



HUMAN RESOURCE ACCOUNTING AND FINANCIAL PERFORMANCE OF LISTED OIL AND GAS FIRMS IN NIGERIA: THE MODERATING ROLE OF FIRM SIZE

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Abstract

The study investigates the moderating effect of firm size on the relationship between human resource accounting and the financial performance of listed oil and gas firms in Nigeria. The independent variable, human resource accounting is proxied by staff training and development costs, while the dependent variable, financial performance is proxied by return on assets. The study employed a correlational design, it utilized secondary data from a six-year period (2019–2024, sourced from the audited annual reports of six (6) sampled listed oil and gas firms in Nigeria. These firms were chosen out of population of nine (9) using purposive sampling technique on the basis of complete data availability. The data was analyzed using panels corrected standard errors regression. The results of the study showed a significant negative direct effect of staff training and development costs on financial performance. The analysis further revealed that firm size acts as a positive moderator; when firm size is considered, the combined interaction enhances financial performance. Consequently, the study recommends that managers in the oil and gas sector should reduce weighty spending on staff training and development in the short run, due to its detrimental impact on profitability. Instead, a strategic recommendation is to focus on growing firm.

Keywords: financial performance, firm size, human resource accounting, staff training and development costs

1. Introduction

In today's fast paced technology driven environment, for a business to be able to function as a going concern, it depends largely on its management's ability in utilizing organizational resources to maintain operational stability and to avoid winding up. Furthermore, managers and entrepreneurs' top priority across all organizations is to improve financial performance, as strong corporate performance seen in successful and

high-performing companies, reflects effective, efficient operations and positive outcomes for stakeholders.

Staff training and development has brought greater dynamism in management practices, given technology's critical role in helping organizations meet their objectives in a competitive landscape. The increasing adoption of technology supported by training has made companies to increasingly drive for creative and innovative-focused, emphasizing skills, knowledge, and mindset to adapt to ongoing technological changes. Eventually, a firm's performance depends on its management's capacity to skillfully navigate an evolving business environment ((Ovedje & Iserien, 2021).

Furthermore, the critical engine for organizational goal achievement relies on human resource functions. It enables firms to navigate dynamic market conditions through strategic innovation and operational efficiency by harnessing employee skills, creativity, and adaptability. Empirical research assesses whether investments in remuneration, training, development, and health initiatives translate into improved financial performance, including return on assets, net profit margin, and shareholder value (Dennis & Christopher, 2025). The indispensable significance of human capital to an organization's viability is firmly established (Ndum & Oranefo, 2021).

In the area of sectors studied in Nigeria, existing researches that examined human resource accounting's impact on financial performance have largely focused on the financial sector, such as banks and insurance companies (Akaegbobi et al., 2025; Goroke & Maccarthy, 2023; Ibrahim et al., 2022; Lazbery, 2024; Oyaide et al., 2024), non-financial sector, such as consumer and industrial goods of manufacturing subsectors (Ajayi & Oluwasesin, 2025; Oko, 2018; Umoh & Edet, 2024; Ovedje & Iserien, 2021), leaving the relationship between human resource accounting specifically, staff training and development costs and the financial performance in the oil and gas listed firms relatively under-explored (Goroke & Maccarthy, 2023).

A sector that depends on skilled labour amid volatile global prices and operational challenges, making the need for training and development necessary. If there is no clear understanding of the relationship between human resource accounting and financial performance and its contribution, workforce development may continue to be under-invested by management, innovation, operational efficiency, and shareholder value may as well be constrained (Dennis & Christopher, 2025).

In knowledge-intensive industry like oil and gas, the relationship is particularly critical as a result of their expertise and safety, which directly impact financial performance. While combining costs like directors' remuneration, health, gratuity, welfare, pensions among others by prior Nigerian studies (Dennis & Christopher, 2025; Goroke & Maccarthy, 2023), to explore human resource accounting, which have produced mixed results. This study distinguishes itself by focusing specifically on the isolated effect of staff training and development costs and how it is moderated by firm size to affect financial performance within the unique context of the Nigerian oil and gas sector, an area with limited empirical evidence (Dennis & Christopher, 2025). For there is no known study that have made this combination.

Additionally, Prior researches on the relationship between human resource accounting and financial performance has yielded inconsistent findings. One body of literature reported a positive relationship (Ajayi & Oluwasesin, 2025; Akaegbobi et al., 2025; Goroke & Maccarthy, 2023; Lazbery, 2024; Onyebuchi, 2024; Oyaide et al., 2024),

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while another reported a negative association (Adamu et al., 2022; Adesola & Yikarebogha, 2025; Dennis & Christopher, 2025; Isyaku et al., 2024). To reconcile these conflicting results, this study introduced firm size as a moderating variable, following the methodological framework proposed by Baron and Kenny (1986).

Consequently, this research aims to address this gap by examining the relationship between human resource accounting and financial performance among the oil and gas firms listed in Nigeria, with firm size as a moderator. The purpose is to contribute empirical evidence that can guide human capital policy within the sector. The main objective of the study is to investigate the moderating effect of firm size on the relationship between human resource accounting and the financial performance of listed oil and gas firms in Nigeria.

The study's specific objectives are:

- (i) To examine the impact of staff training and development costs on financial performance of listed oil and gas firms in Nigeria.
- (ii) To investigate the moderating effect of firm size on the relationship between staff training and development costs and financial performance of listed oil and gas firms in Nigeria.

In line with the objective of the study, the formulated hypotheses were in a null form as:

H₀₁: Staff training and development costs has no significant impact on financial performance of listed oil and gas firms in Nigeria.

H₀₂: Firm size has no significant moderating effect on the relationship between staff training and development costs and financial performance of listed oil and gas firms in Nigeria.

2. Literature Review

Conceptualization

Financial Performance

Lebens and Zuske (2021) defined performance as a combination of financial and non-financial indicators that reflect the extent to which an organization achieves its objectives. Performance is a central measure of organizational success or failure. Financial performance, specifically, refers to a firm's level of achievement in areas such as revenue, profitability, capital adequacy, liquidity, stock prices, and operational efficiency (Goroke & Maccarthy, 2023). Financial performance is the ratio of profit earned to total assets (Yohana & Suhendar, 2023).

Human Resource Accounting.

Human resource accounting (HRA) which also means human asset accounting, is an information system for identifying, measuring, analyzing, and reporting the value of a firm's human resources and communicating this information to stakeholders (Ovedje & Iserien, 2021). As Dennis and Christopher (2025) note, this process entails quantifying the costs related to recruiting, training, and developing employees, as well as assessing their economic contribution to the organization. Goroke & Maccarthy (2023) further characterize HRA as a vital management tool for capturing data on recruitment, compensation, and training expenses. It supports the evaluation of training programs, enhances productivity, and aids managerial decision-making in areas such as promotions, transfers, and turnover.

Staff Training and Development Costs

Staff Training and Development Costs refers to all financial outlays associated with employee training programs, workshops, professional certifications, and other initiatives aimed at improving skills and capabilities (Dennis & Christopher, 2025). In essence, staff training and development costs represents the total investment made in training activities designed to increase employee efficiency.

Firm Size

Firm size indicates the scale of a company's operations, typically measured using its total assets, total sales, market value, equity, or the natural logarithm of these figures (Omeghie et al., 2024). Other common metrics include sales volume and the market value of shares (Aprilia & Kusumawati, 2024).

Empirical Review

Staff Training & Development Costs and Financial Performance

Evidence from the Nigerian financial sector; Adamu et al. (2022) studied the relationship between human resource accounting and financial performance of deposit money banks in Nigeria. The utilized a sound ex-post facto design with appropriate controls. The dependent variable was return on assets. The independent variables for human resource accounting, were staff cost and directors' remuneration. The study controlled for the variables firm age and firm size. Analyzing data from 2015-2021. The study's finding revealed that staff training cost had a significant negative effect on financial performance.

Similarly, Isyaku et al. (2024) examined the strategic role of training and development, provided a focused analysis of Nigeria's non-interest financial sector, employing a relevant metric by measuring Training and Development costs as a ratio to revenue. Training and Development Costs (measured as a ratio to revenue) as the independent variable and (ROA) as the dependent variable. Using a purposive sample of JAIZ Bank and data from 2018-2021. The results of the study revealed a significant negative relationship between Training and Development costs and financial performance. However, staff cost and directors' remuneration not solely investments in training and development, and as well as a single firm case study, its findings lack generalizability to the entire banking sector respectively.

Additionally, Oyaide et al. (2024) and Akaegbobi et al. (2025) both analyzed how human resource accounting influences the financial performance of Nigerian deposit money banks. Using an ex-post facto design, the study evaluated data (2018-2022) from banks listed on the Nigerian Stock Exchange, focusing on staff remuneration, training costs, and healthcare expenses. Through descriptive statistics, correlation, and panel analysis, the results indicated that staff training and development costs significantly affect Earnings Per Share. However, the near-identical design, time frame, and findings suggest potential redundancy in the literature.

Also, Goroke and Maccarthy (2023) investigated impact of the human assets accounting and financial performance in commercial banks listed on the Nigerian exchange group, it explored two independent variables: staff training costs and recruitment and hiring costs. The dependent variable was return on assets. Finding showed that staff training costs and financial performance have a significant influence.

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Evidence from the Nigerian non-financial industry; Onyebuchi (2024) researched on how investments in employee training and development affected financial outcomes for industrial goods manufacturers listed on the Nigeria Exchange Group. The study focused on the population of thirteen listed firms in this sector, employing a non-probability sampling method to select a final sample of ten companies, which represented approximately 76% of the total. The finding was that training and development expenditures demonstrated a positive and statistically significant relationship with the firm's return on assets.

Likewise, Ajayi and Oluwasesin (2025) investigated how human capital investments influenced the profitability of 21 listed Nigerian consumer goods firms from 2015 to 2024. Analyzing panel data from audited annual reports, the study measured key factors including training intensity, salaries, and training and development expenditure. The results indicated that in training and development had a strong, positive effect on a company's return on assets.

A 2025 study by Dennis and Christopher explored human resource accounting components influence on financial performance of Nigeria's oil and gas sector. The researchers specifically analyzed the effect of human capital cost and training and development expenses on key profitability indicators: net profit margin and return on assets. Using secondary data from the audited annual reports of six listed companies on the Nigerian Exchange Group spanning 2014 to 2023, they performed a PLS regression analysis. A central finding of the study was that training and development expenses exhibited a significant negative relationship with return on assets.

In the context of service firms, in 2025, Adesola and Yikarebogha examined how human resource accounting impacts the financial results of service companies on the Nigerian Exchange. They quantified human resource practices using three financial indicators: spending on health and safety, training and development, and retirement benefits. Focusing on Nigeria's 22 listed service firms, they used purposive sampling to analyze 14 companies that fit their study parameters, drawing data directly from annual reports. Using the Dynamic Estimated Generalized Least Squares method for panel data, their analysis revealed that investment in employee training and development showed no statistically significant link to the financial performance of the firms studied.

Firm Size and Financial Performance

In their 2022 study within the Nigerian context, Egbuhuzor and Wokeh investigated how firm size influences the financial performance of listed deposit money banks in Nigeria. They employed an ex-post facto research design, drawing from a population of all 13 such banks listed on the Nigerian Stock Exchange in 2020, and selected the full census sample of 13 banks. Data analysis involved multiple regression techniques run via STATA 12, which ultimately showed no significant impact of firm size, proxied by total assets and total revenue on the financial performance of these banks.

From the middle east specifically Saudi Arabia, Nouf et al. (2025) investigated firm size and leverage impacts on performance of Saudi listed firms. The study found that firm size acts as a critical determinant in the nonlinear relationship between leverage and performance for Saudi listed firms between 2010 and 2019, with the negative impacts of debt being more pronounced in smaller firms. Their research, utilizing a panel threshold regression model.

In the study of the Indonesian market, Meiryani et al. (2020) analyzed the impact of capital structure on financial performance by examining 55 manufacturing firms listed on the Indonesia Stock Exchange. Utilizing R Studio software for a panel data analysis with a random effects model, their findings indicated that firm size did not exert a statistically significant influence on financial performance, a result that held true whether performance was measured by the accounting-based metric return on assets (ROA) or the market-based metric market-to-book value (MBV).

Evidence from East Africa, Mwangi et al. (2025) explored the influence of firm size, measured by total assets, on the financial performance of commercial banks in Kenya, guided by financial intermediation, stakeholders', and behavioural growth theories. After collecting a decade of data (2014-2023) from all the country's commercial banks and conducting descriptive analysis, the measure return on assets was excluded due to its high autocorrelation with the independent variable, total assets. The study's final results demonstrated that a larger firm size has a significant positive effect on financial performance.

In a related Kenyan study, Onsongo et al. (2019) evaluated the financial performance of companies within the commercial and services sector listed on the Nairobi Securities Exchange, specifically investigating the impact of firm size and operational risk. Guided by agency theory, the research employed an explanatory design focusing on all 14 firms in this sector. The analysis utilized secondary panel data from published annual reports spanning 2013 to 2017. After a Hausman test specified the use of a random effects model, a panel regression revealed that firm size had a significant relationship with company performance.

Theoretical Framework

Human capital theory underpinned the study, the theory articulated by Luo (2000), sees conceptual employee training as a strategic investment aimed at enhancing workforce skills. A core tenet of this theory is that such investments are prioritized when the expected gains in productivity outweigh the initial costs. study is grounded in this framework, which emphasizes the need to account both the immediate financial outlay of human resource initiatives and their potential for generating long-term economic returns, such as accelerated firm growth (Isyaku et al.,2024).

Extending this logic, Basil (2025) posits that firm size is a critical moderating factor. Larger organizations typically possess more advanced human resource information systems, dedicated analytical teams, and robust governance structures. These superior resources enable them to be more effectively translate human resource investments like staff training and development costs into tangible outcomes such as productive effort and innovation.

Consequently, human resource accounting is theorized to have a stronger positive effect on financial performance. Return on assets in larger firms compared to smaller. This differential impact arises because larger and smaller firms differ significantly in their managerial capabilities, resource availability, and information processing systems all of which influence how efficiently training expenditures are converted into profitability (Cookey-Gam & Newstyle, 2025).

The human capital theory frames staff training costs as an investment for future productivity gains. It expanded to propose that firm size acts as a key moderator in this relationship. The core argument is that larger firms, due to their volume of resources and

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advanced systems, are inherently more efficient at converting investments in human capital (like staff training costs) into improved financial performance than smaller firms.

3. Methodology.

The study employed a correlational research design, period covered by the study is six years from 2019 to 2024. From the total population of nine (9) oil and gas firms listed on the Nigerian Exchange (NGX) Group, a sample of six (6): Conoil Plc., Eterna Plc., Japaul Gold and Ventures Plc., MRS Oil Nigeria Plc., Oando Plc., and Total Energies Nigeria Plc. These firms were selected through purposive sampling based on the availability of complete data for the specified timeframe. Secondary data was gathered from the firms' audited annual reports and analyzed using a panel corrected standard errors regression.

Human resource accounting (independent variable) is proxied by staff training and development costs, while financial performance (dependent variable) is proxied by return on assets. The financial performance is measured as profit for the year divided by total assets (Yohana & Suhendar, 2023). While staff training and development costs is measured as natural logarithm of total cost on staff training and development (Dennis & Christopher, 2025). Firm size the moderator is measured as natural logarithm of total assets (Omeghie et al., 2024).

The specification of the study's model is shown as:

$FP_{it} = \beta_0 + \beta_1 STDCs_{it} + \beta_2 FS_{it} + \beta_3 STDCs * FS_{it} + \varepsilon_{it}$; Where: FP = Financial Performance; STDCs = Staff Training and Development Costs; FS= Firm Size; STDCs*FS= Interaction between Staff Training and Development Costs and Firm Size; β_0 = Coefficient; β_1 = Coefficient of the independent variable; β_2 = Coefficient of the moderator; β_3 = Coefficient of the moderating variable; it = Panel data indicator; ε = Error term.

4. Results and Discussion

Descriptive Statistics

Table 1 below presents the descriptive statistics of the dependent variable, the independent variables and the moderating variable of the study.

Table 1

Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev	Min	Max
FP	36	0.31	0.23	-0.23	0.64
STDCs	36	9.98	1.74	6.79	12.39
FS	36	17.90	1.14	15.99	19.97

Source: Computed by the authors using STATA output (2026)

Table 1 showed that these firms on average get a return on asset (ROA) of 0.31 (₦0.31) per naira asset. The most efficient firm makes a profit of 0.64 (₦0.64) per naira asset while the worst performing firm suffered maximum loss of -0.23 (₦0.23) per naira asset. The standard deviation of 0.23 (₦0.23) per naira asset point out a sizeable narrow variation among these firms.

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For staff training and development costs (STDCs), the mean value is 9.98 (₦42.3 million), connoting that the expenditure on staff training and development by these firms averages that value. The figure 6.79 represents a firm with the least expenditure on staff training valued at ₦891,000, whereas the highest money spent on staff training was 12.39 (₦239.2 million). The STDCs digresses far away from the mean by 1.74 (₦ 44.5 million). this denotes that the expenditure on STD by these firms vary significantly.

As regards firm size, its mean value is 17.90 (₦115.1 billion), meaning the size of these firms averages around ₦115.1 billion. The smallest firm has a total asset of 15.99 (₦8.8 billion), whereas the biggest firm has a total asset valued at 19.97 (₦471.1 billion). The firm size deviates considerably from the mean by 1.14 (₦120.9 billion), this suggests that these firms vary significantly in size.

Table 2

Correlation Matrix

	FP	STDCs	FS
FP	1.0000		
STDCs	-0.2821	1.0000	
FS	-0.2943	0.4996	1.000

Source: Computed by the authors using STATA output (2026)

Correlation matrix shows the degree of relationship between the independent and dependent variables, and among the independent variables (IVs). High correlation among the IVs could lead to multicollinearity, which may consequently lead to misleading findings and conclusion ((Gujarati, 2004). The rule of thumb provides threshold of less than 0.40, 0.40 to 0.60 and 0.60 and above to imply weak, moderate and strong correlation respectively. Thus, STDCs has a weak negative relationship with FP, firm size has also a weak negative relationship with FP and STDCs and firm size have a moderate positive relationship. However, whether multicollinearity occurs or not, cannot be said with precision until after multicollinearity test (VIF) is been conducted.

Multicollinearity Test

The Variance Inflation Factor (VIF) test was conducted to check whether the independent variables are extremely correlated with one another. The table below presents the VIF result.

Table 3

Multicollinearity Test

Variable	VIF	1/VIF
STDCs	1.10	0.90157
FS	1.08	0.92362
Mean VIF	1.10	

Source: Computed by the authors using STATA output (2026)

Based on the criteria where a Variance Inflation Factor (VIF) is below 10 and a tolerance value above 0.1, indicate acceptable collinearity levels (Gujarati, 2004), the diagnostic results confirm an absence of multicollinearity as shown in table 4.3 above, both the independent variables in the study exhibited VIF values under 10 and tolerance values greater than 0.1, confirming that multicollinearity is not a concern for the dataset

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Hausman's Specification Test

The selection of the model is followed by the Hausman's test, which was conducted to select the appropriate model between the random and fixed effects.

Table 4

Hausman's Specification Test

Test: Ho: difference in coefficients not systematic	
Chi ² (2)	12.45
Prob > chi ²	0.006

Source: Computed by the authors using STATA output (2026)

Table 4 above shows the chi-square (2) has a coefficient of 12.45, with a significant p-value (0.006). Consequently, the study rejects the null hypothesis, because the fixed effect of the panel is selected as the most appropriate model for this analysis, because individual effects are correlated with independent variables (Hausman, 1978).

Heteroskedasticity Test

To test for heteroskedasticity, the study employed Modified Wald test for groupwise test. The test result is shown below:

Table 5

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

Ho: sigma (i) ^2 = sigma ^2 all i	
Chi ² (6)	864.56
Prob > chi ²	0.000

Source: Computed by the authors using STATA output (2026)

Gujarati (2004) opined that if the probability > chi² of heteroskedasticity test is significant at either 1%, 5% and 10%, there is evidence of heteroskedasticity. Thus, the above table 4.5 shows a significant Modified Wald test for groupwise test with p-value of 0.000. Thus, the fixed effect that was earlier chosen by the Hausman could not be used due to the presence of heteroscedasticity. Therefore, the study employed Panels Corrected Standard Errors (PCSEs) Regression as the technique for data analysis which solved the problem.

Regression Results

The results of Panels Corrected Standard Errors regression analysis are presented in table 6 below.

Table 6

Panels Corrected Standard Errors Regression

Variables	Coefficient	Std. err.	z-statist	P-values
STDCs	-.127845	0.071456	-1.79	0.075
FS	-.079812	0.057698	-0.19	0.156
STDCsFS	.007754	0.003978	2.98	0.003
Constant	1.697865	0.723456	2.35	0.019
R-Squared	0.2456			
Wald Chi2 (3)	16.29			0.000

Source: Computed by the authors using STATA output (2026)

Table 6 showed that the predictors in the model explained the total change in the financial performance, as shown by the coefficient of determination (R^2) of 0.2456. This suggests that about 25% of the variation in financial performance can be explained by staff training and development costs and the moderating variable (firm size), while the remaining 75% is caused by factors not captured in the study's model. Furthermore, the table shows a fitted model with a Wald Chi2 (3) of 16.29, significant at the 1% level (p-value = 0.000).

Staff training and development costs indicated a negative significant relationship with financial performance at 10% (p-value = 0.075) significance level, having a coefficient of -.127845 meaning that a 10% increase in staff training and development costs will lead to about 13% reduction in financial performance. This may be due to the high cost of training and development in the short run, as staff training yields economic benefits in the long run, which aligned with human capital theory.

The regression result in the table above showed the interaction of firm size on the relationship between staff training and development costs and financial performance, with a coefficient of .007754 and a p-value of 0.003. The significant positive influence implies that firm size act as a positive moderator, by strengthening the negative effect of staff training and development costs on financial performance. This suggests that a 1% increase in staff training and development costs results in a 0.9% increase in financial performance.

Similarly, this finding is in line with the apriori expectation of the study that larger firms usually have different human resource, management proficiencies, resource pools which changes how effectively staff training and development costs translate into profitability.

The two hypotheses of the study, formulated in null form were tested:

H₀₁: Staff training and development costs has no significant relationship with the financial performance of listed oil and gas firms in Nigeria.

The test hypothesis showed that there is a negative significant relationship between staff training and development costs and financial performance. The result provides evidence to reject the hypothesis of the study. Hence, hypothesis one is rejected. The finding of this research work is supported by the studies of (Adamu et al., 2022; Adesola & Yikarebogha, 2025), however, this is in conflict with the findings of (Goroke & Maccarthy, 2023; Lazbery, 2024; Onyebuchi, 2024).

H₀₂: Firm size has no significant moderating effect on the relationship between staff training and development costs and financial performance of listed oil and gas firms in Nigeria.

The test hypothesis showed that there is a positive significant relationship between staff training and development costs and PF of listed oil and gas firms in Nigeria. The finding of the study is in agreement with human capital theory. The result provides evidence to reject the hypothesis two of the study. Consequently, hypothesis two is rejected. The finding of this study is buttressed by the studies of (Ajayi & Oluwasesin, 2025; Akaegbobi, et al., 2025; Oyaide et al., 2024), but contradicts the results of (Dennis & Christopher, 2025 Isyaku et al., 2024).

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5. Conclusion and Recommendations

Emanating from the findings of the study, it concludes that staff training and development costs has a significant negative direct influence on financial performance, whereas the association between staff training and development costs and financial performance, moderated by firm size influences financial performance positively.

Deriving from the findings and the conclusion of the study. It recommends that:

- (i) The management of firms in the Nigeria's listed oil and gas sector should reduce heavy spending on staff training and development as it reduces financial performance.
- (ii) Because, it is established that the interaction of firm size with STDCs is found to increase FP. Thus, management of such firms should utilize this finding with the aim to grow their firms.

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