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DETERMINANTS OF RESEARCH AND DEVELOPMENT INVESTMENT: A MULTIVARIATE ANALYSIS OF WORKING CAPITAL, RETAINED EARNINGS, EBIT AND VALUE OF EQUITY

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ABSTRACT

This study investigated the determinants of Research and Development (R&D) investment among listed non-financial firms in Nigeria, focusing on the roles of Working Capital (WC), Retained Earnings (RE), Earnings Before Interest and Tax (EBIT), and Value of Equity (VOE). Employing an ex-post facto research design, the study analyzed secondary panel data from 55 firms over six years (2018–2023). The panel-corrected regression technique is utilized to examine the relationship between financial variables and R&D expenditure. Results reveal a statistically significant model (Wald $\chi^2 = 196.62$, $p < 0.001$) explaining 6.8% of the variation in R&D investment. The findings indicate that WC and EBIT negatively impact R&D investment, suggesting firms with higher liquidity and operating earnings may prefer short-term financial stability over uncertain innovation spending. Conversely, RE and Return on Assets (ROA) positively influence R&D, underscoring the importance of profitability and internal funding in driving innovation activities. VOE exhibits a negative relationship with R&D, reflecting shareholder risk aversion to investment uncertainty. These findings align with prior studies emphasizing the nuanced financial and market factors shaping firms' innovation strategies. The study concludes that both operational performance and market valuation critically affect R&D investment decisions. It recommends that firms balance liquidity management with long-term innovation goals while encouraging policies that promote reinvestment of earnings into R&D. Enhancing investor confidence through transparency and risk mitigation is also essential to support sustainable innovation and economic growth in Nigeria.

Keywords:

Research and Development, Working Capital, Retained Earnings, Earnings Before Interest and Tax, Value of Equity, Innovation Investment

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1.0 INTRODUCTION

Research and Development (R&D) is an important driver of innovation, productivity growth, and competitive advantage in both developed and emerging economies. In the context of Nigeria, fostering R&D investment is essential for enhancing technological capabilities, industrial competitiveness, and long-term economic development (Bolaji, et al. 2021; Olurinola, et al., 2021). Despite its recognized importance, R&D expenditure in Nigerian firms remains relatively low, prompting an urgent need to understand the key financial determinants influencing such investments. As highlighted by Akinwale, et al. (2012), a robust relationship exists between R&D, innovation, and economic growth, but weak institutional frameworks and limited financial commitment continue to hinder R&D progress in Nigeria.

Several studies have attempted to investigate the underlying factors influencing firm-level R&D investment. For instance, Abdu,et al. (2018) emphasized the role of firm characteristics and access to finance as significant determinants of innovation in Nigeria, while Shibia (2023) found similar evidence in Kenya, indicating that financial and operational variables shape firms' R&D behavior. In Nigeria, Festus, et al. (2020) and Ogieh andJeroh, (2022) identified persistence in R&D investment influenced by internal cash flow and profitability. These findings suggest that firms' financial capacity, particularly liquidity, profitability, and retained earnings, may play an essential role in R&D decisions.

Working Capital (WC), Retained Earnings (RE), Earnings Before Interest and Tax (EBIT), Value of Equity (VOE), and Return on Assets (ROA) are among the financial indicators that provide insight into a firm's ability to allocate resources to innovation. Adekunle (2023) and Ebiaghan, et al. (2021) emphasized the role of internal capital accumulation in supporting scalable economic growth, while Abdulkarim (2023) and Jeroh, et al. (2022) highlighted retained earnings as a critical investment indicator in Nigeria's growth dynamics. However, the literature remains fragmented regarding how these variables collectively influence R&D investment in Nigerian firms.

This study, therefore, seeks to bridge this gap by employing a multivariate panel-corrected regression analysis to examine the determinants of R&D investment using firm-level data. By understanding the financial levers that drive or hinder R&D efforts, the findings of this study will provide evidence-based insights for policymakers, investors, and corporate managers committed to fostering innovation and sustainable growth in Nigeria's private sector.

Objective of the Study

The primary objective of this study is to examine the determinants of Research and Development (R&D) investment among listed firms by analyzing the effects of key financial indicators [Working Capital (WC), Retained Earnings (RE), Earnings Before Interest and Tax (EBIT), and Value of Equity (VOE)] while controlling for profitability measured by Return on Assets (ROA). The study aims to understand how these financial factors influence firms' decisions to allocate resources toward innovation activities.

2.0 LITERATURE REVIEW

The role of Research and Development (R&D) in economic growth, innovation, and firm competitiveness has been widely acknowledged across both developed and emerging economies (Akinwale, et al. 2022; Ediagbonya, et al. 2023). In Nigeria, studies have highlighted the importance of R&D investment in stimulating technological innovation, industrial productivity, and entrepreneurship development (Juliana, et al. 2021; Olurinola, et al. 2021). However, the level of R&D expenditure among Nigerian firms remains relatively low due to various structural and financial constraints (Bolaji, et al. 2021; Abdu, et al. 2018). This has sparked interest among scholars in identifying the determinants of R&D investment, particularly financial indicators that can serve as enablers or barriers to innovation.

Several financial variables have been investigated in the literature for their influence on firms' R&D expenditure. Working Capital (WC), which reflects a firm's short-term liquidity, is often linked to its investment behavior. While it may indicate financial flexibility, excessive working capital could divert resources from long-term innovative activities.

2.1 Working Capital (WC) and Accounting for R&D Investment

Working capital (WC), representing a firm's short-term financial health, plays a crucial role in enabling or constraining Research and Development (R&D) investment. Firms with adequate WC are better positioned to finance innovation activities, especially when external financing is limited or costly. Abdu, et al. (2018) highlight that in Nigeria, the availability of internal funds, including WC, significantly influences firms' capacity to invest in R&D. This is particularly relevant in sectors like manufacturing, where long development cycles demand stable liquidity.

Nguyen, et al. (2025) further emphasize the importance of liquidity management in multi-business firms, noting that adequate cash holdings, an integral part of WC, enhance the efficiency of R&D investment. When firms manage WC effectively, they can allocate resources toward innovation without disrupting day-to-day operations.The accounting treatment of R&D is also affected by WC levels. Firms with strong WC may choose to capitalize R&D expenses as intangible assets, viewing them as long-term investments, while firms with strained WC might expense R&D to preserve short-term liquidity. Olaoye, et al. (2021) and Sinebe, et al. (2023) suggested that governance mechanisms, which often influence WC policies, also impact how R&D is budgeted and reported. Thus, WC management directly affects both the feasibility and accounting practices of R&D investment in firms.

H0₁: *Working Capital (WC) has no significant effect on Research and Development (R&D) investment among listed firms.*

2.2 Retained earnings and accounting for R&D Investment

Retained earnings (RE) represent internally generated funds that firms accumulate over time, providing a vital source of financing for long-term investments such as Research and Development (R&D). In contrast to external financing, retained earnings allow firms to invest

in innovation without incurring debt or diluting ownership, making them particularly valuable in emerging markets like Nigeria.

Several studies emphasize the positive relationship between retained earnings and R&D investment. Adekunle (2023) highlights that firms with high retained earnings demonstrate greater financial autonomy, enabling them to pursue innovation-driven strategies with reduced dependence on volatile capital markets. This finding aligns with Abdu, et al. (2018), who argue that internal funds are often the most accessible and reliable sources of financing for Nigerian firms due to structural weaknesses in credit systems.

Furthermore, Abubakar, et al. (2021) note that companies that consistently reinvest their profits are more likely to engage in activities that drive sustainable growth, including R&D. The role of RE is also evident in Nguyen, et al. (2025), who find that investment efficiency and future growth opportunities improve when retained earnings are strategically allocated to R&D, especially in multi-business firms.However, despite the theoretical and empirical support for RE-driven innovation, Ukolobi, et al. (2020), Udo, et al. (2021) and Sinebe, (2022)cautions that some firms may prioritize short-term shareholder returns over reinvestment in innovation. Thus, effective corporate governance and long-term strategic orientation are necessary to ensure retained earnings are channeled into productive R&D activities. Retained earnings serve as a critical enabler of R&D investment, particularly when external financing is constrained, and institutional support for innovation remains limited.
H0₂: *Retained Earnings (RE) have no significant effect on Research and Development (R&D) investment among listed firms.*

2.3 Earnings Before Interest and Tax (EBIT) and accounting for R&D Investment

Earnings Before Interest and Tax (EBIT) is a core indicator of operational profitability and is often used to assess a firm's capacity to engage in strategic investments such as Research and Development (R&D). However, evidence on the relationship between EBIT and R&D investment, particularly in emerging economies like Nigeria, is mixed.Shibia (2023) highlights that firms with higher EBIT may avoid R&D spending if the institutional environment is weak or the returns on innovation are uncertain. This finding aligns with Abubakar, et al. (2021), who argue that firms may channel operating profits into more predictable ventures rather than risky R&D projects, especially in contexts where financial transparency and innovation governance are lacking. Similarly, Jeroh, (2016) and Jones, et al. (2024) found that firms in Nigeria's manufacturing sector, despite strong EBIT figures, exhibit cautious behavior toward R&D investment due to economic instability and limited government support.

Moreover, Abdulkarim (2023) suggests that financial performance indicators like EBIT may not directly lead to higher R&D investment without incentives or a robust innovation framework. Onileowo, et al. (2021) also emphasize the role of strategic orientation, noting that innovation must be embedded in organizational goals, not just driven by profitability metrics.Thus, while EBIT signifies the financial ability to invest, R&D expenditure is

influenced by broader economic, institutional, and governance factors. Firms with high EBIT may still underinvest in R&D unless a conducive innovation ecosystem exists.

H0₃: *Earnings Before Interest and Tax (EBIT) has no significant effect on Research and Development (R&D) investment among listed firms.*

2.4 The Value of Equity (VOE) and accounting for R&D Investment

The Value of Equity (VOE) reflects the market's perception of a firm's future earning capacity and intrinsic value. In contemporary research, increasing attention has been given to how Research and Development (R&D) investments influence this value, particularly in emerging markets. Nguyen, et al. (2025) assert that efficient R&D investment enhances VOE by leveraging growth opportunities and optimal cash holdings. Similarly, Jeroh, (2019) and Olaoye, et al. (2021) emphasized the role of governance and R&D expenditure in promoting economic growth in African countries, highlighting a positive linkage between R&D spending and firm valuation.

Innovation serves as a critical pathway for firms to sustain competitive advantage and enhance market value (Onileowo, et al., 2021; Jeroh, et al. (2022); Zhao, 2024). Abdu, et al. (2018) further identified R&D intensity as a determinant of innovation among Nigerian firms, implying that greater investment in R&D correlates with higher firm value. Juliana, et al. (2021) found that creativity and innovation drive entrepreneurship, which indirectly boosts equity value through increased profitability and market positioning.Moreover, Bolaji et al. (2021) highlighted the importance of R&D during the COVID-19 pandemic, reinforcing its value in resilience and continuity. As such, proper accounting treatment and disclosure of R&D investments are essential in reflecting their contribution to VOE in financial reports.

H0₄: *Value of Equity (VOE) has no significant effect on Research and Development (R&D) investment among listed firms.*

2.5 Return on Assets (ROA) as a Control Variable in Accounting for R&D Investment

Return on Assets (ROA), a key indicator of a firm's operational efficiency and profitability, is often employed as a control variable in studies assessing R&D investment. It provides insight into how effectively a firm utilizes its assets to generate earnings, which can influence its capacity and strategy for financing innovation. Agbata, et al. (2017) and Abubakar, et al. (2021) note that firms with higher ROA are more likely to engage in discretionary spending, including R&D, due to stronger internal financing. Similarly, Onyinyechi, et al. (2017) emphasize the relationship between financial performance and resource allocation to intangible assets like R&D.Furthermore, Juliana, et al. (2021) observe that profitable firms are more inclined to invest in innovation as a competitive strategy. By controlling for ROA, researchers can isolate the impact of R&D accounting from the firm's inherent profitability, ensuring that performance-driven investment decisions do not skew the analysis of R&D reporting practices.

2.6 Institutional and Sectoral Context and Accounting for R&D Investment

The institutional and sectoral context significantly influences how firms account for and engage in Research and Development (R&D) investment. In emerging economies like Nigeria, institutional quality, governance frameworks, and sectoral dynamics shape both the scale and effectiveness of R&D expenditures. Olaoye, et al. (2021) emphasize the role of governance in enhancing the efficiency of R&D investment across African countries, noting that institutional strength supports the translation of R&D into economic growth.

Sectoral characteristics also play a crucial role. For instance, Abdu, et al. (2018) found that manufacturing firms in Nigeria are more likely to invest in R&D when supported by industry-specific policies and incentives. Similarly, Jeroh, (2012) and Shibia (2023) identifies access to finance, market competition, and government support as key determinants of R&D in the Kenyan manufacturing sector. These sectoral conditions determine not only the level of R&D spending but also how it is recorded and reported. Moreover, R&D investments are often concentrated in larger firms or foreign affiliates, leaving small and indigenous firms underrepresented in innovation statistics (Olubiyi, 2022; Yahaya, 2025).Furthermore, regulatory environments influence whether R&D is capitalized or expensed. Nguyen, et al. (2025) and Sinebe, et al. (2025) argue that institutional policies promoting investment efficiency improve how multi-business firms allocate and report R&D activities. Thus, strengthening institutional frameworks and tailoring sector-specific support can enhance the transparency and value relevance of R&D accounting in emerging markets.

2.7 Theoretical Background

This study is anchored on the Pecking Order Theory (Myers, et al.1984) and the Cash Flow Theory of Investment (Gilchrist, et al. 1995), both of which offer strong explanatory power for understanding firms' behavior in financing Research and Development (R&D) activities. The Pecking Order Theory posits that firms prefer internal financing, such as retained earnings and working capital, over external financing due to issues related to asymmetric information and the higher costs associated with external capital. This theoretical lens suggests that firms with more substantial retained earnings or working capital are more likely to invest in R&D, as they possess sufficient internal funds to support innovation without incurring external financing risks.

Similarly, the Cash Flow Theory of Investment emphasizes the importance of internal liquidity in guiding firms' investment decisions. It argues that cash availability significantly affects a firm's ability to engage in productive investments, particularly in areas like R&D that carry higher risk and longer-term returns. Working capital and retained earnings thus serve as vital proxies for internal resources under this framework. Both theories converge on the idea that R&D investment is sensitive to internal financial health, implying that firms with greater internal liquidity are better positioned to fund innovative activities and sustain long-term value creation.

2.8 study gap

Despite growing interest in how financial indicators influence Research and Development (R&D) investment, there remains a significant gap in the literature regarding the combined effect of working capital, retained earnings, EBIT, and equity value on R&D expenditures, particularly within emerging markets like Nigeria. Most prior studies have examined these variables in isolation or within developed economies, overlooking the complex financial dynamics of firms operating under liquidity constraints and market inefficiencies. Additionally, few studies incorporate profitability (ROA) as a control variable in this context, limiting the understanding of how internal financial health influences innovation spending. This study addresses this gap by employing a multivariate framework to analyze the collective influence of internal financial resources and profitability on R&D investment among listed Nigerian firms.

3.0 METHODOLOGY

The study made use *ex-post facto* design from secondary data and employed the purposive sampling technique to select fifty-five (55) non-financial firms for a period six (6) years, within the period of 2018-2023, while the panel data estimation technique was adopted for the data analysis.

Model Specifications

The model for this study is stated in econometrics terms below as;

Model I Accounting for R&D investment = *f*(Financial Health)

$$R\&D_{it} = f(WC + RE + EBIT + VOE + ROA) \quad - \quad - \quad - \quad eq.i$$

$$R\&D_{it} = \alpha_0 + \beta_1 WC_{it} + \beta_2 RE_{it} + \beta_3 EBIT_{it} + \beta_4 VOE_{it} + \beta_5 ROA_{it} + \varepsilon_t \quad eq.ii$$

Where;

f = Stochastic error term capturing other unexplanatory variables

ί = firm identifier (55 firms)

t = time variable (6 Years)

ε_t = error term

αo is the intercept of the regression.

β_1 -$\beta_5$are the coefficients measuring the impact of each explanatory variable on R&D investment.

The Apriori expectation: β_1,- $\beta_5$is lesser or greater than 0.

Table 1. Variable Measurement

VARIABLE	ACRONYM	MEASUREMENT
Research and Development	**R&D**	Investment made into the financial levers that drive or hinder R&D efforts
Working Capital	**WC**	measured as Current Assets divided by Current Liabilities
Retained Earnings	**RE**	measured as Retained earnings divided by Total assets

Earnings Before Interest and Tax	**EBIT**	measured as earnings before interest and taxes divided by sales (%)
Value of Equity	**VOE**	Total equity divided by Total debt
Return on Assets	**ROA**	measured as profit after tax divided by total asset (%)

4.0 RESULTS AND DISCUSSION

4.1 Descriptive statistics

Table 2: Summary of Descriptive for RD, WC, RE, EBIT, VOE and ROA

VARIABLES	OBS	MEAN	STD. DEV	MIN	MAX
RD	330	.36061	.48091	0	1
WC	330	-.16435	1.87841	-17.77901	6.12259
RE	330	-.24827	2.47652	-25.20146	.687481
EBIT	330	.05331	.45934	-4.20033	6.19316
VOE	330	2.23289	6.22507	-.948868	48.2121
ROA	330	.03238	.38839	-2.35991	6.17431

Source: Regression Output, 2025.

Table 2 presents the descriptive statistics for the study variables: R&D investment (RD), Working Capital (WC), Retained Earnings (RE), Earnings Before Interest and Tax (EBIT), Value of Equity (VOE), and Return on Assets (ROA), based on 330 firm-year observations. The mean value of RD is 0.3606, suggesting that around 36% of the firms engage in R&D activities. WC and RE have negative means (-0.164 and -0.248 respectively), indicating that a significant number of firms operate under working capital and earnings constraints. EBIT and ROA show low mean values (0.053 and 0.032), suggesting modest profitability. The high standard deviations for WC, RE, and VOE reflect substantial variability across firms. VOE has a wide range (from -0.95 to 48.21), highlighting disparities in market valuation. Overall, the descriptive statistics reveal diverse financial positions among firms, with many potentially constrained in liquidity and earnings—factors crucial to understanding R&D investment behavior.

4.2 Normality Test

Table 3: Shapiro-Wilk W test for normal data for RD, WC, RE, EBIT, VOE and ROA

VARIABLES	OBS	W	V	Z	PROB>Z
RD	330	0.99613	0.898	-0.253	0.59969
WC	330	0.24184	175.791	12.190	0.00000
RE	330	0.21143	182.842	12.282	0.00000
EBIT	330	0.30651	160.796	11.979	0.00000
VOE	330	0.34532	151.798	11.844	0.00000
ROA	330	0.25808	172.026	12.138	0.00000

Source: Regression Output, 2025.

Table 3 presents the Shapiro-Wilk W test results for normality across all study variables. The null hypothesis of the test assumes that the data is normally distributed. For R&D investment (RD), the p-value is 0.5997, indicating no significant deviation from normality. However, all other variables, Working Capital (WC), Retained Earnings (RE), Earnings Before Interest and Tax (EBIT), Value of Equity (VOE), and Return on Assets (ROA), show W values far below 1 and p-values of 0.0000. This strongly suggests these variables significantly deviate from a normal distribution. The implication is that the data for these financial variables are highly skewed, which may affect regression assumptions. Consequently, appropriate estimation methods like panel-corrected standard errors or robust regressions are essential to address non-normality and produce reliable statistical inferences in the multivariate analysis.

4.3 Correlation Analysis

Table 4: Summary of Spearman Correlation Matrix for RD, WC, RE, EBIT, VAE and ROA

	RD	**WC**	**RE**	**EBIT**	**VAE**	**ROA**
RD	1.0000					
WC	0.1075	1.0000				
	0.0511					
RE	0.1766*	0.4449*	1.0000			
	0.0013	0.0000				
EBIT	0.1563*	0.3484*	0.5734*	1.0000		
	0.0044	0.0000	0.0000			
VOE	-0.1680*	0.3458*	0.4158*	0.2274*	1.0000	
	0.0022	0.0000	0.0000	0.0000		
ROA	0.1818*	0.3620*	0.5691*	0.9387*	0.2399*	1.0000
	0.0009	0.0000	0.0000	0.0000	0.0000	

Source: Regression Output, 2025.

Table 4 presents the Spearman correlation matrix among the study variables. R&D investment (RD) shows positive and statistically significant correlations with Retained Earnings (RE) ($\rho = 0.1766$, $p < 0.01$), Earnings Before Interest and Tax (EBIT) ($\rho = 0.1563$, $p < 0.01$), and Return on Assets (ROA) ($\rho = 0.1818$, $p < 0.01$), suggesting that firms with higher profitability and accumulated earnings are more likely to invest in R&D. Working Capital (WC) has a weak positive, but insignificant, relationship with RD ($\rho = 0.1075$, $p > 0.05$). Interestingly, Value of Equity (VOE) shows a significant negative correlation with RD ($\rho = -0.1680$, $p < 0.01$), possibly reflecting shareholder caution toward uncertain innovation outcomes. High intercorrelations are observed among EBIT, RE, and ROA, indicating potential multicollinearity. This warrants careful examination in regression modeling. Overall, the correlation analysis provides preliminary evidence supporting the roles of profitability and internal resources in explaining R&D investment behavior.

4.4 Result of Multicollinearity Test Using Variance Inflation Factor (VIF)

Table 5: VIF Test Result

VARIABLE	VIF	1/VIF	MEAN VIF
ROA	1.01	0.990178	1.01
WC	1.01	0.990178	
RE	1.01	0.993766	1.01
ROA	1.01	0.993766	
EBIT	7.69	0.129959 0.129959	7.69
ROA	7.69		
ROA	1.00	0.999827 0.999827	1.00
VOE	1.00		

Source: Regression Output, 2025

Table 5 presents the Variance Inflation Factor (VIF) results used to assess multicollinearity among independent variables. Most variables, including WC, RE, ROA, and VOE, show VIF values close to 1.00, indicating no multicollinearity concerns. However, EBIT records a notably high VIF of 7.69, suggesting a strong linear relationship with other predictors, particularly ROA, raising potential multicollinearity concerns. Despite this, the overall mean VIF remains acceptable at 1.01. The results imply that while the majority of variables do not exhibit multicollinearity issues, caution should be taken in interpreting the coefficient of EBIT in the regression model due to its high VIF.

4.5 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Table 6: Breusch and Pagan Lagrangian Multiplier Tests fitted values of RD

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Decision rule If p-value is statistically significant, then reject Ho and accept HA

	VARIABLE	CHI2(1)	PROB > CHI2
	ROA WC	2.52	0.1127
	RE ROA	2.16	0.1418
	EBIT ROA	1.02	0.3121
	ROA VOE	7.30	0.0069

Source: Regression Output, 2025.

Table 6 presents the results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity to examine whether the variance of residuals is constant across observations. The null hypothesis (H_0) assumes homoskedasticity (constant variance), while the alternative hypothesis (H_1) suggests heteroskedasticity (non-constant variance).For the majority of variable combinations (ROA with WC, RE, and EBIT), the p-values are greater than 0.05 (0.1127, 0.1418, and 0.3121 respectively), indicating no evidence to reject the null hypothesis. Thus, these combinations do not exhibit significant heteroskedasticity. However,

for the model involving ROA and VOE, the test yields a statistically significant chi-square value of 7.30 (p = 0.0069), indicating a violation of the homoskedasticity assumption.This suggests that the Robust standard errors may be needed for correction.

4.6 Levin-Lin-Chu Unit Root Test

Table 7: Diagnostic Tests Results for all the variables

Variable	Statistics		P-value	Remarks	Implication
RD	Unadjusted t	-2.8284			stationary
	Adjusted t*	65.4082	1.0000	1(0)*	
WC	Unadjusted t	-65.4741			stationary
	Adjusted t*	-71.0078	0.0000	1(0)*	
RE	Unadjusted t	-39.3735			stationary
	Adjusted t*	-42.6888	0.0000	1(0)*	
EBIT	Unadjusted t	-55.0537			stationary
	Adjusted t*	-59.5792	0.0000	1(0)*	
VOE	Unadjusted t	-19.0746			stationary
	Adjusted t*	-19.2034	0.0000	1(0)*	
ROA	Unadjusted t	-77.0449			stationary
	Adjusted t*	-83.6963	0.0000	1(0)*	

Source: Regression Output, 2025.

Table 7 reports the results of the Levin-Lin-Chu (LLC) unit root test conducted to assess the stationarity of all variables in the study. Stationarity is crucial in panel data analysis to avoid spurious regression results. The test evaluates the null hypothesis that each variable contains a unit root (non-stationary) against the alternative hypothesis of stationarity.All variables, RD, WC, RE, EBIT, VOE and ROA, exhibit statistically significant adjusted t-statistics with p-values of 0.0000 or 1.0000 under the adjusted test, indicating rejection of the null hypothesis for non-stationarity.Specifically, the variables are integrated of order zero, I(0), meaning they are stationary at level. This implies the data do not require differencing and are suitable for panel regression analysis without the risk of spurious relationships. The stationarity of variables ensures reliable and valid inference in the subsequent econometric modeling of R&D investment determinants.

4.7 Hypotheses Testing

Table 8: Summary linear regression analysis for RD, WC, RE, EBIT, VAE and ROA

Panel-Corrected RD	**COEF.**	**STD. ERR.**	**z**	**P>|z|**
WC	-.08900	.03254	-2.74	0.006
RE	.09850	.02537	3.88	0.000
EBIT	-.24304	.11116	-2.19	0.029
VOE	-.01470	.00115	-12.76	0.000
ROA	.30851	.14252	2.16	0.030
_CONS	.40621	.00418	97.15	0.000
N				330
R-squared				0.0681
Wald chi2(5)				196.62

Prob > chi2	0.0000

Source: Regression Output, 2025

Table 8 presents the panel-corrected regression results examining the determinants of R&D investment. The model, with 330 observations, shows a statistically significant fit (Wald χ^2 = 196.62, $p < 0.001$), although the R-squared of 0.0681 indicates that approximately 6.8% of the variation in R&D investment is explained by the included variables.WC and EBIT have significant negative coefficients (-0.089, $p = 0.006$; -0.243, $p = 0.029$ respectively), suggesting that higher liquidity and operating earnings correspond to lower R&D spending. This may reflect firms prioritizing stable returns over uncertain innovation investments. Conversely, RE and ROA positively influence R&D (0.0985, $p < 0.001$; 0.3085, $p = 0.030$), implying that more profitable firms with internal funds are more willing to invest in R&D activities. VOE negatively affects R&D (-0.0147, $p < 0.001$), possibly due to shareholder risk aversion towards R&D uncertainty. The constant term is highly significant, underscoring the baseline level of R&D investment. Overall, findings highlight the nuanced financial factors shaping firms' innovation expenditure decisions.

4.10 Discussion of Findings

The findings of this study align with existing literature emphasizing the critical role of financial and operational variables in shaping firms' investment in R&D. Consistent with Aseinimieyeofori (2022) and Jones, et al. (2024), profitability indicators such as RE and ROA positively influence R&D investment, suggesting that internally generated funds and strong asset performance empower firms to commit more resources to innovation. This supports Nguyen, et al. (2025) assertion that efficient cash holdings and growth opportunities enhance R&D spending.

Conversely, the negative relationship between WC and EBIT with R&D echoes Bolaji et al. (2021) and Abdu, et al. (2018), indicating firms with high liquidity or operational earnings may prioritize short-term stability over uncertain innovation investments. The inverse impact of market valuation proxy (VOE) on R&D aligns with Shibia's (2023) findings in Kenya, highlighting shareholder risk aversion to innovation uncertainty.

Moreover, the study underscores the strategic importance of R&D for sustaining competitive advantage and economic growth, resonating with Onileowo, et al. (2021) and Olurinola, et al. (2021). Overall, the results highlight how Nigerian firms' financial health and market environment shape their innovation trajectories, with implications for policy and corporate governance aimed at fostering sustainable development (Yahaya, 2025).

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

This study reveals that profitability measures like RE and ROA positively influence R&Dinvestment in Nigerian firms, supporting the view that strong financial performance enables innovation funding. Conversely, WC and EBIT negatively affect R&D, suggesting a preference for liquidity and short-term gains over long-term innovation. The negative

relationship between market valuation (VOE) and R&D reflects shareholder caution toward risky investments. These findings align with previous research and highlight the need for policies that encourage sustainable innovation to enhance firm competitiveness and economic growth in Nigeria.

5.2 Conclusion

The study rejects the null hypotheses $H0_1$, $H0_2$, $H0_3$, and $H0_4$, indicating that Working Capital (WC), Retained Earnings (RE), Earnings Before Interest and Tax (EBIT), and Value of Equity (VOE) all have significant effects on Research and Development (R&D) investment among listed firms. Specifically, WC and EBIT negatively influence R&D investment, while RE positively impacts it. Additionally, VOE shows a negative relationship with R&D investment, highlighting market valuation concerns. These results demonstrate that both financial performance and market factors critically shape firms' decisions on innovation investments.

5.3 Recommendation

To foster increased R&D investment, firms should strategically manage working capital and earnings to balance liquidity needs with long-term innovation goals. Policymakers and regulators should encourage frameworks that incentivize reinvestment of earnings into R&D activities. Furthermore, improving investor confidence through transparency and risk management can enhance market valuation perceptions, thereby supporting sustainable innovation funding.

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