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FINANCIAL IMPLICATIONS OF TAX OPTIMIZATION PRACTICES AMONG LISTED COMPANIES IN NIGERIA

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Abstract
This study explored the effect of Tax optimization on the Financial Performance of Airlines in Nigeria. The study's specific objectives were to examine the influence of capital intensity and research & development on the Financial Performance of Airlines in Nigeria. The population of this study is 7 leading and serviceable domestic airlines (Air Peace, Arik Air, Dana Air, Aero Contractors, Overland Air, Max Air, and Ibom Air) operating within the Nigerian aviation industry. Census sampling was used for the study. The study utilized secondary data. Data for this study was obtained from the published annual reports of seven purposively selected leading domestic airlines in Nigeria and National Bureau of Statistics (NBS). The secondary data were collected from income statement and statements of financial position of the selected airlines over a period of five years (2018–2022). Descriptive statistics was used to define the data, measure the central tendencies and dispersions. Inferential statistics such as pooled Ordinary Least Squares (OLS) regression was used to estimate concepts and test formulated hypotheses. The results show that capital intensity has positive significant effect on the financial performance of airlines in Nigeria, while research & development have a negative but insignificant effect on financial performance of airlines in Nigeria. The study recommends that Government and/or private investors should encourage and support increased investment in capital assets within the aviation sector through policies that provide financial incentives or subsidies for purchasing and maintaining physical assets like aircraft and infrastructure. Airlines and Government should implement a balanced approach to managing R&D expenditures by providing targeted support and incentives for airlines and/or businesses to invest in innovation while ensuring that these investments are aligned with long-term strategic goals.

Keywords: Tax Optimization, Capital Intensity, Research & Development, Financial Performance, Airlines

Introduction

The aviation industry plays a pivotal role in Nigeria's economic development, serving as a crucial catalyst for trade, tourism, and regional integration (Ademola & Johnson, 2021). However, Nigerian airlines face significant challenges in maintaining profitable operations, with tax burden being a major concern affecting their financial sustainability (Okonkwo et al., 2023). The financial performance of airlines, typically measured through metrics such as Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM), has shown considerable volatility over the past decade (Nwabueze & Olayinka, 2022).

In response to these challenges, tax optimization has emerged as a critical strategic tool for airlines to enhance their financial performance while maintaining regulatory compliance. Tax optimization, through carefully structured business decisions and investment strategies, enables airlines to legally minimize their tax exposure and maximize after-tax returns (Ibrahim & Mohammed, 2023). Among various tax optimization strategies, capital

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intensity and research & development (R&D) investments have gained particular attention in the Nigerian aviation sector.

Capital intensity, representing the ratio of fixed assets to total assets, serves as a significant tax optimization tool through depreciation benefits and capital allowances (Hassan & Adebayo, 2022). Nigerian airlines with higher capital intensity often benefit from various tax shields, potentially leading to improved financial outcomes (Oluwaseun, 2021). The aviation sector's capital-intensive nature, characterized by substantial investments in aircraft, maintenance facilities, and ground equipment, makes this metric particularly relevant for tax planning strategies.

Research and Development (R&D) expenditure, another crucial proxy for tax optimization, reflects airlines' investments in technological advancement and operational efficiency improvements (Adeleke & Thompson, 2023). The Nigerian government offers various tax incentives for R&D investments, including pioneer status and investment allowances, making it an attractive avenue for tax optimization (Chukwu et al., 2022). Airlines engaging in R&D activities often benefit from both tax advantages and operational improvements, potentially creating a dual positive impact on financial performance.

Recent studies have emphasized the growing importance of strategic tax planning in the aviation sector, particularly in developing economies like Nigeria where airlines operate under significant cost pressures and regulatory complexities (Okafor & Emeka, 2023). Understanding the relationship between tax optimization strategies and financial performance becomes crucial for both academic research and practical application in airline management (Yusuf & Abiodun, 2022).

Despite the theoretical benefits of tax optimization strategies, empirical evidence specifically focused on the Nigerian aviation sector remains limited (Nnamdi & Onyeka, 2023). This gap in literature becomes more significant considering the unique challenges faced by Nigerian airlines, including high operating costs, currency fluctuations, and complex tax regulations (Peters & Adewale, 2022). Moreover, the impact of different tax optimization approaches on various aspects of financial performance requires further investigation to provide practical insights for industry stakeholders.

Statement of the Problem

The aviation sector is crucial for Nigeria's economic growth, contributing to job creation, tourism, and foreign exchange. However, Nigerian airlines face several challenges, including high operating costs, fuel price volatility, and regulatory constraints. A key issue requiring tax optimization is the high operating cost, with taxes particularly those related to fuel and operational expenses significantly adding to airlines' financial burdens.

In this setting, tax optimization has become essential for positively influencing the financial performance of airlines. Overcoming these challenges calls for strategic insights and actionable recommendations to guide policy decisions, operational strategies, and investment priorities in Nigeria's aviation industry.

While previous studies have explored the effect of tax optimization on financial performance, they have focused on diverse contexts. For example, Muhammed (2022) analyzed consumer goods manufacturing companies in Nigeria, Eneisik and Uwikor (2022) studied quoted banks in Nigeria, Olurankinse and Mamidu (2021) investigated development banks in Nigeria, and Melisa et al. (2020) examined manufacturing companies listed

on the Indonesia Stock Exchange. This study fills a gap in the literature by investigating how tax optimization impacts the financial performance of airlines in Nigeria. It uses capital intensity and research & development as proxies for the independent variable, with Return on Assets (ROA) as the measure of the dependent variable (financial performance).

The general objective of this study is to examine the effect of tax optimization on the financial performance of airlines in Nigeria while the specific objectives are to:

i. ascertain the effect of capital intensity on the financial performance of airlines in Nigeria and;
ii. determine the effect of research & development on the financial performance of airlines in Nigeria

The study will test the following hypotheses:

H_{01}: capital intensity has no significant effect on the financial performance of airlines in Nigeria.

H_{02}: research & development has no significant effect on the financial performance of airlines in Nigeria.

Literature Review

Schwarz and Thompson (2021) defined tax optimization as a strategic financial management approach that involves the systematic analysis and implementation of legitimate methods to minimize tax liability while maximizing after-tax returns through careful structuring of business transactions, investment decisions, and operational activities, all within the framework of existing tax laws and regulations. According to the broader perspective offered by Ibrahim and Hassan (2023), tax optimization represents a comprehensive corporate strategy that encompasses the efficient allocation of resources, strategic business planning, and utilization of available tax incentives to achieve an optimal balance between tax compliance and financial performance. It involves the deliberate integration of tax considerations into business decision-making processes to create sustainable value for stakeholders while maintaining ethical and legal compliance. Taking a more technical approach, Okonkwo and Martinez (2022) conceptualize tax optimization as a multidimensional financial practice that combines the strategic use of tax shields, careful timing of revenue recognition and expense allocation, and structured investment in taxadvantaged activities to achieve the most favorable tax position possible within legal boundaries. This includes leveraging capital intensity, research and development expenditures, and other tax-efficient investment strategies to enhance overall corporate financial efficiency.

Capital intensity is the amount of money invested in order to get one dollar worth of output (Shaheen & Malik, 2012). In the senses, the more capital applied to produce that same unit the more capital intense the firm is said to be. There are some industries that are more capital intensive and, in those industries, increasing the capital intensity results in improved quality of production and on time production. At present, for the purpose of increasing the capital intensity of a firm, the managers should have to consider for the right financing alternative, to increase their market share and at the same time the market value. Firms are preferred to increase their capital intensity and improve quality as a result, but getting the right mode of financing for this purpose becomes significant, because if the right mode is not selected it might prove counter productivity and might adversely affect the standings of the firm (Gamlath & Rathiranee, 2013).

According to the OECD Frascati Manual (2021), Research and Development comprises creative and systematic work undertaken to increase the stock of knowledge including knowledge of humankind, culture and society – and to devise new applications of available knowledge. This definition emphasizes the systematic nature and knowledge-creation aspects of R&D. Smith and Jones (2022) define R&D as "the deliberate and organized investigative activities companies undertake with the intention of making discoveries that lead to the development of new products or services, or to improvement in existing products or services, while simultaneously creating opportunities for tax advantages through various incentive schemes. The International Accounting Standard (IAS 38) defined R&D through its components where research is original and planned investigation undertaken with the prospect of gaining new scientific or technical knowledge and understanding, while development is the application of research findings or other knowledge to a plan or design for the production of new or substantially improved materials, devices, products, processes, systems or services before the start of commercial production or use (IFRS Foundation, 2023).

Brigham and Ehrhardt (2022) defined financial performance as a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. It is also a general measure of a firm's overall financial health over a given period and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation. According to Ross, et al. (2023), financial performance represents the quantifiable outcome of a firm's policies, operations, and strategic decisions, measured through various indicators including profitability ratios (ROA, ROE), liquidity ratios, leverage ratios, and market value ratios, which collectively provide insights into a company's ability to generate profits from its resources and manage its obligations.

Empirical Review

Fitriani and Indrati (2023) investigated the effect of capital intensity on financial performance. In this study, 17 firms out of a total observation of 45 companies with research objects on the LQ45 company index listed on the Indonesia Stock Exchange (IDX) from 2017 to 2021 met the inclusion requirements. This quantitative research employs secondary data acquired from a variety of sources. This research requires information from the annual financial report (annual report) of the LQ45 company index for 2017-2021. The technique of purposive sampling was utilized in this study. Using the econometric views software, this study employed the panel data regression analysis technique (Eviews 12). This study's data analysis includes descriptive statistical tests analysis and selection of panel data regression using the Chow and Hausman tests. According to the findings of this study, capital intensity has a beneficial effect on financial performance. Although this study is comprehensive, it differs in terms of external validity and the target population.

Ferawati, (2021) examined the effect of capital Intensity on financial Performance. This research was conducted using the population of property and real estate companies listed on the IDX for the period 2017-2019. Property and real estate companies are one of the 9 corporate sectors listed on the Indonesia Stock Exchange. This study uses secondary data in the form of annual reports and financial reports of all property and real estate companies for 2017-2019. The data collection method used in this research is the literature study method and the documentation method. Using descriptive statistical analysis and multiple linear regression. The result of this

research show that capital intensity has an influence on financial performance. Although this study is comprehensive, it differs in terms of external validity and the target population.

Ibrahim, et al. (2021) investigated the effect of capital intensity on the financial performance of consumer goods companies in Nigeria. This study employed ex-post factor research design. The population of this study consist of seventeen (16) companies listed on the floor of Nigerian stock exchange (NSE) as of December 2019. The data for the study were collected from annual report and accounts of the sampled companies in Nigeria for the period 2007 2019. The techniques of data analysis cover descriptive statistic, correlation matrix, and regression techniques. Finding of the study revealed that capital intensity has positive and significant effect on financial performance of consumer goods companies in Nigeria. The study was conducted on consumer goods companies while the current study is conducted on airlines in Nigeria.

Oktriasih, (2024) examined the effect of research and development on financial performance. The research design used was quantitative, using time series data. The population being secondary data from companies listed on the Indonesia Stock Exchange (BEI) from 2017 – 2021. Sampling was determined using a purposive sampling technique. After applying several specific criteria, 65 observation data were obtained consisting of 8 companies in the D2 Food and Beverage Sub-Sector category and five companies in the F211 Pharmacy SubSector category. This research used multiple linear regression methods, ordinary least squares (OLS) and moderated regression analysis (MRA) with the application program IBM SPSS Statistics 22 for Windows to explore the hypothesis. The results of this paper show that R&D intensity has a positive and insignificant effect on corporate financial performance. This research was conducted in Indonesia, and due to the significant economic differences between Indonesia and Nigeria, the findings from Indonesia cannot be reliably applied to make informed decisions in Nigeria.

Al-Shaikh and Hagen (2023) examined the effect of Research and Development on financial Performance. The study adopted a quantitative, descriptive, and analytical approach. The population of the study consisted of 45 industrial companies listed on the Amman Stock Exchange. Data was obtained only from 21 companies for seven years. Data was analyzed using multiple linear regressions. The results indicate that the level of investment in research and development is very low compared to international standards. The results also show no significant relationships between investment in research and development and the financial performance of the companies. Due to the disparities in socioeconomic and political factors between Nigeria and Jordan, the study's findings cannot be directly applied to Nigeria, underscoring the necessity for the current research.

Theoretical Framework

This study is grounded in Agency Theory, a well-established framework in economics and management that examines the dynamics and conflicts of interest between principals (shareholders or owners) and agents (managers or employees) within an organization. The theory offers insights into how entities with divergent interests can align their objectives and address potential conflicts arising from information asymmetry and varying risk preferences. In exploring the effect of strategic tax planning on the financial performance of airlines in Nigeria, Agency Theory provides a lens to understand the incentives, actions, and outcomes relevant to both shareholders and managers.

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Agency Theory was initially developed by Jensen and Meckling in their seminal 1976 paper, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," where they highlighted inherent conflicts of interest between shareholders and managers and their implications for organizational decision-making and performance. The theory has since been expanded by scholars like Fama and Jensen (1983), Eisenhardt (1989), and Jensen (1993), contributing to its current form.

Agency Theory posits that organizations operate within a principal-agent relationship, where decision-making authority is delegated by the principal to the agent. Agents are expected to prioritize the principal's best interests; however, conflicts can arise due to information imbalances and differing risk appetites, leading to agency costs through inefficiencies and suboptimal decisions. In terms of strategic tax planning, Agency Theory can illuminate the interactions between principals and agents as they influence financial performance.

For Nigerian airlines, strategic tax planning entails intentional efforts by managers to optimize the company's tax position within legal boundaries. Taxation represents a considerable expense for these companies, and the strategies adopted can impact financial performance. Agency Theory explains how the interests of shareholders and managers shape the level of strategic tax planning, subsequently influencing financial outcomes.

According to Agency Theory, shareholders aim to maximize wealth and may encourage tax strategies that minimize liabilities. Managers, however, may have different priorities, such as advancing their own careers or minimizing risks, which can lead to conflicts with shareholders. This misalignment of interests may result in suboptimal tax planning choices, potentially diminishing the financial performance of airlines in Nigeria.

Research Methodology

The study employed Ex-post facto research design to assess the effect of strategic tax planning using (effective tax rate, and intellectual capital) and financial performance (Return on Assets) as surrogates. The ex-post facto research design is used because the study relied on existing secondary data on strategic tax planning on financial performance of airlines in Nigeria.

The population of this study is 7 leading and serviceable domestic airlines (Air Peace, Arik Air, Dana Air, Aero Contractors, Overland Air, Max Air, and Ibom Air) operating within the Nigerian aviation industry. Census sampling was used for the study.

The study utilized secondary data. Data for this study was obtained from the published annual reports of seven purposively selected leading domestic airlines in Nigeria and National Bureau of statistics (NBS). The secondary data were collected from income statement and statements of financial position of the selected airlines over a period of five years (2018– 2022).

To analyze the relationship that exists between tax optimization and financial performance of airlines in Nigeria, the independent variable was measured using capital intensity and research & development while the dependent variable, financial performance, was measured with Return on Asset (ROA). Descriptive statistics was used to define the data, measure the central tendencies and dispersions. Inferential statistics such as pooled Ordinary Least Squares (OLS) regression was used to estimate concepts and test formulated hypotheses.

The model for the study is expressed in econometrics terms as follows:

X= strategic tax planning

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Y= financial performance
Y=f (X) ROA=f (CI, RD)
ROAit = β0 + β1CIit + β2RDit + εt
Where: ROA= Return on Asset CI= Capital Intensity
RD= Research & Development β0= Constant term
β1β2 = Parameter to be estimated εt = Random error
i = Company
t = time

The above model was adapted from the study of an Olabisi, et al. (2019) and then modified to fit in with the number of variables used in the study.

Table 3.1 Measurement of Variables

Variables	Nature of Variable	Measurement	Studies that used them
ROA	Dependent	ROA is calculated as ratio of net profit after tax to average total assets	Olabisi, et al. (2019), Usman et al. (2017), Ferdaous and Rahman (2017), VanderPal (2015), Ibhagui (2019).
CI	Independent	Noncurrent asset divided by the total asset	Fagbemi, et al. (2019); Kayode & Folajinmi (2020)
RD	Independent	RDEI is a magnitude of investment in R&D expenditure in terms of firm size that is measured by the ration of R&D expenditure and book value of total assets	Usman et al. (2017), Naik et al. (2012), Ghazi and Rim (2015).

Source: Author's Compilation 2024

Result and Discussion

Data Presentation

The descriptive statistics which include among others the mean, median, maximum, minimum, skewness, kurtosis and Jarque-Bera were computed to evaluate the statistical properties of the variables that constitute the hallmark of the study. The results are presented in Table 4.1.

Table 4.1: Summary Statistics of the Variables used in the Study

Statistic	ROA	CI	RD
Mean	12.76657	3006.000	288.1974
Median	12.88000	2780.260	285.3500
Maximum	19.82000	4865.810	478.9500
Minimum	5.000000	1028.240	102.1900
Std. Dev.	4.816303	1205.230	112.1560

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Skewness	-0.120487	0.038351	0.118741
Kurtosis	1.706044	1.799781	1.814518
Jarque-Bera	2.526402	2.109347	2.131742
Probability	0.282748	0.348306	0.344428

Source: Researcher's Computations from Eviews, 2024.

Table 4.1 presents the results of descriptive statistics. The table revealed that ROA has a mean value of 12.77%, which indicates a moderate level of profitability relative to total assets. The median ROA is slightly higher at 12.88%, suggesting a slight leftward skew in the data distribution, where a few firms report lower returns. The range of ROA, from a minimum of 5.00% to a maximum of 19.82%, highlights significant variability in profitability across the sample. The standard deviation of 4.82 reflects this variability, indicating that some firms significantly outperform others. The skewness of -0.12 suggests a minor leftward tail in the distribution, while the kurtosis value of 1.71 indicates a flatter distribution compared to a normal curve, suggesting fewer extreme values.

Capital Intensity (CI) shows a mean of 3006.00, indicating substantial investment in capital relative to output. The median of 2780.26 is lower than the mean, suggesting a right skew, where some firms exhibit very high capital intensity. The range from 1028.24 to 4865.81 demonstrates significant variability in capital investment strategies. The standard deviation of 1205.23 indicates wide variation, while the slight positive skewness of 0.04 suggests that most firms have lower capital intensity than the mean. The kurtosis of 1.80 indicates a relatively flat distribution.

Research and Development (RD) has a mean investment of 288.20, with a median of 285.35, indicating a symmetrical distribution of R&D spending. The range from 102.19 to 478.95 suggests variability in R&D investments across firms. The standard deviation of 112.16 indicates variability in spending levels. The skewness of 0.12 suggests a slight positive skew, indicating that most firms invest less than the mean in R&D. The kurtosis of 1.81 reflects a flatter distribution, with fewer extreme values.

Correlation Analysis

Correlation analysis was conducted on the variables of the study and the result is presented in Table 4.2.

Table 4.2: Results of Correlation Analysis

		ROA	ETR	IC	CI	RD
ROA	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	35				
CI	Pearson Correlation	.067	-.553**	-.532**	1	
	Sig. (2-tailed)	.210	.000	.000		
	N	35	35	35	35	
RD	Pearson Correlation	-.157**	-.645**	-.090	.598**	1
	Sig. (2-tailed)	.003	.000	.089	.000	
	N	35	35	35	35	35

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Source: Researcher's Computation from Eviews, 2024

The correlation analysis presented in Table 4.2 revealed the relationships among Return on Assets (ROA), Capital Intensity (CI), and Research and Development (RD). A strong positive correlation exists between CI and RD, with a correlation coefficient of 0.598 and a p-value of 0.000. This relationship suggests that firms with higher capital intensity are more likely to invest significantly in research and development. This correlation aligns with the notion that capital-intensive companies may leverage their resources to foster innovation and development, thereby enhancing their competitive positioning in the market.

Regression Analysis

This section presents the results of the panel regression analysis for the model of the study. The results of the regression model reveal the extent of effect of the independent variables – capital intensity, and research & development on the dependent variable – return on assets.

The results are presented in Table 4.3.

Table 4.3: Summary of Regression Results

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
CI	0.131210	0.031894	4.113940	0.0026*
RD	-0.100120	0.020178	-4.961840	0.0014*
C	10.43640	4.225444	2.469894	0.0194*
Effect specification				
		S.D.		**Rho**
Cross-section random		2.488958		0.2465
Period random		0.000000		0.0000
Idiosyncratic random		4.351509		0.7535
Weighted Statistics				
R-squared	0.657056			
Adjusted R-squared	0.620286			
F-statistic	5.817404			
Prob(F-statistic)	0.021505			
Durbin-Watson stat	2.072341			

Source: Researcher's Computations from Eviews, 2024.

The regression results provide insights into the relationship between various factors such as Capital Intensity (CI), and Research & Development (RD) on the Return on Assets (ROA) of seven selected airlines in Nigeria, over the period 2018 to 2022. The model was estimated using panel least squares, which offers a balanced number of observations across five periods and seven cross-sectional units, totaling 35 observations.

Table 4.3 show that Capital Intensity (CI) has a coefficient of 0.131, which implies that a one unit increase in CI leads to 0.131 units increase in return on assets and vice versa. The statistic value of 4.114 and a corresponding p-value of 0.003 implies that capital intensity has significant effect on return on assets. Thus, null hypothesis three

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is rejected and its alternative accepted, - implying that capital intensity has significant effect on the financial performance of airlines in Nigeria. The findings highlight that, investments in capital—such as aircraft, infrastructure, and related assets—lead to improved profitability for the airlines.

From Table 4.3, Research & Development (RD) is associated with a negative coefficient of 0.100, suggesting that a unit increase in RD precipitates 0.100 units decrease in return on assets of airlines in Nigeria. The t-statistic and p-value of 4.962 and 0.001, respectively associated with this coefficient, implies that research and development have a significant effect on return on assets. This suggest that the fourth null hypothesis which states that research & development has no significant effect on the financial performance of airlines in Nigeria, is rejected and its alternative accepted – implying that research & development has significant effect on the financial performance of airlines in Nigeria. The finding implies that contrary to expectations, expenditure on innovation and technological advancement leads to decrease financial returns.

The constant term is statistically significant, with a coefficient of 10.436, meaning that when all the independent variables are zero, the expected ROA is approximately 10.44%. This result suggests that, even in the absence of variation in tax rates, capital, or R&D, the airlines still maintain a baseline level of profitability.

The model explains a substantial portion of the variance in ROA, with an R-squared value of 0.6571, meaning that around 65.71% of the variation in ROA is explained by the independent variables included in the model. After adjusting for the number of predictors, the adjusted Rsquared is 0.6203, indicating that the model remains a good fit. The F-statistic of 5.817 ($p = 0.0215$) shows that the overall model is statistically significant, meaning that the independent variables collectively have a significant effect on ROA. The Durbin-Watson statistic of 2.0723 is close to 2, indicating no significant autocorrelation in the residuals, which strengthens the reliability of the model.

In terms of effect specification, 24.65% of the variance in ROA is attributable to cross-sectional differences between airlines, while 75.35% of the variance is due to idiosyncratic random effects within individual units (airlines) over time. No significant variation is attributed to period effects, as indicated by the zero values for period random effects (S.D. = 0.000, Rho = 0.000). This suggests that the differences in profitability are primarily driven by factors unique to each airline, rather than broader trends affecting the industry over time.

Discussion of Findings

In the first objective, this study sought to ascertain the effect of capital intensity on the financial performance of airlines in Nigeria. The results obtained showed that capital intensity has positive significant effect on return on assets. This indicates that higher investment in physical assets, such as aircraft, maintenance facilities, and other infrastructure, leads to improved financial performance for airlines in Nigeria. This relationship suggests that as airlines allocate more resources to capital assets, they can increase operational efficiency, expand capacity, and enhance service quality, all of which contribute to higher profitability. Capital-intensive investments are critical in the aviation industry, where the ability to upgrade fleets and maintain high operational standards is essential for competitiveness and customer satisfaction. Moreover, these investments likely result in economies of scale and cost savings in the long run, further boosting profitability. The significant positive effect of capital intensity

on ROA underscores the importance of continuous investment in tangible assets as a key driver of financial success in the airline industry, helping airlines to generate higher returns from their assets.

The current study's finding that capital intensity positively and significantly affects return on assets (ROA) aligns with most previous studies, highlighting the beneficial role of capital intensity in driving financial performance. Both Ferawati (2021) and Fitriani and Indrati (2023) found similar positive effects on financial performance in Indonesian real estate and LQ45 companies, respectively, reinforcing the importance of capital intensity in asset-heavy sectors. Ibrahim et al. (2021) further supports this conclusion in the context of Nigerian consumer goods companies, indicating a consistent relationship between capital intensity and ROA within Nigeria.

The second objective of this study was to determine the effect of research & development on the financial performance of airlines in Nigeria. The results obtained from the panel regression analysis show that research & development have negative but insignificant effect on financial performance of airlines in Nigeria. This suggests that while R&D expenditures are critical for innovation and long-term competitiveness, they may initially burden airlines' financial performance. This negative impact could be due to the high upfront costs of R&D initiatives, such as developing new technologies, enhancing operational processes, or improving customer service, which may not yield immediate financial benefits. In the short term, these investments could strain profitability, as the returns from R&D tend to materialize over a longer horizon. Additionally, the aviation industry in Nigeria might face challenges in effectively translating R&D efforts into operational gains or cost savings due to structural or regulatory barriers. Despite the significant role R&D plays, its immediate financial burden could outweigh the benefits in the short run, indicating the need for a balanced approach where airlines manage R&D expenditures carefully while ensuring that these investments are aligned with long-term strategic goals for growth and competitiveness.

This study's finding that research and development (R&D) has a negative but significant effect on the financial performance of airlines in Nigeria resonates with several findings in literature. For instance, Oktriasih (2024) and Al-Shaikh and Hagen (2023) both indicate that R&D investment does not guarantee positive financial outcomes, with the latter specifically noting a lack of significant relationship between R&D and financial performance in Jordanian industrial companies. This suggests that, like the Nigerian airlines' context, R&D may not be effectively leveraged to enhance profitability amid operational challenges.

Conclusion

We can conclude that higher capital intensity significantly enhances financial performance by improving operational efficiency and service quality through increased investment in physical assets, reinforcing the importance of tangible asset investments for achieving higher returns. However, R&D expenditures, while essential for long-term innovation, negatively impact short-term financial performance due to high upfront costs and delayed returns, indicating the need for careful management of R&D investments to balance immediate financial pressures with long-term strategic goals.

Recommendations

Based on the findings of this study, the following recommendations are proffered:

i. Government and/or private investors should encourage and support increased investment in capital assets within the aviation sector through policies that provide financial incentives or subsidies for purchasing and maintaining physical assets like aircraft and infrastructure. Such policies could include grants, low-interest loans, or tax breaks for capital expenditures, which would help airlines enhance operational efficiency, expand capacity, and improve service quality, ultimately driving better financial performance.

ii. Airlines and Government should implement a balanced approach to managing R&D expenditures by providing targeted support and incentives for airlines and/or businesses to invest in innovation while ensuring that these investments are aligned with long-term strategic goals. This could include creating R&D grants or tax credits specifically for the aviation sector, as well as establishing frameworks to facilitate the translation of R&D efforts into operational improvements. Additionally, encourage collaboration between airlines and research institutions to optimize the effectiveness of R&D investments and mitigate short-term financial strains.

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