

Cost Efficiency and Financial Performance of listed Manufacturing Firms in Nigeria

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Abstract: *This study examined the influence of cost efficiency on financial performance of listed manufacturing firms in Nigeria. This was achieved through the following specific objectives: to examine the effect of raw materials management efficiency to ascertain the influence of labour efficiency on financial performance of listed manufacturing firms in Nigeria; to determine the effect of overhead efficiency. The study used ex post facto research design with sample size of ten (10) firms from 2015-2021. Secondary data were the main source of data collection; this was obtained from financial reports of the listed manufacturing firms. Multiple linear regressions was employed to test the hypotheses at 0.05 level of significance and statistical package for social science (SPSS version 20.0) was used to enhance data analysis. The findings of the study revealed that there was a significant positive effect of raw material efficiency on the financial performance of listed manufacturing firms in Nigeria; also, labour efficiency was also found to have a positive influence on financial performance of listed manufacturing firms in Nigeria. Based on the findings of the study, it was concluded that there is a significant influence between raw material efficiency, labour efficiency and overhead efficiency on financial performance of manufacturing firms in Nigeria. It was therefore recommended that; material cost should be reduced to the barest minimum since it is one of the integral components of cost of sale and this can be achieved by encouraging large scale merchandized production of the major raw material of the firm; It was also recommended that manufacturing firms should increase their resource commitment to training and re-training of staff and R&D so as to update their knowledge, develop their skills in modern manufacturing techniques.*

Keywords: *Management Efficiency, Labour Efficiency, Overhead and Financial Performance, Non-Value adding activities*

Introduction

Cost efficiency is an important and basic determinant of the decision-making process in a business. This is because cost efficiencies are business strategies that strive to reduce the cost of creating a product or performing an activity without compromising quality. Determining cost

efficiencies requires comparing the benefits of the output to the costs of the input. By measuring the revenue generated against expenses incurred, this highlights potential areas of improvement for the organization to save money and improve efficiencies. Cost efficiencies are important because they facilitate ways for a company to become more profitable. Nkem and Akujinma (2017) opined that cost efficiencies maximize a company's capabilities, enabling it to generate more revenue and improve the value provided to customers. This is especially important as businesses grow and expand. Cost efficiencies also allow businesses to make better decisions. They allow professionals to assess the benefits, costs and worth of investments, programs and projects to determine their profitability and to manage inventory. They may also uncover potential benefits or opportunities not previously considered.

Efficient labour utilization is the sum of all wages paid to employees, as well as the cost of employee benefits and payroll taxes paid by an employer. A better way to optimize revenue and resources is to adopt a cost efficiency mindset. Cost efficiency is about reducing the cost of delivering organizations services, without undermining the services themselves. Having a sound inventory management system will directly affect a business' costs. Cost efficiency consists of those actions that are taken by managers to reduce costs, some of which are prioritized on the basis of information extracted from the accounting system.

There are two major types of costs involved in manufacturing firms: direct costs and indirect costs. Direct costs are the costs which can be traceable physically and directly to a product or service; while the reverse applies for indirect costs. Although they cannot be traced directly to the product or service itself. However, it is extremely important to ensure that indirect costs are apportioned accurately, as the amount significantly impacts on the pricing decision of a manufacturing business.

Financial performance is a subjective measure of how well a firm can use assets from its

primary mode of business and generate revenues. The term is also used as a general measure of a firm's overall financial health over a given period. Financial performance is also strongly influenced by financial ratios. Performance measurement is of significance to manufacturing companies as most of them operate with uncertainty. It plays a link role in that it provides feedback into the business strategy in order for any refinements to be applied. The financial performance measure for the study is return on asset (ROA). Return on asset is a profitability measure that provides how much profit a company is able to generate from its assets. In other words, return on asset (ROA) measures how efficient a company's management is in earning profit from their economic resources or assets on their statement of financial position. Thus, this study aims to examine the relation between cost efficiency and financial performance of listed manufacturing firms in Nigeria.

Statement of the Problem

Financial performance of some listed manufacturing firms in Nigeria has been found to be inadequate over the years. This may be due to lack of vital cost-efficient approach that would have improved the overall profitability to make informed decisions. Poor inventory management system of raw material and high labour cost of employee's salaries directly affects a business' costs, a better way to optimize revenue and resources is to adopt a cost efficiency mindset. Cost efficiency is about reducing the cost of delivering organizations services, without undermining the services themselves. This will mean having a sound inventory management system which will directly affect a business' costs. Inventory management may help organizations only when the order the items they actually need and ensure that the firm order the correct amounts, this can help avoid creating overstock or ordering too much of something that becomes obsolete and difficult to sell.

The benefits of cost efficiency are enormous as cost efficiency helps a company improve its product and processes by reducing waste and other non-value-adding activities. Efficiency strategy helps firms to produce the standard, high-volume product or service at the most competitive price to customers; it also helps to create higher financial performance for firms competing in the emerging economies.

Objectives of the Study

The main objective of this study was to examine the relationship between cost efficiency and financial performance of listed manufacturing firms in Nigeria. This was achieved through the following specific objectives:

- i. To examine the effect of raw materials management efficiency on financial performance of listed manufacturing firms in Nigeria.
- ii. To ascertain the influence of labour efficiency on financial performance of listed manufacturing firms in Nigeria.
- iii. To determine the effect of overhead efficiency on financial performance of listed manufacturing firms in Nigeria.

Research Hypotheses

- H₀₁:** The effect of raw material efficiency on financial performance of listed manufacturing firms in Nigeria is not significant.
- H₀₂:** The influence of labour efficiency on financial performance of listed manufacturing firms in Nigeria is not significant.
- H₀₃:** The effect of overhead efficiency on financial performance of listed manufacturing firms in Nigeria is not significant.

Significance of the Study

This research on completion would be significant to academicians, and manufacturing industry. The

findings of this study would help manufacturing firms understand better ways to solve the problem of cost efficiency and improve standards of living. It will also be beneficial to management of companies as it will aid improved decisions for business expansion and growth. For the academics, it would add to the improvement of the literature on cost efficiency and financial performance, and would throw more light to scholars and students on cost management. It would also serve as a body of reserved knowledge to be referred to by researchers. Cost efficiencies are important because they facilitate ways for a company to become more profitable, maximize a company's capabilities, enabling it to generate more revenue and improve the value provided to customers. This is especially important as businesses grow and expand. They allow professionals to assess the benefits, costs and worth of investments, programs and projects to determine their profitability. They may also uncover potential benefits or opportunities not previously considered.

Literature Review

Conceptual framework

Management of cost is critical in considering the performance of any company. The cost rate structure plays a critical role in supporting strategic business model and consistent business operations. Profit making and not-for-profit, service-oriented manufacturing or combination of both, should reflect the operational expenses (Sriyana, 2015). One of the major challenges confronting the Nigerian manufacturing industry today is the persistent increase in inputs costs incurred in the manufacture and distribution of the products in the sector. This situation has degraded the financial performance in the industry to the detriment of the economy (Okwo andUgwunata, 2012).

The conceptual framework of this study is presented in the diagram below:

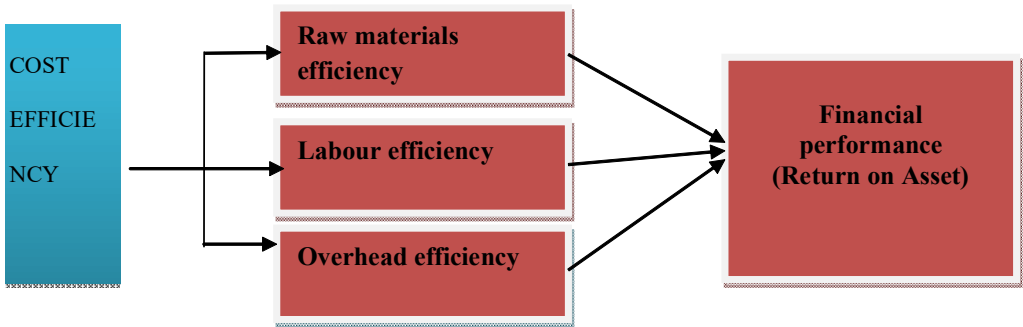


Fig 2.1: Diagrammatical representation of the variables.

Source: Researcher’s compilation, (2023)

Cost Efficiency

Irina, Aleksejs and Agnese, (2016) emphasized that efficiency is closely interdependent with effectiveness, meaning that an efficient undertaking without being effective will not have a very long period of existence, and an effectiveness of organization without obtaining efficiency automatically lead to unfavorable economic results. Cost efficiency strategy supports decision making and improves competitive advantage that results in a better resource allocation (Chutimon, Dulip, and Regin, 2020). Limited resource and apparent continuous competition influence firms to better managing cost of production by implementing standard costing, budget system, monitoring cost information, and focusing on value added activities by eliminating non-value-added activities through supplier coordination, and emphasizing on cost structure by analyzing cost and finding the way to reduce costs in the stage of pre-production (Gichuki, 2014).

According to Mamidu and Akinola, (2019) Firms with cost efficiency strategy implementation are able to know the amount of cost they will incur in the future if they have current and future cost information.

Ways of Improving Cost Efficiencies

There are different ways of improving cost efficiencies, such as; investing in ways to innovate your organization and maximize your

production. For example, explore ways to source materials directly from suppliers, expand your manufacturing processes or create a new distribution network with local suppliers. This may make your product more accessible, attracting more customers and increasing your revenue (Khalifaturofi’ah, 2018). According to Nkem and Akujinma, (2017) developing and implementing an efficient inventory management system will provide a real-time report of an organization’s current stock. Inventory management may help an organization order only the items actually needed and ensure the correct amounts are ordered

Determinants of Cost efficiency

Raw Materials efficiency

According to Sasha and Martin, (2014) material efficiency is a key element within circular economy and resource efficiency, which reduces solid industrial waste, recoups a large portion of the original material value, helps the manufacturing industry to go up the waste hierarchy, and in a national and/or global perspective reduces the demand for virgin raw material.

In general, the goal is to have all of the raw materials an organization need to produce a product to ensure the production process is efficient and stays on schedule. Scrap and spoilage are elements that companies consider when calculating raw materials cost and purchasing raw materials (Sasha, Mohammed, Martin and Magnus, 2016). Although some amount of scrap is unavoidable due to the manufacturing process, companies can avoid

spoilage by properly budgeting for raw materials and then storing them properly (Sasha and Martin 2014).

Labour Efficiency

Efficiency of labour implies the quality and quantity of goods and services which can be produced within a given time and under certain conditions, it is also the ability of labour by virtue of which it is productive. In addition to gross wages, labour efficiency includes the social contributions payable by the employer (social security, unemployment, pension, provident scheme, severance pay), whether compulsory, conventional or optional (Nwarogu&Iormbagah, 2017).

Labour efficiency is an integral part of your business, as it tells you how efficient your mechanics are, over time. It is also a key performance indicator (KPI) which defines how much of the technician's time is spent working productively (Business dictionary, 2018).

Overhead (OH) Efficiency

Overhead efficiency is the whole of functions arrived at steering and supporting the organization's primary processes efficiently. Overhead is an intangible phenomenon (Christian *et al.*, (2020); Nwarogu and Iormbagah, 2017) that is difficult to grasp for a number of reasons. Overheads efficiency are ways of efficiently dealing with business costs that are related to the day-to-day running of the business (Nwarogu&Iormbagah, 2017). Unlike operating expenses, overheads cannot be traced to a specific cost unit or business activity. Instead, they support the overall revenue-generating activities of the business (Nwabgoso, 2017).

Overhead efficiency is important in determining how much a company must charge for its products or services in order to generate a profit.

Douye, Gospel, and Amos, (2022) emphasized that overheads are the indirect costs that cannot be allocated to any specific job or process as they are not capable of being identified with any specific job or process. It includes cost of indirect materials, indirect labor and indirect expenses that

cannot be conveniently charged to any job or process. The basic principles to be considered while treating an item as OH according to Christian, Alessandro and Sara, (2020) are as follows: The aggregate of indirect material costs, indirect wages and indirect expenses is OH. Thus, it comprises of all indirect costs. Therefore, the relationship of the items of cost to products, jobs, etc., must be traced.

The Concept of Financial Performance

The term is also used as a general measure of a firm's overall financial health over a given period (Abdul, 2021). The financial performance identifies how well a company generates revenues and manages its assets, liabilities, and the financial interests of its stakeholders and stockholders (Inseng&Uford, 2019).

Financial performance is a complete evaluation of a company's overall standing in categories such as assets, liabilities, equity, expenses, revenue, and overall profitability.. Batchimeg(2017) highlighted that the assessment of an organization's financial performance can be known through financial statements. Financial statements consist of financial position statements, profit or loss statements, cash flow statements, and equity statements. For internal users, financial performance is examined to determine their respective companies' well-being and standing, among other benchmarks. For external users, financial performance is analyzed to dictate potential investment opportunities and to determine if a company is worth their while. Financial performance is an indication of how well an organization has utilized its resources with the main objective of maximizing shareholder's wealth by way of profitability (Naz, Ijazand Naqvi, 2016). According to Abdul (2021) organization's financial performance is one of the factors that can be seen by prospective investors to determine their stock investment. It is important to note the assessment of Akpan and Uford (2023), which stated that financial performance may be understood differently depending on the person involved in the assessment of the firm

performance. They mentioned that it is to define the concept of financial performance, it is necessary to know its fundamental characteristics to each area of responsibility involved. Common examples of financial performance measures include profit, return on assets, return on equity, earnings per share gross profit margin (Charles & Uford, 2023).

Return on Asset (ROA)

Corporate management, analysts, and investors can use ROA to determine how efficiently a company uses its assets to generate a profit. Return on assets compares the value of a business's assets with the profits it produces over a set period of time (Uford, 2017).

Yuksel, Mukhtarov, Mammadov & Ozsari, (2018) stated that the ROA figure gives investors an idea of how effective an organization is in converting the money it invests into net income. The higher the ROA number, the better, because the organization is able to earn more money with a smaller investment. In simpler form, a higher ROA means an asset is more efficient and productive at managing its balance sheet to generate profits while a lower ROA indicates there is room for improvement.

Assets in question are overall company properties, obtained from the capital itself or from foreign capital that has been converted into company assets used for corporate sustainability (UwahAji & Iniabasi, 2023).

Cost Efficiency and Financial Performance

According to Pandey, (2004) a firm may produce a relative high profit margin by adopting the efficiency management. Simply put, it is the act of saving money by making a product or performing an activity in a better way (Izah, Nor., & Sudin, 2010).

Efficiency is a fundamental concept in the economic field as a measure of success in resource allocation. Efficiency is the ratio between the number of resources or costs that must be sacrificed to achieve an activity's results (Hwai-

shuh, 2012). According to Gichuki, (2014) cost efficiency and other organizational success dimensions are based on external and internal influences. External aspects, such as inflation rates, tax, interest on credit or financial stability.

Raw Material Efficiency and Financial Performance

Material efficiency is one of the widely suggested strategies to cut cost in an organization and attain superior financial performance (Greenovate, 2012). For instance, with widely documented fear of possible resource scarcity in terms of water and energy supply, firms which attain material efficiency will require less of these resources hence, bracing themselves for these unfavorable conditions which will see most firms closing up (Greenovate, 2012).

Material efficiency enables firms to reduce raw material required to produce a product, which is a low hanging fruit strategy towards cutting costs. Hence, material efficiency initiatives such as use of lesser material, easily recycled material, use of biodegradable material and improved raw material handling can help a firm to enhance its return on capital. Additionally, firms which adopt measures to attain a circular economy can enhance their market value from the perspective of green consumers and investors (Fischer, 2013).

Labour Efficiency and Financial Performance

Labour productivity measures the efficiency of the workforce, while efficiency takes into account all factors of input such as capital, workforce and other resources. Proficient use of inputs permits companies to maximize performance and hence, fulfil the requirements of more consumers (Hyunminet *et al*, 2022). According to Mustahsan and Bilal, (2017), efficient utilization of inputs signifies that fewer inputs are required to produce a certain level of output, therefore, reducing the unit costs for the organization.

There are several ways to enhance efficiency and which will boast the overall productivity as well as the performance of the organization such as; Utilization of renewable resources, increase the education and training of the labour force,

increase the degree of investment in capital equipment, developments in management skills and inclination for taking risks, combination of the factors of production in a well-adjusted way as this will make sure that all inputs are utilized in an effective manner (Tuna & Yildiz, 2016).

Overhead Efficiency and Financial Performance

Nwarogu and Iormbagah, (2017) opined that overhead efficiency is important because it directly impact both your financial statement and income statement, but perhaps even more important, an organization knowing or incorrectly calculating their overheads can result in decreased profit from inaccurate product pricing. Understanding and managing overheads efficiently, particularly how it relates to business output will help ensure organizations are profitable and to obtain the best margins (Nwagboso, 2017). Not efficiently managing overheads when pricing a product or service can result in a significant loss of profit if a product is underpriced. Conversely, an incorrect estimate of overhead cost might cause a product to be overpriced thereby, adversely impacting sales and potentially inventory turn-over rates.

Theoretical framework

This study is anchored on cost management and efficiency theory but other theories that are relevant to the study are also discussed here.

Cost Management and Efficiency Theory

Efficiency theory acknowledges that, if a firm has achieved both technically efficient and allocatively efficient levels of production, it is economically efficient. Efficiency theory also states that an action achieves the greatest benefit when marginal benefit from its allocation of resources is equivalent to its marginal social cost. Efficiency according to Farrell's documentation was decomposed into technical and allocative efficiency, Farrell distinguished between technical and allocative efficiency in production through the use of a frontier production function. Farrell in his study states two primary categories approach that efficiency can be applied which

are the data envelopment analysis (DEA) approach and stochastic frontier approach (SFA). The SFA being an economic model used to construct measures of inefficiency or efficiency while the DEA is a mathematical method using linear programming techniques to convert inputs to outputs.

In the "traditional model of cost behavior", efficient production specifies the optimal combination of inputs for a given level of output, several factors may intervene to preclude or limit resource adjustments. These factors are hypothesized to lead to "sticky" cost behavior in which costs adjust asymmetrically; more quickly for upward than for downward demand changes. A key factor in determining whether adjustment occurs is the cost of adjustment itself. For example, increasing labor inputs may require search, recruitment, and training costs while decreasing these same inputs might require severance payments Chutimonet *al*, (2020). Adjustment costs may be a property of the production function, as in the example of labour adjustments, or they may arise if managerial incentives diverge from those of the firm. Efficiency theory when applied by managers of manufacturing firms will bring forth optimum resource allocation, the minimum cost for producing goods and services and maximum outcome. (Dhaliwal, Igbai, Duflo & Tulloch, 2012).

Theory of Constraints

The fundamental of TOC is that constraints establish the limits of performance for any system. Most organizations contain only a few core constraints. TOC advocates suggest that managers should focus on effectively managing the capacity and capability of these constraints if they are to improve the performance of their organization. Once considered simply a production-scheduling technique, TOC has broad applications in diverse organizational settings. The theory of constraint focuses its attention on constraints and bottlenecks within the organization, which hinder speedy production. TOC is based on the idea that every system has at least one bottleneck which can be

defined as any kind of situation that impedes the system to reach high performance level in terms of its purposes. The main concept is to maximize the rate of manufacturing output i.e., the throughput of the organization. This requires examining the bottlenecks and constraints which are defined: A bottleneck is an activity within the organization where the demand for that resource is more than its capacity to supply (Izah, *et al*, 2010).

Theory of constraints, focuses on understanding and managing the constraints that stand between an organization and the attainment of its goals (Batchimeg, 2017). The financial professional, playing a pivotal role in theory of constraints implementation, uses management accounting to focus on identifying, analyzing, and reporting key events and opportunities affecting the organization. Emphasizing the development and maintenance of core management information sources within an organization will aid in achieving efficient cost management (Okwo, &Ugwunta, 2012).The main aim of every company is increasing the profit. According to this point of view, constraints are main obstacles at achieving companies' aims. In other words, everything which exists in the road of having more profit is considered as a constraint. So, if manufacturing firms can handle constraints by (rationale use of resources in an efficient manner) in their system and manage these bottlenecks, they would have a continuous improvement management system and thus the firms could achieve higher profits.

Transaction Cost Economics Theory

Transaction cost economic theory posits that the optimum organizational structure is one that achieves economic efficiency by minimizing the costs of exchange. The theory suggests that each type of transaction produces coordination costs of monitoring, controlling, and managing transactions. Transaction costs refer to explicit fees associated with a transaction as well as implicit fees of monitoring and controlling a transaction The optimum level of inventory should be determined on the basis of a trade-off between costs and benefits associated with the

levels of inventory. Costs of holding inventory include ordering and carrying costs. Ordering costs is associated with acquisition of inventory which includes costs of preparing a purchase order or requisition form, receiving, inspecting, and recording the goods received. However, carrying costs are involved in maintaining or carrying inventory and will arise due to the storing of inventory and opportunity costs.

Research Method

Research Design

Expost facto research design was adopted in this study. The research design was adopted since it relied on historical data to allow a complete assessment of the cost efficiency and financial performance of listed manufacturing companies in Nigeria.

Population of the Study

The study focused on manufacturing firms that are listed on the Nigerian Exchange Group (NGX). The population of the study consisted of 20 manufacturing firms actively trading on the floor of the NGX between the period of 2015-2021. The twenty (20) manufacturing firms for this study are Guinness Nigeria Plc, Champion Breweries Plc, Nestle Nigeria Plc, Honeywell Flour Mill Plc, Golden Guinea Brew Plc, Vita Foam Nig. Plc, PZ Cussons Plc, Bua Cement Plc, Dangote Cement Plc, Nascon Allied Industries Plc, Cadbury Nig. Plc, Dangote Flour Mills Plc, 7up Bottling Company Plc, First Alluminium Plc., Berger Paint Nigeria Plc, Multi-Trek Integrated Foods Plc, Union Dicon Salt Plc, Lafarge Cement Plc and Unilever Nig. Plc.

Sample Size and Sampling Technique

The sample size of this study consisted of ten (10) manufacturing firms that are listed and actively trading on the Nigerian exchange group. Purposive sampling technique was used for the study, the technique enhances selection of ten (10) manufacturing firms that disclosed cost related information. This selection is based on the nature and availability of the annual reports on the web over the period of the study.

Sources of Data

Secondary data were the main source of data for the study. The data were obtained from financial reports and accounts of companies selected for the study particularly, the comprehensive income statement of the firms as well as their respective notes to the accounts. The other relevant data for this study were collected from sources were the various books, publications of the Nigerian exchange group, journals, magazines, and websites.

Method of Data Collection

Data for both dependent variable- financial performance proxied by (return on asset) and independent variable which consisted of raw material efficiency, labour efficiency and overhead efficiency were extracted from financial reports of listed manufacturing firms via content analysis.

Descriptive and inferential statistics were used to analyze the data. Descriptive analysis such as mean, standard deviation, skewness and kurtosis were computed for each of the variable for the purpose of describing them. Multiple linear regression (least square regression model) was employed to test the hypotheses at the 0.05 level of significance. To enhance data analysis, the Statistical Package for Social Sciences (SPSS version 20.0) was used.

Research Variables and their Measurement

Independent Variables: The independent variable of this study is the cost efficiency of manufacturing firms. This includes raw material efficiency, labour efficiency, and overhead efficiency.

Dependent Variable: The dependent variable in this study is financial performance (return on asset).

Model Specification

Based on the empirical studies on cost efficiency and financial performance, the study model was adapted from Cabinova and Onuferovato, (2019) but was modified to capture cost efficiency (raw materials efficiency, labour efficiency and overhead efficiency) and financial performance (ROA) of listed manufacturing firms in Nigeria. Thus, the study designed the model from the variables of the study and was for the purpose of establishing the influence of the dependent variables and the linear combinations of several determining variables captured in the study. Succinctly, the econometric form of our model is expressed as follows;

$$ROA_{kt} = \hat{a}_0 + \hat{a}_1 LOG_RME_{kt} + \hat{a}_2 LOG_LE_{kt} + \hat{a}_3 LOG_OE_{kt} + e_t$$

Where:

$\hat{a}_1, \hat{a}_2, \hat{a}_3$ = coefficient of each of the independent variable in the specified

multiple regression model

\hat{a}_0 = Constant

ROA_{kt} = Return on asset for manufacturing firm k in year t

LOG_RME_{kt} = Raw material efficiency for manufacturing firm k in year t

LOG_LE_{kt} = Labour efficiency for manufacturing firm k in year t

LOG_OE_{kt} = Overheard efficiency for manufacturing firm k in year t

e_t = Error term in year t.

Table 1: Measurement of variables and a priori expectation

S/N	Variables	Sources	Apriori sign
	Dependent Variable		
1.	Return on asset (ROA)	Net profit/total assets	
	Independent variable		
2.	Raw material efficiency	Raw materials and consumables	+
3.	Labour efficiency	Personnel expenses (Salaries, wages and other employees' expenses)	+
4.	Overhead efficiency	Administrative cost	+

Source: Researcher’s Computation, (2023)

Data Analysis & Findings

Data Presentation

The data set were obtained via content analysis from the financial statements of the selected manufacturing firms. The studied firms are Guinness Nigeria Plc, Nigerian Breweries, Champion Breweries Plc, Nestle Nigeria Plc, Pz

Cussons Plc, Bua Cement Plc, Dangote Cement Plc, Lafarge Cement Plc, First Alluminium Plc., Berger Paint Nigeria Plc. The data set covered the period 2015 to 2021. The required data were raw material efficiency, labour efficiency, overhead efficiency and return on assets. The data set is presented in Appendix.

Table 2: Descriptive statistics for cost efficiency and financial performance of listed manufacturing firms in Nigeria

S/N	Firms	RME		LE		OE		ROA	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	Berger Paint Plc	1718.01	622.04	605.66	82.82	897.58	174.94	5.86	2.55
2	Bua Cement	9760.46	9277.93	4788.82	3445.01	7599.86	5187.25	6.88	7.49
3	Champion Breweries	1448.37	1014.16	971.83	133.79	1324.37	595.18	3.13	3.27
4	Dangote Cement	114926.00	37445.90	29599.86	8256.70	49415.43	11813.56	14.48	4.43
5	First Alluminium	4659.19	2865.54	263.75	326.62	309.62	212.10	-0.87	2.77
6	Guinness Plc	55817.00	17405.68	10961.49	1437.35	36255.32	3094.79	12.41	22.89
7	Largage Africa	44004.20	42471.98	7054.91	4957.91	39090.30	35741.05	5.81	9.28
8	Nestle Nigeria Plc	104824.53	34321.12	24061.01	3778.83	47300.33	14921.89	18.07	7.53
9	Nigerian Breweries	131885.60	33538.87	41649.53	3816.99	92802.95	11966.84	5.79	3.32
10	PZ Cusson	40221.59	13905.51	7412.38	914.51	15030.37	924.15	1.58	5.13

RMSE- Raw material efficiency, LE- Labour efficiency, OE- Overhead efficiency, ROA- Returns on Asset, SD- standard deviation. Values on RME, LE and OE are in ₦ millions

Result in Table 2 presents the summary of the descriptive analysis for cost efficiency dimensions (raw material, labour and overhead efficiency) of financial performance of listed manufacturing firms in Nigeria. Result indicates

that Nigeria Brewery secured the highest average cost on raw material (₦131,885.60 million), labour (₦41649.53 million) and overhead cost (₦92802.95 million). In terms of ROA, Nestle Nigeria (mean = 18.07) reported the highest mean Return on Asset among the listed manufacturing firms in Nigeria. Summary result of the descriptive statistics for the research variables is as presented in Table 4.2.

Table 3: Descriptive Statistics For Cost Efficiency and Financial Performance Variables

	N	Min.	Max.	Mean	SD	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
RME	70	367.75	197821.76	50926.50	52987.77	0.90	-0.27
LE	70	24.26	49605.58	12736.93	14006.02	1.06	-0.13
OE	70	177.11	118301.78	29002.61	31157.86	1.15	0.65
ROA	70	-9.23	63.76	7.31	10.11	2.72	13.26

Source: Researcher’s Computation, (2023) Using SPSS Version 20.0.

RMSE- Raw material efficiency, LE- Labour efficiency, OE- Overhead efficiency, ROA- Returns on Asset, SD- standard deviation. Values on RME, LE and OE are in ₦ millions

Table 3 presents the descriptive statistics for the research variables. Result reveals mean values of ₦50,926.50 million, ₦12,736.93 million, ₦29,002.61 million for raw material efficiency, labour efficiency and overhead efficiency with

standard deviation of 52987.77, 14006.02, 31157.86 and 10.11 respectively. The average ROA was 7.31 indicating that these firms made gain on the average within the period of study.

Test for Assumptions of the Least Square Regression Model

The various tests and analysis were carried out using a statistical package (SPSS) at 5% level of significance.

Table 4: Test for Linearity

			Sum of Squares	df	Mean Square	F	Sig.
RESPONSES * VARIABLES	Between Groups	(Combined)	2103.776	3	701.259	1240.419	.000
		Linearity	1334.587	1	1334.587	2360.679	.000
	Within Groups	Deviation from Linearity	769.189	2	384.595	680.289	.090
			156.034	276	.565		
Total			2259.810	279			

Source: Researcher’s Computation (2023)

Table 4 presents above revealed that there exists a linear relationship between the dependent and the independent variables. This is true since the

p- value of 0.000 was less than the significance level of 0.05 used in the test. The significance level for deviation from linearity confirms the existence of linear relationship as the p-value was not significant at 5% level of significance.

Table 5: Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
10.683	3	276	.070

Source: Researcher’s Computation (2023)

Table 5 above showed that the variances are equal. The validity of the assumption holds

because the Levene statistic of 10.683 was not significant at 5% level of significance (p-value 0f 0.070>0.05).

Table 6: Tests of Normality

Variables	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Variables	.252	.280	.1500	.769	.280	.0703

a. Lilliefors Significance Correction

Source: Researcher’s Computation (2023)

Table 6 presents the summary of the results of the normality test. The two-test statistic;

Kolmogorov-Smirnov and Shapiro-Wilk were not significant at 5% level of significance since the p-values for both statistics were greater than 0.05. hence, the error terms associated with the variables are normally distributed.

Table 7 : Test for Autocorrelation

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.378 ^a	.143	.104	9.61521	1.987

a. Predictors: (Constant), LOGRME, LOGLE, LOGOE

b. Dependent Variable: Return on asset (ROA)

Source: Researcher's Computation, (2023)

From table 7 above, the Durbin-Watson statistic of 1.987 was observed. It is necessary to note that the Durbin-Watson statistic of below 2.00, 2.00 and above 2.00 signifies the presence of

positive autocorrelation, no auto correlation and negative autocorrelation. Hence, 1.987 by approximation, it means that there exists no serious autocorrelation.

Test for Multicollinearity

The result of the collinearity test is as captured in Table 4.7 below.

Table 8: Collinearity Statistics^a

Model	Collinearity Statistics		
		Tolerance	VIF
1	(Constant)		
	LOGRMSE	.236	1.233
	LOGLE	.131	1.655
	LOGOE	.107	1.340

Source: Researcher's Computation (2023)

The result of the collinearity test using the Variance Inflation Factor (VIF), it noticed that the VIF values were all less than 5 which is the accepted region for the absence of collinearity. Values above 10 implies a stronger degree of collinearity among the independent variables which means the variables are dependent. Hence, the independent variables (raw material efficiency, labour efficiency and overhead efficiency) used in this work are truly independent in relation to the dependent variable.

Coefficient of Correlation and Determination

Table 8 above also captured coefficient of multiple correlation and determination represented as R and R-Square respectively. The result showed a multiple correlation coefficient of 0.378 indicating

a weak but positive correlation between financial performance as measured by ROA and the independent variables; raw material efficiency, labour efficiency and overhead efficiency of listed manufacturing firms in Nigeria. Also, the coefficient of determination of 0.143 implies that about 14.3% of the variation in the financial performance as measured by ROA was accounted for by raw material efficiency, labour efficiency, overhead efficiency of listed manufacturing firms in Nigeria.

Parameters Estimates of the Multiple Regression

The parameter estimates of the multiple regression model as well as the significance of each of the parameter in the multiple regression model is as presented in Table 9.

Table 9: Parameters estimates of the regression for the relationship between raw material efficiency, labour efficiency, operational efficiency and financial performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-24.431	10.657		-2.292	.025
	LOGRMSE	.186	2.989	.015	-.062	.030
	LOGLE	3.288	3.919	.264	.839	.010
	LOGOE	1.591	4.176	.133	.381	.034

Source: Author's computation (2023) using SPSS version 20.0

Result in Table 9 presents parameters estimates of the regression result showing the relationship between raw material efficiency, labour efficiency, overhead efficiency and financial performance. The unstandardized regression coefficients of .186, 3.288 and 1.591 were obtained for raw material efficiency, labour efficiency and operational efficiency respectively which implies that there is a positive relationship between financial performance and cost efficiency variables (raw material, labour and overhead efficiency). This means that there is a positive relationship between raw material efficiency and

financial performance ($\hat{\alpha} = .186$), labour efficiency and financial performance ($\hat{\alpha} = 3.288$) and between overhead efficiency and financial performance ($\hat{\alpha} = 1.591$).

Test for Adequacy of the Model

Result of Analysis of Variance (ANOVA) showing whether there is a regression relationship between the financial performance of listed manufacturing firms as measured by ROA and cost efficiency (raw material efficiency, labour efficiency and overhead efficiency) of listed manufacturing firms is presented in Table 10.

Table 10: ANOVA result summary showing the relationship between raw material efficiency, labour efficiency, overhead efficiency and financial performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1019.783	3	339.928	3.677	.016 ^b
	Residual	6101.855	66	92.452		
	Total	7121.638	69			

a. Dependent Variable: Return on asset (ROA)
 b. Predictors: (Constant), LOGRMSE, LOGLE, LOGOE

Source: Author’s computation (2023) using SPSS version 20.0

Table 10 above showed the summary of the model for the relationship between raw material efficiency, labour efficiency, overhead efficiency and financial performance of listed manufacturing firms in Nigeria. P-value of 0.016 is less than the significance level of 0.05. This means that there is a significant regression relationship between the firm performance as measured by ROA and cost efficiency variables (raw material efficiency, labour efficiency and overhead efficiency) since the fitted multiple regression model is adequate.

Test of Hypotheses

Hypothesis 1

H_{01} : The effect of raw material efficiency on the financial performance of listed manufacturing firms in Nigeria is not significant.

Result in Table 10 reveals that raw material efficiency ($\hat{\alpha} = .186$, SE = 2.989, t-calc. = -0.062, P-value = 0.030) has positive and significant effect on the financial performance of listed

manufacturing firms. Result also shows standardized beta coefficient of 0.015 for raw material efficiency which indicates that if other variables are held constant, for every 1 unit increase in raw material efficiency, the financial performance of the listed manufacturing firms as measured by ROA will increase by 0.015. The null hypothesis is rejected which means there is positive and significant effect of raw material efficiency on the financial performance of listed manufacturing firms. This result implies that if there is a significant improvement in raw material efficiency, there will be a significant improvement in the financial performance of listed manufacturing firms in Nigeria.

Hypothesis 2

H_{02} : The influence of labour efficiency on the financial performance of listed manufacturing firms in Nigeria is not significant

Result reveals that labour efficiency ($\hat{\alpha} = 3.288$, SE = 3.919, t-calc. = 0.839, P-value = 0.010) has positive and significant influence on the financial performance of listed manufacturing firms. Result

also shows standardized beta coefficient of 0.264 for labour efficiency which indicates that if other variables are held constant, for every additional unit increase in labour efficiency, the financial performance of the listed manufacturing firms as measured by ROA will increase by 0.264. The null hypothesis is rejected which means there is positive and significant influence of labour efficiency on the financial performance of listed manufacturing firms. This result implies that if there is a significant improvement in labour efficiency, there will be a significant improvement in the financial performance of listed manufacturing firms in Nigeria.

Hypothesis 3

H_{03} : The effect of overhead efficiency on the financial performance of listed manufacturing firms in Nigeria is not significant.

Result reveals that overhead efficiency ($\hat{\alpha}=1.591$, $SE=4.176$, $t\text{-calc.}=0.381$, $P\text{-value}=0.034$) has positive and significant effect on the financial performance of listed manufacturing firms. Result also shows standardized beta coefficient of 0.133 for overhead efficiency which indicates that if other variables are held constant, for every additional unit increase in overhead cost efficiency, the financial performance of the listed manufacturing firms as measured by ROA will increase by 0.133. The null hypothesis is rejected which means there is positive and significant effect of overhead efficiency on the financial performance of listed manufacturing firms. This result implies that if there is a significant improvement in overhead efficiency, there will be a significant improvement in the financial performance of listed manufacturing firms in Nigeria.

Discussion of findings on the effect raw material efficiency on financial performance

The result of the analysis showed that raw material efficiency with a regression coefficient of 0.186 indicates a significant positive effect on financial performance of manufacturing firms in Nigeria. The result of the analysis shows that there is a positive effect of raw materials efficiency on

financial performance of listed manufacturing companies in Nigeria.

Discussion of findings on the influence of labour on financial performance

The result of the analysis showed that labour efficiency with a regression coefficient of 3.288 for has a significant positive influence on financial performance of listed manufacturing firms in Nigeria. This result means that an increase in the labour efficiency will increase the financial performance of selected manufacturing companies. The result of the analysis shows that labour efficiency has a positive influence on financial performance of selected manufacturing companies in Nigeria as shown.

Discussion of findings on the effect of overhead efficiency on financial performance

The overhead efficiency has a regression coefficient of 1.591 also showed significant positive influence on the financial performance of listed manufacturing companies in Nigeria. This result means that an increase in the overhead efficiency will lead to corresponding improvement in the financial performance of selected manufacturing companies in Nigeria.

Findings & Conclusion

The following were the major findings of the study;

1. There is a significant positive effect of raw material efficiency on the financial performance of listed manufacturing firms in Nigeria. The study also established that if other variables are held constant, for every 1 unit increase in raw material efficiency, the financial performance of the listed manufacturing firms will increase by 0.015.
2. Labour efficiency was also found to have a positive influence on the financial performance of the listed manufacturing firms in Nigeria. Result also showed that that if other variables are held constant, for every 1 unit increase in labour efficiency, the financial performance of the listed manufacturing firms will increase by 0.264.

3. The result of the analysis showed a significant positive effect of overhead efficiency on the financial performance of the listed manufacturing firms in Nigeria. Finding also revealed that for every 1-unit increase in labour efficiency, the financial performance of the listed manufacturing firms will increase by 0.133.

Based on the result of the findings, it was concluded that; there is a significant positive influence of raw materials efficiency and overhead efficiency on the financial performance of manufacturing firms in Nigeria.

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