research which has repeatedly found that managerial performance is positively associated with firm performance. For example, Ting et al. (2021) reported that the quality of the managers improves the performance of the firms through efficient management of capital structure, and Park and Byun (2022) showed that managerial ability affects the value of firms in the Korean SME market under the RBV perspective. Likewise, Edi and Wijaya (2022) found that managerial competence had positive and significant effects on operational performance and stock returns in the firms listed in Indonesia, while Obiageli et al. (2024) concluded that there was a positive and significant relationship between managerial ownership and ROCE in manufacturing companies listed on the Nigerian Stock Exchange.

Furthermore, Ola et al. (2024) showed that managerial efficiency leads to investment efficiency in Egypt, while Sinha et al. (2024) found that managerial efficiency is crucial for the banking performance in India. This finding differs significantly from previous studies, indicating that managerial ability-performance relationship is context specific and could not necessarily be captured in accounting-based metrics such as ROCE, especially in the developing markets where institutional constraints, governance inefficiencies and market imperfections may dampen the transmission mechanism. Further results reveal that leverage has a positive and statistically significant influence on ROCE which is in line with Ting et al. (2021) and the trade-off theory that suggests that the optimum use of leverage increases the value of the firm due to tax benefits and management discipline. The negative and significant relationship between firm age and ROCE indicates that firms age might lead to lower capital productivity as a result of organizational inertia and lower

adaptability, which is congruent with the previous research on firm maturity effects.

However, sales activity is found to have a positive and highly significant relationship with ROCE which supports the finding of Das (2021) that the revenue generation improves the efficiency of capital use.

On the other hand, the relationship between the firm size and ROCE is positive but insignificant, suggesting that the economies of scale do not necessarily lead to better capital efficiency because there are difficulties in coordinating and managing larger firms. The results in general agree that ROCE of Nigerian conglomerates is more influenced by their structural and operational characteristics than managerial efficiency itself, which provides partial support to the resource based view, but also indicates the contextual constraint of managerial skill to increase capital productivity in emerging markets.

Conclusion

The study findings shows that managerial ability, measured using Data Envelopment Analysis (DEA), does not have a statistically significant direct effect on Return on Capital Employed (ROCE) of the listed conglomerates in Nigeria, implying that managerial efficiency is not enough to boost capital productivity in the sample context. Leverage and sales activity, on the other hand, have positive and significant impact on ROCE, whereas firm age has negative significance impact on ROCE, implying that efficiency of leverages and intensity of sales activity, and maturity of the firm, are more important in determining the efficiency of investments than managerial ability as such. Based on the above, the study concludes that optimal management of leverage, boosting revenue generation potential and implementing measures that reduce the inefficiencies of organizational ageing should be central to corporate management and decision-making practice, while governance should be improved to better link managerial skill with monetary results. The study makes a contribution to the knowledge by offering empirical evidence from a developing economy context, which contradicts the conventional notion of a universally positive managerial ability–performance relationship, especially when using ROCE as a measure of performance – extending the literatures on managerial efficiency, capital productivity, and the performance of conglomerate firms. It also identifies the context of the application of resource-based and efficiency theories in the absence of institutional and structural constraints in emerging markets.

In future research, it is recommended to include other proxies for managerial ability (both behavioural and cognitive), to explore moderating factors (such as corporate governance quality and macro-economic conditions) in the relationship between managerial ability and ROCE, and to consider other sectors or cross-country comparisons to gain insights in how contextual factors affect the managerial ability – ROCE relationship.

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