



Organizational efficiency dynamics and financial performance of manufacturing companies in Nigeria

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Abstract

This study examines the impact of management efficiency, human capital efficiency, and tax payment efficiency on the financial performance of manufacturing firms in Nigeria. The data used for this research were obtained from 38 manufacturing companies listed with the Nigerian Exchange Group (NGX) for the period of 2014-2023. The descriptive statistics and panel data analyses with both fixed and random effects models will be used for data analysis in this study. The descriptive statistics showed heterogeneous conditions among the firms in the sample. Model selection was guided by the use of the Hausman test which showed no significant difference between the fixed effects and random effects. However, in this paper, fixed effects have been chosen because of possible autocorrelation and firm-specific differences. The correlation test showed no multicollinearity issue. The results indicate that management efficiency negatively influences financial performance, while human capital efficiency positively affects it. However, tax payment efficiency does not significantly affect financial performance. The findings highlight the need for improving efficiencies in order to enhance the financial performance of manufacturing firms in Nigeria. It also adds to the literature that looks into how operational efficiency and resource utilization are considered relevant to firm performance and offers guidelines that help a firm give more priority to management and human capital investment to ensure better financial outcomes.

Keywords: Management efficiency, human capital efficiency, tax payment efficiency, financial performance, manufacturing firms, Nigeria

Introduction

The manufacturing sector contributes to the economic development of Nigeria directly through employment creation, addition to revenue, and increasing GDP. The sector is one of the core industries and has huge potential for promoting economic divergence in a country still heavily reliant on oil revenues (Chukwu, 2023) ^[9]. The manufacturing industry in Nigeria has grown over the years, buoyed by a number of government policies, including the National Industrial Revolution Plan in 2014 and targeted tax incentives in recent times to drive industrial output (Ezeanyejí *et al.*, 2023) ^[11]. Despite these efforts, the sector still grapples with persistent challenges, including infrastructural deficits, limited access to capital, inconsistent power supply, and a volatile fiscal environment. These factors have constrained growth, increased operational costs, and impinge on the financial performance of many firms (Chukwu, 2023) ^[9]. In the wake of these challenges, organizational efficiency has become the key for firms to improve on performance and competitiveness. Efficiency involves the best use of available resources such as human and financial to achieve maximum output at minimal cost (Asamani *et al.*, 2021) ^[5]. There are several measures of efficiency which include efficiency of management, efficiency of human capital, and efficiency of tax payment among others (Alu *et al.*, 2021) ^[4]. For a manufacturing company, management efficiency refers to how a company manages its resources towards value maximization while having personnel who are competent and efficient is expected to increase firm value (Odumisor, 2024) ^[22]. Tax-payment efficiency refers to how it takes advantage of fiscal policies to minimize tax burden (Alu *et al.*, 2021) ^[4]. Each

of these factors could potentially influence profit-making and the sustainability of the firms, particularly in a constrained resource environment like Nigeria. These have led to high production costs resulting from huge inefficiency in energy supply, infrastructure decay, and high inflation rates that the manufacturing firms in Nigeria usually face.

Mostly, such inefficiencies often erode profit margins and ensure that firms are not very competitive, both locally and internationally (Akinleye & Olanipekun, 2024) ^[2]. Moreover, some firms have difficulties attracting and retaining competent human capital which is crucial in driving innovation and excellence in operations (Abubakar *et al.*, 2022) ^[1]. The absence of sufficient strategies on tax efficiencies adds to this challenges because companies increasingly feel fiscal pressures in an environment where compliance to tax requirements is vital. These are issues that require a broad-based understanding of how efficiency can drive firm performance. The financial performance of firms, especially in the manufacturing sector of Nigeria, has been increasingly dependent on their ability to optimize resource use and navigate adverse economic conditions. Management efficiency, human capital efficiency, and tax payment efficiency are critical drivers of organizational success (Alu *et al.*, 2021) ^[4].

However, the combined effect of all these efficiency dimensions on the ROA performance of firms remains mostly unaddressed in the literature. Prior research has focused on operational efficiency, among other broader measurements of efficiency, while the active role of management and human capital efficiency in driving profitability have been largely overlooked especially in less developed economies, like Nigeria (Azad *et al.*, 2018;

Imhanzenobe, 2019; Onaolapo & Odedoyin, 2024) [6, 15, 25]. Therefore, there is a literature gap about their relationship with financial performance. Another important factor is tax payment efficiency which has also not been given due consideration by earlier research studies. While studies have concentrated more on tax compliance and its effects on firms (Ifeyinwa *et al.*, 2024; Okeke & Saluadeen, 2021) [14, 24], few studies have been directed towards examining how profitability is affected by efficiency in tax matters. This aspect becomes very relevant in the case of Nigeria, where the fiscal environment undergoes occasional changes and firms have to reduce their costs of operation. Effective management of taxation could result in increased profitability as a result of reduced unnecessary outflows. Besides, the scope of existing studies has been considerably limited. Most related studies cover short-term periods, often less than ten years, and are focused on non-African economies. There is a need for more long-term studies on Nigeria's manufacturing sector to comprehend the performance trends in a dynamic and resource-constrained environment. This study addresses such limitations by examining the combined effect of management efficiency, human capital efficiency, and tax payment efficiency on financial performance proxied by return on assets. The focus is on listed manufacturing firms in Nigeria from 2014 to 2023.

1. Research Objectives

1. To determine the effect of management efficiency on the financial performance of manufacturing firms in Nigeria.
2. To assess the effect of human capital efficiency on the financial performance of manufacturing firms in Nigeria.
3. To evaluate the effect of tax payment efficiency on the financial performance of manufacturing firms in Nigeria.

2. Research Hypotheses

1. **H₀:** Management efficiency has no significant effect on the financial performance of manufacturing firms in Nigeria.
2. **H₀:** Human capital efficiency does not significantly affect the financial performance of manufacturing firms in Nigeria.
3. **H₀:** Tax payment efficiency does not significantly affect the financial performance of manufacturing firms in Nigeria.

Literature Review

1. Conceptual Review

1.1. Financial Performance

Financial performance can be defined as the ability of a firm to generate revenue, control its costs, and provide value to its stakeholders (Mahrani & Soewarno, 2018) [20]. It is usually measured by different measures such as return on equity, return on investment, net profit margin, and earnings per share among others (Choiriyah *et al.*, 2021) [7]. However, this study will use Return on Assets (ROA) as the measure of financial performance. Kamruzzaman (2019) [16] noted that ROA reflects the efficiency of using enterprise assets for generating profit and, therefore, it is a very important indicator of operational efficiency. It is more appropriate for the manufacturing industry, where asset-

intensive operations have to be continuously monitored in terms of the productivity of the resources. ROA can capture a firm's profitability in relation to its total assets and is, therefore, an indispensable tool in assessing performance as far as the capital-intensive manufacturing sector is concerned.

1.2. Management Efficiency

Management efficiency refers to a firm's capacity to optimize all its inputs, processes, and strategic decisions that will ensure the acquisition of optimum productivity and profitability (Odumisor, 2024) [22]. It involves the efficiency of resource allocation, minimizing wastages, and ensuring smooth operations. In the manufacturing industry, where firms often have to bear high costs of production and face resource constraints, management efficiency often acts as the key factor for firms to remain competitive. Various studies, such as Sobhy *et al.* (2020) [29], have established that firms with higher management efficiency tend to exhibit better financial performance. However, despite its importance, studies on management efficiency in developing economies like Nigeria have been limited; thus, there is a need to understand its influence on financial performance over time.

1.3. Human Capital Efficiency

Human capital efficiency captures the contribution of employees to a firm's value creation. It reflects the ability of the firm to leverage the skills, knowledge, and expertise of its workforce in developing productivity and profitability (Nneji *et al.*, 2024) [21]. This is very critical in the manufacturing industry, given that skilled labor is needed for innovation, quality control, and process optimization. Despite this importance, human capital efficiency remains an area for more studies especially in Nigerian manufacturing firms.

1.4. Tax Payment Efficiency

Tax payment efficiency refers to the efficiency of a firm in managing its tax obligations to minimize fiscal outflows unnecessarily while still observing the regulatory requirements. Efficient tax practices could have a very important effect on the profitability of a firm by freeing resources for reinvestment and operational needs. In Nigeria's manufacturing sector, where firms always operate in an intricate and dynamic fiscal environment, efficiency in paying taxes can become crucial for determining a firm's financial performance Ogudu *et al.* (2018) [23].

1.5. Relationship between Efficiency and Performance

The relationship between operational efficiency and financial performance has been a common theme across several industries, with varied influences and mediating factors. It was noted that operating efficiency has a positive effect on the financial performance of Deposit Money Banks in Nigeria, as was observed by Onaolapo and Odedoyin (2024) [25]. This further shows that the cost control activities of the banks are necessary to enhance bank performance. Operational efficiency is observed to have a significant, but mixed effect on financial performance, especially by the cost of the total operating cost and cost of sales ratios from cement firms listed on the Nairobi Securities Exchange (Kariuki, 2021) [17]. These findings suggest that cost management may be associated with

improved performance but could be contingent on the specific cost category and industrial contexts. In contrast, Azad, Raza, and Zaidi (2018) ^[6] found that some operational efficiency indicators, such as total asset turnover and debtors' turnover, had negative effects on profitability, measured by return on equity, in the oil and gas sector of Pakistan. However, fixed asset turnover and current ratio were positively related to profitability, showing that the type of efficiency measure used is very important in terms of financial performance.

Furthermore, Kurniasih and Akhmadi (2024) ^[18] proved that operational efficiency had an indirect impact on financial performance through profitability in companies listed on the Jakarta Islamic Index, which again proved profitability to be an important mediating variable. Similarly, Sobhy *et al.* (2020) ^[29] found that the significant impact of operational efficiency on financial performance was negative and that the existence of earnings management might moderate such a relationship as evidence of its complexity in financial performances. Generally, these studies underscore the view that although most operational efficiencies often have a positive impact on enhancing financial outcomes, such relationships remain contextual and perhaps influenced by sectoral changes, the measure of efficiencies employed, mediating variables, profitability, and earnings management.

2. Theoretical framework

The theoretical underpinning of this research is based on two significant theories, namely the Resource-Based View (RBV) Theory and Efficiency Theory, since both theories provide understanding of how operational efficiency influences financial performance in firms.

2.1. Resource-Based View (RBV) theory

The Resource-Based View was propounded by Birger Wernerfelt (1984) and later refined by Jay B. Barney (1991). The theory propounds that firms have their competitive advantage and high performance because of their unique resources and capabilities (Ramon-Jeronimo *et al.*, 2019) ^[28]. From an operational efficiency perspective, RBV puts great emphasis on the role played by internal resources: technological capabilities, human capital, and organizational processes that make a difference in the attainment of operational excellence. By leveraging such resources, the firm can increase its productivity thereby reducing its cost of operations and enhancing its financial performance eventually.

RBV presumes that a firm's ability to sustain its competitive advantage depends on the firm's core resources and how well the resources are utilized. It could complement RBV in explaining how proprietary technologies, skilled labor, and efficient processes lead the firm to achieve operational efficiency (Mahdi & Nassar, 2021) ^[19]. Effectively optimizing cost structure, enhancing service delivery, and improving profitability contribute to a firm's better market performance. Operational efficiency, therefore, in the perspective of the RBV, is an outcome or the result of the capability of the firm to deploy its core resources in such a way that would give it a competitive advantage.

2.2. Efficiency theory

Efficiency Theory was propounded by Harvey Leibenstein in 1966. The theory deals with linking operational practices with the effective utilization of resources for obtaining

maximum output at minimal input costs (Huil, 2014) ^[13]. It asserts that a firm with better operational efficiency will outperform the others financially since it can organize its resources in such a way that its inputs are maximally productive with minimal wastage of any form (Huil, 2014) ^[13]. In this study, efficiency refers to a mode of performance measured by the value of key performance indicators such as cost efficiency, asset utilization, and productivity ratios, which influence the profit-margin attainment capability of a firm for market performance enhancement.

According to the Efficiency Theory, operational efficiency is not a matter of cost reduction but rather process optimization toward optimal effectiveness (Phan & Ngu, 2021) ^[27]. For example, firms can become more efficient by adopting new technologies, simplifying processes, and reducing operational risks, which will in turn make them more profitable and improve their financial performance. As Phan and Ngu (2021) ^[27] have pointed out, the theory emphasizes that the greater the efficiency, the better the allocation of resources, the better the decision-making, and the stronger the financial position of firms.

These theories have shed valuable light on how to explain the relationship between operational efficiency and financial performance. While RBV has focused on the use of firm-specific resources for sustainable competitive advantage, Efficiency Theory emphasizes that optimal utilization of resources will result in maximum performance. These two theories provide a sound framework through which this study can investigate the effect of operational efficiency on the financial performance of manufacturing firms in Nigeria.

3. Empirical review

Onaolapo and Odedoyin (2024) ^[25] examined the effect of operating efficiency on the financial performance of deposit money banks in Nigeria. A sample of 12 listed banks was retrieved between the period 2011-2020 and through the use of Pearson correlation along with the panel least square regression, a positive significant relationship was noted between operating efficiency and financial performance. The financial performances did not vary significantly between systemically important and non-systemically important banks; hence regulators should accord equal attention to all banks.

Azad, Raza, and Zaidi (2018) ^[6] investigated the effect of operational efficiency on the oil and gas sector's profitability in Pakistan from 2010 to 2015. The efficiency proxies taken for the study are total asset turnover, fixed asset turnover, and debtor turnover, whereas ROE was measured for profitability. The results indicated that total assets turnover, debtor turnover, and quick ratio negatively influenced ROE, while current ratio and fixed asset turnover positively influenced profitability.

Sobhy, Megeid, Mohamed, Abd-Elmageed, and Riad (2020) ^[29] investigated the effect of operational efficiency and financial performance on capital structure, moderated by earnings management. Based on panel data from 65 Egyptian non-financial firms over the time period 2013 – 2019, observations showed that return on equities, gross profit margins, firm size are positively related to capital structure, whereas higher levels of operational efficiency with liquidity ratios negatively affect their capital structure. Their study also portrayed how operational efficiency positively influences earnings management.

Otoo (2024) ^[26] explored financial management practices affecting performance among small and medium enterprises (SMEs). Through structural equation modeling in a sample of 117 SMEs, it was found that working capital management and capital budgeting management significantly enhanced organizational performance, while asset management did not. The findings highlight that proactive attitudes toward financial management are core to the sustainability and competitiveness of SMEs, despite the limitations of cross-sectional data.

Kurniasih and Akhmadi (2024) ^[18] discussed the influence of operational efficiency on the financial performance of companies through the Jakarta Islamic Index 70 listing, years 2018-2022. From 240 data points of observations using multiple regression analysis, the work indicated that operational efficiency could not affect financial performance significantly and instead shows an indirect result on profitability. The positive mediation role of profitability plays an important part in driving firms' economic performance.

Kariuki (2021) ^[17] illustrated the effect of operational efficiency on the financial performance of cement firms listed in the Nairobi Securities Exchange from the period 2005 to 2020. It is observed from the Pearson correlation analysis that the operating cost and cost of sales ratios are negatively related and significant with ROA. However, administration cost ratio is positive, meaning reduction in operational costs will improve financial performances of cement firms.

Chude, Chude, and Egbunike (2023) ^[8] investigated the impact of intellectual capital on the financial performance of quoted manufacturing firms in Nigeria from 2011 to 2019. Intellectual capital, as measured with VAIC, significantly influenced asset turnover, gross profit margin, and return on assets. The result has important implications for how crucial intellectual capital is toward boosting the performance of manufacturing companies.

Sirojuzilam, Nasution, and Yustina (2021) tested the influence of operational efficiency on the financial performance of firms within Indonesia's agricultural sectors. These studies used financial ratios of efficiency that ranged from fixed asset turnover ratio to the current ratio. Such influences turn into increased profitability, emphasizing how crucial resources can be for making improvements in corporate financial performance.

Ali and Amir (2023) examined the relationship between operational performance and financial performance of the textile sector in Pakistan. Using data from listed firms from the period 2010 to 2020, the study found that total assets turnover and inventory turnover significantly and positively influenced ROA. However, administrative costs deter improvement in financial performance. The study recommends cost control measures along with better inventory management for effective operational performance.

Yang, Liu, and Zhang (2022) conducted research on the effect of operational efficiency on financial performance with respect to manufacturing firms in China. Through panel regression analysis, the paper drew the conclusion that increased operational efficiency, that is, higher fixed asset turnover and cost ratios has significantly increased the level of profitability through returns on equity and assets. Therefore, they suggested a strategic policy of efficient

resource allocation in pursuit of better long-run financial performance.

Chen and Lee (2023) examined the mediating influence of operational efficiency in financial performance among small enterprises of Taiwan. The study used a structural equation modeling method to establish that operational efficiency ensures positive profitability, which, in turn, is reflected to improved financial performance. The results have indicated that small enterprises can achieve improvements in financial performance by increasing their focus on enhancing operating processes and reducing inefficiencies in their business operations.

Zhang, Zhao, and Li (2020) explored how cost management influences the operational efficiency and financial performance of Chinese technology firms. In the study, panel regression analysis was used to test the relationship between cost ratios, efficiency metrics, and profitability measures. The results indicated that cost efficiency significantly influences financial performance as measured by two variables: ROE and net profit margins. The authors support strategic cost management practices to improve performance.

The literature reviewed pinpoints a few gaps. While several studies, for example, Yang *et al.* (2022) and Sobhy *et al.* (2020) ^[29], examined the operational efficiencies of an organization, they did not take into consideration the managerial and human capital efficiencies which could potentially pose as significant profitability drivers. For instance, not much studies especially in recent times have focused on developing economies like Nigeria especially with a focus on key indicators of efficiency such as management-specific and human capital efficiency. Additionally, the efficiency related to tax payment is usually excluded from financially related studies. This becomes even more significant in the changing landscape of Nigeria's fiscal environment. From a scope perspective, most of these studies are framed within a short-term framework, usually less than ten years some of which were carried out outside Africa (Azad *et al.* 2018; Chen & Lee, 2023) ^[6]. This paper seeks to bridge these gaps by centring its focus on listed manufacturing firms in Nigeria over a decade-from 2014 to 2023-for the long-term appreciation of performance trends.

Methodology

The research adopts an ex post facto design. The selection of this design is appropriate in this study, because it suit the research aims and provide the ground for data collection without manipulation. The target population for this study consists of 38 manufacturing companies listed in the Nigerian Exchange Group, with data spanning from 2014 to 2023. These companies were selected based on their availability of comprehensive financial data over the specified period. The selected companies are representative of the wide spectrum in the Nigerian manufacturing sector, including the following firms: Aluminium Extrusion Industries, Berger Paints Nigeria, Beta Glass Company, Cadbury Nigeria, Chellarams, Chemical & Allied Products, Cutix, Dangote Cement, Dangote Sugar, Fidson Healthcare, Flour Mills of Nigeria, GlaxoSmithKline Nigeria, Greif Nigeria, Honeywell Flour Mills, Industrial & Medical Gases Nigeria, John Holt, Lafarge Cement WAPCO Nigeria, Livestock Feeds, May & Baker Nigeria, McNichols Consolidated, Meyer Plc, Nascon Allied, Neimeth

International Pharmaceuticals, Nestlé Nigeria, Nigeria Breweries, Nigerian Enamelware, Northern Flour Mills Nigeria, Pharma-Deko, Portland Paints Nigeria, Premier Paints, PZ Cussons, SCOA Nigeria, Studio Press Nigeria, Thomas Wyatt, Transcorp Nigeria, UAC of Nigeria, Unilever Nigeria, and Vitafoam Nigeria. These firms were selected based on their data availability and they represent a significant portion of the manufacturing industry in Nigeria. Therefore, the study adopted annual reports of the companies and the variables used for the study are defined the following formulas:

Table 1: Variable measurement

| Variable | Formula |
|--------------------------|--|
| ROA (Return on Assets) | PAT/Total Assets |
| Management Efficiency | Operating Expenses/Revenue |
| Human Capital Efficiency | (PBT + Employee Compensation) /Employee Compensation |
| Tax Payment Efficiency | Income Tax Paid/PBT |

The data analysis was done using descriptive statistics and panel data analysis. Panel data techniques are appropriate for this study, as they account for variations across companies as well as over time. Estimation was done using both Fixed Effects and Random Effects models. The Hausman test was used in determining which model, fixed or random effects, best fits the data. This is in order to make the estimates reliable and valid. Multicollinearity test was carried out to see if there was a problem of high correlations between independent variables, since high levels may inflate the variance of the regression coefficients, reducing stability and interpretability. The heteroskedasticity test was conducted to find out if the variance of the error terms was constant for all observations. Where heteroskedasticity exists, robust standard errors may be used. An autocorrelation test was also conducted to check whether or not the residuals/errors arising out of a regression model are correlated with each other across time. To this regard, when there is auto-correlation, an adjustment on the model would be done. A significant test at 5% levels will have its P-value < 0.05 (meaning when the p value is less than 0.05 the null hypothesis will be rejected otherwise it shall be accepted).

Model specification

The functional relationship between financial performance and the independent variables is expressed as follows:

$$ROA = f(\text{Management Efficiency}, \text{Human Capital Efficiency}, \text{Tax Payment Efficiency})$$

The regression model used for the analysis is:

$$ROA = \beta_0 + \beta_1ME + \beta_2HCE + \beta_3TPE + \mu$$

Where:

ROA = Return on Assets

ME = Management Efficiency

HCE = Human Capital Efficiency

TPE = Tax Payment Efficiency

β_0 = Intercept

β_1 – β_3 = Coefficients for the independent variables

μ = Error term, representing unobserved factors influencing ROA

Results and discussion

1. Descriptive statistics

Table 1: Descriptive statistics

| | ROA | ME | HCE | TPE |
|--------------|-----------|----------|-----------|----------|
| Mean | 3.737427 | 26.88443 | 2.069284 | 29.75971 |
| Median | 3.810000 | 20.63000 | 1.740000 | 14.87000 |
| Maximum | 53.96000 | 200.1600 | 34.79000 | 762.4900 |
| Minimum | -179.9200 | 2.750000 | -18.29000 | 0.000000 |
| Std. Dev. | 14.38505 | 25.55896 | 3.490635 | 67.05447 |
| Observations | 377 | 377 | 377 | 377 |

Source: Eviews 14 Output, 2024

The mean values of ROA, ME, HCE, and TPE suggest general trends within the data. The mean ROA of 3.74 indicates a moderate profitability level for the firms, although it is somewhat skewed due to the maximum value of 53.96, which represents an outlier, while the minimum value of -179.92 indicates extreme financial distress in some firms. The median value (3.81) being close to the mean suggests the data distribution is relatively symmetric for ROA, but the large spread (Standard Deviation of 14.39) suggests variability across firms. For Market Equity (ME), the mean of 26.88 contrasts with the large spread indicated by the high standard deviation of 25.56, signaling diverse market sizes among the firms in the sample. Similarly, HCE shows a wide variance with values ranging from -18.29 (possibly reflecting negative or minimal investments in human capital) to 34.79, while the large standard deviation (3.49) further underscores variability. The TPE variable exhibits extreme values, with a maximum of 762.49 and a minimum of zero, implying that some firms spend disproportionately high or no funds on product-related expenses. These extreme values, combined with the substantial standard deviation (67.05), suggest potential outliers. The variability in these variables implies a heterogeneous sample, indicating that the firms in the study are likely operating in different conditions, which may need to be accounted for in further analysis.

2. Correlation analysis

Table 2: Correlation matrix

| Correlation Probability | ROA | ME | HCE | TPE |
|-------------------------|---------------------|---------------------|---------------------|-------------------|
| ROA | 1.000000 ----- | | | |
| ME | -0.390730 0.0000 | 1.000000 ----- | | |
| HCE | 0.465249 0.0000 | -0.277470 0.0000 | 1.000000 ----- | |
| TPE | 0.005422 0.9164 | -0.081281 0.1151 | -0.033058 0.5222 | 1.000000 ----- |

Source: Eviews 14 Output, 2024

The correlation matrix reveals the relationships between the variables ROA, ME, HCE, and TPE. The significant negative correlation between ROA and ME (-0.39) suggests that higher market equity is associated with lower returns on assets, which may reflect larger firms having lower efficiency. There is a moderate positive correlation between ROA and HCE (0.47), indicating that higher human capital expenditure tends to improve financial performance, as expected. The correlation between ROA and TPE is

negligible (0.0054), suggesting no meaningful linear relationship between total product expenditure and return on assets. Importantly, the correlations between ME and HCE (-0.28) and between HCE and TPE (-0.03) suggest limited multicollinearity, as the correlations are not high enough to cause concern.

3. Test of hypotheses

Table 3: Correlated random effects - hausman test

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 3.245998 | 3 | 0.3552 |

Source: Eviews 14 Output, 2024

Table 4: Panel regression (Fixed Effect and Random Effect) test

| Statistic/Variable | C | ME | HCE | TPE | R ² | Adj R ² | F-stat | Prob (F-stat) | Durbin-Watson stat |
|--------------------|--------|---------|--------|---------|----------------|--------------------|---------|---------------|--------------------|
| RE Coefficient | 6.0480 | -0.1957 | 1.3602 | -0.0010 | 0.2593 | 0.2533 | 43.5189 | 0.0000 | 1.2543 |
| RE Std. Error | 1.5276 | 0.0271 | 0.1984 | 0.0085 | | | | | |
| RE t-Statistic | 3.9592 | -7.2105 | 6.8557 | -0.1223 | | | | | |
| RE Prob. | 0.0001 | 0.0000 | 0.0000 | 0.9027 | | | | | |
| FE Coefficient | 6.8262 | -0.2103 | 1.2496 | -0.0007 | 0.5346 | 0.4792 | 9.6477 | 0.0000 | 1.6957 |
| FE Std. Error | 1.1622 | 0.0293 | 0.2139 | 0.0086 | | | | | |
| FE t-Statistic | 5.8733 | -7.1870 | 5.8416 | -0.0802 | | | | | |
| FE Prob. | 0.0000 | 0.0000 | 0.0000 | 0.9362 | | | | | |

Source: Eviews 14 Output, 2024

Hypothesis 1: Management Efficiency (ME)

The Hausman test result (p-value = 0.3552) suggests no significant difference between the fixed effects (FE) and random effects (RE) models, which means both models could be appropriate. However, due to autocorrelation and potential differences in firm-specific conditions, we choose the fixed effects model. The coefficient for ME in the fixed effects model is -0.2103, with a t-statistic of -7.1870 and a p-value of 0.0000, indicating a significant negative relationship between management efficiency and the financial performance of manufacturing firms in Nigeria. Thus, we reject the null hypothesis (H₀: ME has no significant effect on financial performance). The negative relationship implies that higher management efficiency is associated with lower financial performance, potentially due to inefficiencies in resource allocation or decision-making that affect profitability.

Hypothesis 2: Human Capital Efficiency (HCE)

In the fixed effects model, HCE has a coefficient of 1.2496 with a t-statistic of 5.8416 and a p-value of 0.0000, showing a significant positive relationship between human capital efficiency and financial performance. Based on the Hausman test and regression results, we reject the null hypothesis (H₀: HCE does not significantly affect financial performance). The positive relationship implies that greater investment in human capital positively influences the financial performance of manufacturing firms, highlighting the importance of skilled workforce and human resource development.

Hypothesis 3: Tax Payment Efficiency (TPE)

For TPE, the coefficient is -0.0007 in the fixed effects model, with a t-statistic of -0.0802 and a p-value of 0.9362, indicating that the relationship between tax payment efficiency and financial performance is statistically insignificant. Therefore, we fail to reject the null hypothesis (H₀: TPE does not significantly affect financial performance). The very small negative coefficient and lack of statistical significance suggest that tax payment efficiency does not have a meaningful impact on the financial performance of manufacturing firms in Nigeria. This might be attributed to other factors influencing financial outcomes, overshadowing the impact of tax efficiency.

4. Discussion of findings

The findings of this study both agree and disagree with several empirical studies in the literature. In Hypothesis 1, the significant negative relationship between Management Efficiency and financial performance was contrary to Onaolapo and Odedoyin (2024)^[25] and Sobhy *et al.* (2020)^[29], who found that operational efficiency positively influenced financial performance. This could be due to the industry-specific nature of factors at play or the use of different efficiency proxies, such as operating costs or asset turnover. The inverse relationship obtained in this study implies that, within the Nigerian manufacturing environment, management efficiency could well result in misallocation of resources or decision-making inefficiency that decreases profitability. In the same vein, the negative effect that Kariuki 2021^[17] established on operating costs and financial performance was in line with what was interpreted to mean that where operational efficiency is not well managed, it may have a negative consequence on financial performance.

Hence, given the highly significant positive association observed from the study between Human Capital Efficiency and financial performance, the test of Hypothesis 2 was, therefore, confirmed and supported the views of Chude *et al.* (2023)^[8] and Azad *et al.* (2018)^[6] that intellectual and human capital contributes significantly to enhancing firm performance. From the regression analysis, it can be stated that the positive coefficient shows better financial outcomes due to human capital investment in manufacturing firms, and is also consistent with global findings; among them are the studies conducted by Yang *et al.* (2022) and Sirojuzilam *et al.* (2021) who obtained positive results on different occasions.

For Tax Efficiency, the insignificance of its result disagrees with Sobhy *et al.* (2020)^[29], who posited that operational efficiency influences firm performance through liquidity and earnings management. Such findings could mean that other variables like market conditions or firm-specific strategies may have a stronger in effect on the relationship between tax efficiency and financial performance. This result validates the findings of Kurniasih and Akhmadi's (2024)^[18] study which noted that operating efficiencies did not affect financial performance directly but had an indirect effect through profitability, suggesting a similar mediating role for factors like profitability in the Nigerian context.

Conclusion

This study provides an overview of the influence of operational efficiency indicators on the financial performance of manufacturing firms in Nigeria, using management efficiency, human capital efficiency, and tax payment efficiency as variables. It was found that management efficiency significantly and negatively affects financial performance. On the other hand, human capital efficiency shows a significant positive effect, which highlights a need for investment in developing skilled work to improve firm performance. Taxation payment efficiency was insignificant and infers that market or any operational strategy factor plays a significant influence on financial outcomes. Overall, these results suggest that manufacturing firms in Nigeria should invest in enhancing their management practices and building human capital while reassessing the role of tax efficiency in determining financial performance. Future studies may consider other determinants of financial performance, especially in regard to Nigerian economic and industrial contexts.

Based on the findings, the following recommendations are made:

1. **Management efficiency enhancement:** The inverse relation between management efficiency and financial performance suggests that manufacturing firms should focus on the better allocation of resources and decision-making to reduce inefficiency and improve profitability.
2. **Investment in human capital:** Firms should invest in the training and enhancement of their employees' skills to improve the productivity of the workforce, which in turn would improve financial performance, given the positive relationship between human capital efficiency and financial performance.
3. **Focus beyond tax efficiency:** Since tax payment efficiency showed no significant impact, firms should prioritize other areas like operational efficiencies and cost-effective strategies to improve financial performance, while ensuring tax compliance.

References

1. Abubakar B, Oluwade DO, Ibrahim UA. Evaluating the effects of human capital development on employee retention in Nigerian Universities. *Journal of Human Resource and Sustainability Studies*,2022;10(3):617–651. <https://doi.org/10.4236/jhrss.2022.103037>
2. Akinleye GT, Olanipekun CT. Financial leverage and performance of manufacturing firms in Nigeria. *International Journal of Research and Innovation in Social Science*, VIII(XI), 2024, 3344–3359. <https://doi.org/10.47772/ijriss.2024.8110257>
3. Akintunde AJ, Lambe I, Daniel EK. Effect of management techniques and financial performance of listed manufacturing firms in Nigeria. *International Journal of Research and Innovation in Social Science*,2024;8(2):1912–1937. <https://ideas.repec.org/a/bcp/journal/v8y2024i2p1912-1937.html>
4. Alu CNA, Adegbe FF, Akintoye IR. Managerial capability and corporate social performance of quoted firms in Nigeria. 6th Annual International Academic Conference on Accounting and Finance, 2021.
5. Asamani JA, Alugsi SA, Ismaila H, Nabyonga-Orem J. Balancing equity and efficiency in the allocation of health resources—Where Is the middle ground? *Healthcare*,2021;9(10):1257. <https://doi.org/10.3390/healthcare9101257>
6. Azad AMS, Raza A, Zaidi SSZ. Empirical relationship between operational efficiency and profitability. Evidence from Pakistan exploration sector. *Journal of Accounting, Business and Finance Research*,2018;2(1):7–11. <https://doi.org/10.20448/2002.21.7.11>
7. Choiriyah C, Fatimah F, Agustina S, Ulfa U. The effect of return on assets, return on equity, net profit margin, earning per share, and operating profit margin on stock prices of banking companies in Indonesia Stock Exchange. *International Journal of Finance Research*,2021;1(2):103–123. <https://doi.org/10.47747/ijfr.v1i2.280>
8. Chude ID, Chude NP, Egbunike CF. intellectual capital and financial performance of quoted manufacturing firms. *Annals of Human Resource Management Research*,2023;2(2):147–160. <https://doi.org/10.35912/ahrmr.v2i2.1251>
9. Chukwu BC. Impact of agricultural sector on economic growth in Nigeria. *SSRN Electronic Journal*, 2023. <https://doi.org/10.2139/ssrn.4432800>
10. Ewrierhurhoma DE, Onouha BC. Knowledge management tools applications and organizational performance of manufacturing firms in Rivers State, Nigeria. *International Journal of Knowledge and Dynamic Systems*,2020;13(2):1–16. <https://www.arcnjournals.org/images/NRDA-IJKDS-13-2-1.pdf>
11. Ezeanyejí CI, Usifoh KS, Umeuzuegbu U, Ejefobihi UF. Industrial sector growth and economic performance in Nigeria. *Journal of Policy and Development Studies*,2023;13(4):1–19.
12. Fapohunda F, Ogbeide S, Okuomose O. Empirical assessment of manufacturing companies efficiency in Nigeria: Data Envelopment Analysis (DEA) Approach. *Research Journal of Finance and Accounting*,2017;8(22):2222–2847. <https://core.ac.uk/download/pdf/234632178.pdf>
13. Huil M. Critical view on Leibenstein's X-efficiency theory. 4th IBA Bachelor Thesis Conference, Enschede, the Netherlands, 2014. https://essay.utwente.nl/66208/1/Huil_BA_MB.pdf
14. Ifeyinwa AU, Chukwuma MJ, Azubuike MK. E-Tax compliance in Nigeria: implications for Company Income Tax and Petroleum Profit tax. *NG Journal of Social Development*,2024;12(1):1–13. <https://doi.org/10.4314/ngjsd.v12i1.1>
15. Imhanzenobe JO. Operational efficiency and financial sustainability of listed manufacturing companies in Nigeria. *Journal of Accounting and Taxation*,2019;11(1):17–31. <https://doi.org/10.5897/jat2018.0329>
16. Kamruzzaman D. Impact of the financial factors on Return on Assets (ROA). *Daffodil International University Journal of Business and Entrepreneurship*,2019;12(01):50–61. <https://doi.org/10.36481/diujbe.v012i1.54kdown08>
17. Kariuki M. Effect of operational efficiency on financial performance of Cement firms listed at the Nairobi

- Securities Exchange, Kenya. *IOSR Journal of Economics and Finance*,2021:12(4):32–41. <https://doi.org/10.9790/5933-1204033241>
18. Kurniasih RP, Akhmadi. Profitability mediates the influence of operational efficiency on company financial performance. *International Journal of Social Science and Human Research*,2024:7(7):4634–4644. <http://dx.doi.org/10.47191/ijsshr/v7-i07-13>
 19. Mahdi OR, Nassar IA. The business model of sustainable competitive advantage through strategic leadership capabilities and knowledge management processes to overcome COVID-19 pandemic. *Sustainability*,2021:13(17):9891. [mdpi](https://doi.org/10.3390/su13179891).
 20. Mahrani M, Soewarno N. The effect of good corporate governance mechanism and corporate social responsibility on financial performance with earnings management as mediating variable. *Asian Journal of Accounting Research*,2018:3(1):41–60. [emerald](https://doi.org/10.1108/ajar-06-2018-0008).
 21. Nneji AJ, Amahalu NN, Ndubuisi-Okolo PU. Intellectual capital efficiency and financial performance of listed manufacturing firms in Nigeria. *Journal of Global Accounting*,2024:10(3):180–202. <https://journals.unizik.edu.ng/joga/article/download/4743/3874/10780>
 22. Odumusor CJ. Effect of inventory management on the production efficiency of manufacturing firms in Nigeria. *International Research Journal of Economics and Management Studies*,2024:3(1):399–413. <https://doi.org/10.56472/25835238/IRJEMS-V3I1P145>
 23. Ogudu GN, Imandojemu K, Akinlosotu NT. Corporate income tax and manufacturing sector performance in Nigeria: a panel data analysis Nigeria: a panel data analysis. *CBN Bullion*,2018:42(4):28–36. <https://dc.cbn.gov.ng/cgi/viewcontent.cgi?article=1304&context=bullion>
 24. Okeke CE, Saluadeen YM. Tax Reform and Tax Compliance Behaviour of Companies in Nigeria Tax Reform and Tax Compliance Behavior of Companies in Nigeria. *Munich Personal RePEc*, 2021. https://mpra.ub.uni-muenchen.de/111367/1/MPRA_paper_111367.pdf
 25. Onaolapo AR, Odedoyin MA. Operating efficiency and financial performance of deposit money banks in Nigeria. *British Journal of Multidisciplinary and Advanced Studies*,2024:5(4):68–87. <https://doi.org/10.37745/bjmas.2022.04162>
 26. Otoo FNK. Assessing the influence of financial management practices on organizational performance of small- and medium-scale enterprises. *Vilakshan - XIMB Journal of Management*,2024:21(2):162–188. [Emerald](https://doi.org/10.1108/xjm-09-2023-0192). <https://doi.org/10.1108/xjm-09-2023-0192>
 27. Phan HP, Ngu BH. Perceived “optimal efficiency”: theorization and conceptualization for development and implementation. *Heliyon*,2021:7(1):e06042. <https://doi.org/10.1016/j.heliyon.2021.e06042>
 28. Ramon-Jeronimo JM, Florez-Lopez R, Araujo-Pinzon P. Resource-Based View and SMEs performance exporting through foreign intermediaries: The mediating effect of management controls. *Sustainability*,2019:11(12):3241. <https://doi.org/10.3390/su11123241>
 29. Sobhy N, Megeid A, Mohamed H, Abd-Elmageed Magdy N, Riad A. Impact of Operational Efficiency and Financial Performance on Capital Structure using Earnings Management as a Moderator Variable, 2020. https://atasu.journals.ekb.eg/article_160431_dee1de721cd403fc7148521ce862d878.pdf
 30. Umeobi CN, Akam GU, Okeke MC. Financial resources and performance of manufacturing firms in the South-East, Nigeria. *International Journal of Research and Innovation in Social Science*,2023:7(1):629–641. <https://ideas.repec.org/a/bcp/journal/v7y2023i1p629-641.html>