

COST REDUCTION TECHNIQUES AND OUTPUT EFFICIENCY IN NIGERIA MANUFACTURING FIRMS

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Abstract: *This study empirically examined the cost reduction techniques and output efficiency in Nigeria manufacturing firms between the periods of 2013 - 2022. The objectives of this study are to; examine the effect of change in cost of inventories on output efficiency in Nigeria manufacturing; measure the effect of change in cost of labour on output efficiency in Nigeria manufacturing; determine impact of change in cost of sales on output efficiency in Nigeria manufacturing; examine the impact of change in overhead cost on output efficiency in Nigeria manufacturing. Four research questions and four hypotheses were formulated in line with the stated objectives. The variables used were sourced from secondary source. Ex-post facto research design was used in this study, the study selected 10 manufacturing firms in Nigeria as a sample size, the study used panel least square as a method of data analysis. Data used for the study were obtained from the financial report of the selected consumer firms various years, the variables used are change in cost of inventory, degree of change in cost of labour and change in cost of sales. The study shows that, It was observed that cost of inventory has a positive sign and statistically insignificant with financial performance of manufacturing firm. Cost of labour has a positive sign and statistically insignificant with financial performance of manufacturing firm. cost of sales has a positive effect and is statistically significant with financial performance of manufacturing firm. The study recommends that Company policy makers and transaction advisors should be keen on making cost management policies to be applied since they greatly impact on financial performance of the company. Company policies regarding to inventory cost of companies should incorporate various cost management strategies since they greatly impact financial performance. Financial policies regarding cost of sales strategies should be formulated and be used keenly and with a lot of controls to avoid critical financial losses.*

Keywords: *cost reduction techniques, output efficiency, cost of inventories, cost of labour, cost of sales*

1.1 INTRODUCTION

Cost reduction techniques refer to cost cutting and it's commonly approached that firm managers use to respond to the decreasing sustainable profitability (Anderson, 2019). The most important managerial tools are cost management strategies (Zengin & Ada, 2020), and cost reduction techniques are considered as critical factors to increase revenue for the success of manufacturing companies (Kumar & Shafabi, 2019). Cost reduction supports decision making and improves competitive advantage that results in

a better resource allocation (Ellram & Stanley, 2018). In addition, cost reduction techniques may be an integral feature of overall businesses' management effectiveness and facilitate to determine accurately estimated cost before process starting and can help to forecast cost occurrence in the future. Cost reduction effectiveness helps to finish the task with the spending of limited allocated resources and makes valuable to firms such as working capital invested reduction, lower cost per unit, and better quality of the process and product (Groth & Kinney, 2019).

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 (Caroline, 2014). Firms with cost management strategy implementation are able to know when the amount of cost will incur in the future if they have current and future cost information. Thus, managers can make better decision which will positively improve the financial performance of organization (Caroline, 2014). For minimization so has to enhance performance of any organization the following cost must be taken into consideration in the controlling and budgeting function in the organization which include;

Prevention Cost is the cost which is incurred in the organization to prevent quality, but maintain standardized quality of the organization and enhance financial performance (ISO 9000). Appraisal cost this are the inspection of raw materials cost, inventories and finished goods cost, and maintenance program cost in the organization Fadare & Adegbe, (2020). Internal Failure cost this are the cost which are incurred when the product or services of the organization does not conform to customer expectation which is usually noticed at the stage of delivery. External factor cost this are the cost in the organization that has to do with warranty cost, product liability cost and lost goodwill (Olayinka, 2020). However, the process of tracking this various cost will give the organization the opportunity to know effective and in the long run will determine the financial performance from the external to the internal benefit of the organization. Based on this preposition this study intends to investigate the cost reduction techniques and output efficiency in Nigeria manufacturing.

Despite the significant contribution made by manufacturing sector in the past to the growth of Nigeria economy, the high costs of production, inadequate infrastructure, and poor capacity utilization have shrunk the contribution and performance in recent years. The situation has been exacerbated due to the resultant effect of economic recession in 2015 which contributes negatively to the performance of firms in Nigeria. In 2016, shortly after the recent recession in Nigeria, it was observed that manufacturing companies were badly affected in terms of performance and existence. Consequently, many manufacturing companies had been crippled and struggling to survive which oftentimes led to loss of jobs, and leaves some companies in the brick of collapse which ultimately led to a decrease in productivity and profitability. Also, the huge cost incurred in the production process as a result of high exchange rate, cost of raw materials and cost of funds were equally attributed to the poor performance of companies, and the production capacity has reduced significantly which reflects the recent poor performance of

manufacturing companies in Nigeria. Owing to this above challenges, some companies experienced an unprecedented closure of factories and low production. These challenges have forced various companies to find the appropriate policy and management strategy to stay in business and survive the harsh period. Some previous literature has attributed the high cost of production to the depreciation of exchange rate that triggers cost of imported raw materials, high cost of borrowing, and exorbitant tax rate. These costs have been conceptually identified in the literature as the major factors affecting the performance of manufacturing companies in Nigeria and consequently led to dwindling in their profitability in recent times (Godwin, Amos & Sunday, 2019). Despite the huge empirical studies such as Oluwagbemiga, Olugbenga & Zacccheaus, (2014) who investigated the relationship that exists between cost management practices and firm's performance in the manufacturing organizations The result indicates that a positive significant relationship exists between cost management practices and firm "performance in the manufacturing organization. Oyewo, (2013) examined Strategic Cost Management (SCM) techniques on Nigerian companies. The research found out that although Nigerian companies are receptive to the philosophies of SCM, there are challenges inhibiting their adoption and implementation in the Nigerian environment. Innes and Michel (2014) examine the cost management and companies "performance in US the study found that fixed manufacturing overhead was found to be negatively correlated with profitability which was used as one of performance indicators in the study. Ezejiofor, Nwakoby & Okoye (2015) have strongly advocated that cost reduction has a significant impact on the survival of manufacturing companies in Nigeria while other previous studies have provided a contrary conclusion that cost reduction is not a significant factor in determining the survival of companies in Nigeria. It was observed that some of these previous studies have not considered some important variables such as change in cost of inventories, change in cost of labour, change in cost of sales and change in overhead cost Also, the years of research in the previous study limits the effectiveness of their conclusion and recommendations on the subject matter. It is against this backdrop that this current study evaluates the cost reduction techniques and output efficiency in Nigeria manufacturing between the period of 2013 and 2022.

REVIEW OF LITERATURE

2.1 Conceptual Review

2.1.1 Cost Reduction Techniques

Cost reduction techniques is the application of appropriate accounting techniques in processing the historical and projected economic data of an entity to assist management in establishing a plan for reasonable economic objective and in making of rational decision with a view towards reducing corporate expenditure (Parker, 2018). It is aimed at providing managers with information to help them make decisions and maintain a more efficient control over corporate resources (Wilson, 2016). Cost reduction practice entails method or concepts necessary for efficient planning decision-making that allows for choosing among alternative business actions and controlling through the evaluation and interpretation of performance (Ezejiofor, Nwakoby, & Okoye, 2015). The techniques of cost reduction provide timely and accurate information to facilitate efforts to control costs, to measure and improve productivity. Cost reduction strategy entails a set of techniques and methods for planning, measuring, and reporting intended to reduce a company's

expenditure incurred on products and processes. The first step in cost reduction strategy is taken while ascertaining cost for cost control and decision-making purpose (Oluyinka, 2016). They can be applied to make or buy decisions, negotiation price appraisal and assessing purchasing performance. The purpose of cost management practice is to compute the total cost of production of goods or the cost of providing services, and to help in cost control and cost reduction in the firms. Cost reduction strategy is concerned primarily with the internal needs of management; it is oriented toward evaluation of performance and development of estimates of the future with the aim of lessening firm expenditure. The practice of cost reduction is a system which is designed to suit the way goods are processed or manufactured or the way services are provided, with the least possible cost. Cost reduction is defined as a phenomenon established to ensure efficiency of the overall cost of the organization (Lawal, 2017). It is a kind of reduction that is of a permanent nature because it directly influences the unit cost of manufactured products without impairing the intended quality (Olayinka, 2019). Cost reduction entails a concept of creating favourable standard cost while retaining the value of products. It systematically improves profit margin by removing various kinds of waste and eliminable expenses without jeopardizing revenue generation. It is also known as profit improvement or cost efficiency.

2.2 Theoretical Framework

Cost Management & Efficiency Theory by (Berger 1993)

Efficiency theory negate that managers plan and control expenditures by arming themselves with better information on when and where costs occur and what costs add to the value of a product. In the “traditional model of cost behavior”, costs are classified as either fixed or variable. Fixed cost remains constant within relevant range while Variable costs change proportionately with changes in the activity driver (Stelias, 2006). In the second model, managers deliberately adjust resources in response to changes in volume. While 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 labour inputs may require search, recruitment, and training costs while decreasing these same inputs might require severance payments. When adjustment costs are present, managers weigh the costs of releasing (adding) resources when activity decreases (increases) against the alternative of not adjusting. Adjustment occurs if the adjustment costs are more than compensated by incremental profits associated with producing efficiently at a new level of output (Kallapur & Eldenburg, 2005).

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. For example, if an individual manager experiences loss (gain) of status or position when the number of his subordinates decreases (increases), his decisions about reducing (increasing) labour resources may be colored by private adjustment costs (Hamermesh, 1995). In cases in which manager’s compensation, job satisfaction or other rewards are

linked to span of resource control, agency theory predicts that private adjustment costs motivate managers to grow faster than they shrink. Thus, a theory (or theories) about individual adjustment costs could be used to motivate tests of asymmetric cost behavior. In that case, one basis for the null hypothesis would be that adequate management controls and appropriate competition within the firm for scarce resources prevent this influence of individual managers from being manifest in sticky (asymmetric) cost behavior for the firm (Moel&Tufano, 2002). Aside from the costs of adjustment, uncertainty about future events creates another impediment to adjustment. With certainty about the future level of demand, managers can easily calculate a payback period for recouping adjustment costs associated with re-establishing the optimal resource level for future output. Adjustment occurs when the new level of demand is expected to be sustained and/or adjustment costs are modest. With uncertainty about future demand this calculation becomes more difficult.

In particular, while adjustment costs may be certain, the period in which they will be recovered is uncertain (Stelios, 2006). Indeed, part of the uncertainty is that in the future, the need for new and different adjustments may be indicated. In many circumstances significant uncertainty favors the “do nothing” alternative; however, it is important to note that this choice is itself cost management. Moreover, like firm-level adjustment costs, theory does not support the thesis that uncertainty is associated with asymmetric adjustment that favours upward versus downward activity changes. Finally, no consideration of the effect of adjustment costs on efficiency decisions is complete without considering how managers evaluate losses incurred from producing with a suboptimal mix of resources. In a perfectly competitive market, failure to adjust would cause the firm to face higher costs than competitors who adjusted (or who entered the market with new, optimized production technology and capacity) while receiving identical (market) prices (Anderson et al, 2003).

Relevance

This theory is relevant in this study since manufacturing firms are keen on minimizing operating costs and maximizing on operating incomes which ultimately adds to the profitability of the manufacturing companies. Therefore, operating efficiency is achieved when the manufacturing firms is able to minimize its expenses and maximize income. This can be achieved by among other factors making sound decisions regarding asset liability cost.

2.3. Empirical Review

Adebawojo, (2023) investigated the effect of cost management on the financial sustainability and performance of manufacturing companies in Nigeria. An ex-post-facto research design was adopted. The study population included all 33 manufacturing companies in Nigeria as at December 2019 while the sample size consisted 10 Foods and Beverages companies selected based on Purposive and Judgmental Sampling Techniques. Validity and Reliability of data obtained were based on the statutory audit of the financial reports. Data was analyzed using Multiple Regression. The results revealed that Cost Management without Company Size as control variable significantly affected Financial Sustainability of Manufacturing Companies with Adjusted $R^2 = 0.0941$, F-statistics (3.96) = 4.43, P-value < 0.05. On the other hand, with the inclusion of Company Size as control variable, Cost Management maintained significant effect on Financial

Sustainability with Adjusted R²= 0.0887, F-statistics (3.96) = 3.41, and P-value <0.05. The results further confirmed that Cost Management also significantly affected Financial Performance proxy by ROCE, NPM, EPS and DPS with Adjusted R² of 0.1376, F-statistics (3,96) =5.11 and P-value < 0.05. The study concluded that Cost Management affect Financial Sustainability of Manufacturing Companies in Nigeria. Our findings showed that Manufacturing companies' management should establish formidable cost management strategies that will identify and control all cost drivers such that operational costs are reduced to ensure profitability and enhance financial sustainability of manufacturing companies.

Aggreh, Abiahu & Nworie, (2024) determine the effect of cost reduction on the financial performance of quoted consumer goods firms in Nigeria. Specifically, the study ascertained the extent to which cost of assets, cost of sales and staff costs affect the return on equity of quoted consumer goods firms in Nigeria. The study used ex-post facto research design. Purposive sampling was used to obtain the twelve firms that made up the sample size of the study, from a population size of twenty. Secondary data were obtained from the review of audited financial statements of the listed consumer goods firms over the 10-year period from 2011 to 2020 (both years inclusive). Pooled Ordinary Least Square regression was used in estimating the test results at 5% level of significance. The major findings of the study are that: costs of assets do not significantly affect the return on equity of quoted consumer goods firms in Nigeria (t-ratio = -0.05, Prob>t = 0.960); costs of sales do not significantly affect the return on equity of quoted consumer goods firms in Nigeria (t-ratio = -1.03, Prob>t= 0.305); staff costs significantly affect the return on equity of quoted consumer goods firms in Nigeria (t-ratio = 2.99, Prob>t = 0.003). The study recommends that shareholders of listed consumer goods firms should encourage programmes that enhance training, development and welfare of the staff since such investments make significant contributions to the firm's performance.

Adeniyi (2024). investigate the relationship between cost management and the financial success of particular Nigerian manufacturing enterprises. The study focused on how these firms' earnings after taxes were impacted by selling and distribution expenses as well as administrative costs. The study used secondary data acquired from the annual financial reports often sample organizations between 2011 and 2020. Descriptive statistics, correlation analysis, and panel regression techniques such pooled OLS, random effect estimation, and fixed effect estimation were used to evaluate the data. The Hausman test and post-estimation tests were also used to evaluate the models that were taken into consideration for the study. The findings revealed that while administrative costs had an insignificantly negative influence on the tested firms 'earnings after tax, selling and distribution costs had an insignificantly positive impact. The study led to the conclusion that cost control has both positive and negative effects on the financial performance of manufacturing firms in Nigeria, especially when measured in terms of profit after-tax. Based on the results of the study, manufacturing organizations are urged to manage administrative. Any attempt to improve a specific financial performance measure through cost control may have unfavorable effects on other measures. In order to avoid situations where one measure of financial performance may be triggered at the

expense of another, manufacturing organizations should consider the organization's overall performance aim.

Ali-Momoh, Egbekun, Omoolorun, Mathew, & Aruna (2024) examined the link between cost control and the financial performance of selected Nigerian manufacturing firms. Specifically, the study examined the effect of administrative cost, selling and distribution cost on profit after tax of manufacturing firms in Nigeria. The study employed secondary source of data and that were collated through annually financial reports of ten (10) sampled firms through 2011 to 2020. Data were analyzed using descriptive statistics, correlation analysis and panel regression which involve, pooled OLS, random effect estimation and fixed effect estimation including Hausman test as well as post estimation test for the models considered in the study. The findings of the study reported that administrative cost exert insignificant negative effect on profit after tax of the sampled firms, while selling and distribution cost exert insignificant positive effect on profit after tax. Therefore, this study concluded that cost control has both positive and negative effect on financial performance of manufacturing firm in Nigeria, especially, when measured in terms of profit after tax. The study recommended that manufacturing firms need to ensure optimal control of administrative cost as any attempt to employ as positive change agent for a specific financial performance measure can lead to unfavourable effect in another measure. As such control of administrative cost by manufacturing firms should be carried out by taken into consideration the overall performance objective of the firms per time, so that provision can be made available for possible trigger of one measure of financial performance at the expense of the other.

Onuora & Edoziuno (2019) analysed the effect of cost control system on corporate profitability: a study of selected industrial products in Nigeria. The broad objective is to evaluate the effect of cost control on corporate profitability between the periods Of 2010-2018. Ordinary Least Squared (OLS) method of data analysis was used. Secondary sources of data were employed; the interested variables were culled from the annual report of the quoted firms. The following variables were used, return on asset as the dependent variables, while cost of inventory, cost of labour and cost of sales are the independent variables. The findings shows It was observed that cost of inventory has a positive sign and statistically in significant with corporate performance. It was also observed that cost of labour has a positive sign and statistically insignificant with audit quality. The researcher recommends that Company policy makers and transaction advisors should be keen on making cost management policies to be applied since they greatly impact on financial performance of the company. Company policies regarding to inventory cost of companies should incorporate various cost management strategies since they greatly impact financial performance.

Nkpodot, & Emenyi, (2023) 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 on financial performance of listed manufacturing firms in Nigeria; to ascertain the influence of labour efficiency on financial performance of listed manufacturing firms in Nigeria; to determine the effect of overhead efficiency on financial performance of listed manufacturing firms in Nigeria. The study used expost facto research design with sample

size of ten(10) firms from 2015-2021. Secondary data was the main source of data collection and 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 (SSPS 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

Okeke (2023) Cost Reduction Strategies and Performance of Manufacturing Companies in Nigeria (A Study of Selected Manufacturing Firm in Rivers State). Cost reduction strategies was measured by value analysis and value engineering while the researcher measured performance by Profit before tax and return on assets. The specific objectives of the study were: to determine relationship between value analysis and profit before tax of Manufacturing Companies in Nigeria; To investigate relationship between value analysis and return on asset of Manufacturing Companies in Nigeria; To determine relationship between value engineering and profit before tax Manufacturing Companies in Nigeria. To determine relationship between value engineering and return on asset of Manufacturing Companies in Nigeria. Questionnaires were used in generating data while the Spearman Rank Order was used in the determination of relationship between the variables. From the analysis the following findings were made; There is a significant relationship between value analysis and Profit before tax of the selected manufacturing companies in Nigeria; There is a significant relationship between value analysis and return on asset of selected manufacturing companies in Nigeria; There is a significant relationship between value engineering and profit before tax of selected manufacturing companies in Nigeria; There is a significant relationship between value engineering and return on asset selected manufacturing companies in Nigeria. It was therefore recommended as follows; Manufacturing firms should continuously embark on value analysis of existing products as an attempt in reducing cost of production which ultimately improves the profit before tax; Manufacturing firms should consistently compartmentalize the functions in the production process of products as this will reveal areas cost can be reduced with the ripple effect of reporting favorable Return on Assets

Sani,. & Ikpor, (2023) examined the impact of cost reduction techniques on operational efficiency of Nigerian Textile industry using selected textile firms operating within North-Western Nigeria as a reference point. Primary data for the study were obtained through a structured questionnaire administered to five hundred and fifty six (556) staff of these firms. Data obtained were descriptively analyzed using means and standard deviations

well simple regression. The result of the descriptive analysis show that activity based costing (ABC) has significant and positive impact on firm Survivals (FS) in Nigeria. The regression result also indicated that the explanatory variable has significant impact on FS at 0.05 level of significance. It was further revealed in the regression analysis that about 60% of the variation in the rate of FS (Dependent Variable) is explained by the value of the predictor variable (ABC). Based on the findings, the study recommends continued implementation of the accounting technique (ABC) for cost reduction and efficiency of the existing textile firms in Nigeria

Fatoki & Adewale (2023) evaluates the effects of cost control on the survival of the manufacturing companies in Nigeria. The study adopted finance cost, salaries and wages and cost of goods sold to determine the extent to which the various techniques of reducing cost has manifested in the industry. The study reviewed relevant theories such as “growth rate fitter theory”. Data on salaries and wages, finance cost and cost of goods sold were collected from the five selected manufacturing companies, and the data were analysed using fixed effects model in panel regression to examine the influence of these costs on the growth or survival of the companies. Following the results of the analysis, findings revealed that the manufacturing companies have been able to control the cost incurred on salaries and wages and cost of borrowing known as finance cost or interest on loan. The cost of sales has not been able to control. The study concludes that finance cost, salaries and Wages cost and cost of sales have significant impact on the profitability of manufacturing companies in Nigeria. The study recommends that adequate management and alternative sourcing of raw materials should be pursued by manufacturing firms in Nigeria. This alternative can be achieved by encouraging large scale mechanized production of the primary raw materials and create a source of supply for foreign raw materials

Aduwo, (2023) investigates the effect of cost strategies on growth of manufacturing companies in Nigeria. The study uses changes in material costs, administrative costs, and factory costs as proxies for cost-reduction initiatives, whereas sales growth was utilized as a gauge of manufacturing companies' growth in Nigeria. The data was obtained from the annual reports of selected manufacturing companies listed on the Nigerian Group of Exchange. Panel data regression is the method used in the analysis. The growth of sales for manufacturing enterprises in Nigeria was found to be negative but insignificantly impacted by changes in material costs. However, an increase in administrative cost change has a favorable but negligible effect on the growth of manufacturing company sales, and this suggests that an increase in administrative cost change would the growth of manufacturing firms in Nigeria. The outcome also demonstrates that a change in production costs has a negative but noticeable impact on the expansion of sales. According to the study's findings, cost containment measures in Nigeria have a conflicting impact on the expansion of manufacturing companies. As a result, the study suggests that manufacturing firms adopt and enhance variance costing to cut back on excessive production costs and boost their sales growth in Nigeria

RESEARCH METHODOLOGY

3.1 Research Design

Ex-post facto research design was used in the course of this study because; the collected data used in this study cannot be controlled or manipulated. ' Since the number of manufacturing firms listed is too large the study selected 10 firms, such as Dangote Flour Mills, International Breweries, Nascon Allied Industries, Nestle Nigeria, PZ Cussons Nigeria, Okomu Oil Palm, Presco, Nigeria, 7-Up Bottling Company, Unilever Nigeria. and ABC Transport were gathered from the published financial statement, for a ten (10) years period spanning from 2013-2022. The study use convenience sampling to select the convenience manufacturing firms. The choice of the selected firm is because of their performance for the last 10 years and as well their data is up to date . This study made use of secondary data mainly. The data were sourced from publications of the Nigerian Exchange Group (NEG), the annual report and accounts of the listed technology firms, particularly the comprehensive income statement and statement of financial positions of these companies as well as their respective notes to the accounts. Regression analysis predicts the value of a variable based on the value of the other variables and explains the impact or effect of changes in the values of the variables.

3.2 Model Specification

The study modify the work of Oluwagbemiga, Olugbenga & Zaccheaus, (2014) who investigated the relationship that exists between cost reduction practices and firm's performance in the manufacturing firms. The following model were adopted by them where

$$OP = f(DMC, DLC, POC, AOC)$$

OP Operating profit (Profitability)

DMC Direct material cost,

DLC Direct labour cost,

POC Production overhead cost

AOC Administrative overhead cost

F= functional notation

Our model will be modifying in line with the state objectives. Algebraically, therefore

$$OPE = F(COI, COL, COS, OHC)$$

Where

OPE= Output efficiency (proxy of firm performance)

CCOI= Change in Cost of inventory

CCOL= Change in Cost of Labour

CCOS= Change in Cost of sales

COHC= Change in Overhead cost

With the linear expression of the model being

$$ROA = \beta_0 + \beta_1 CCOI + \beta_2 CCOL + \beta_3 CCOS + \beta_4 COHC + \mu$$

Where

B_0 = constant

β_1 - β_4 is parameters to be estimated

3.3 Variables and their Measurement

Variables (code)	Proxies (operational definitions)	Sources
Dependent variable ROA	<i>Equity/Return ON assets</i>	Rodrigues and Craig, (2015).
Independent variables * Change in Cost of inventory	Beginning inventories + net purchase=goods available for sales – ending inventory	Ordu, & Anele (2015)
* Change in Cost of labour	Divide labour cost by total operating costs and multiply by 100	Fadare & Adegbe, (2020)
* Change in Cost of sales	<i>Current Cost of Sales–Previous Cost of Sales/Previous cost of multiple by 100/1</i>	Fadare & Adegbe, (2020)
* Change in Overhead cost	divide the indirect costs by the direct costs and multiply by 100	Olalekan, 2019

3.4 Decision Rule

The decision for the hypotheses is to accept the alternative hypotheses if the p-value of the test statistic is less or equal than the alpha and to reject the alternative hypotheses if the p-value of the test statistic is greater than alpha at 5% significance level.

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Descriptive Analysis

The descriptive statistics for the dependent and independent variables used in this study were presented in table 4.1 below:

Table 4.1: Summary of descriptive statistics for the variables employed in this study:

	COI	ROA	COL	COS	COC
Mean	14.55393	0.513273	2.765412	8.397095	0.994727
Median	14.06596	0.450000	2.766799	8.394573	0.545000
Maximum	15.90723	2.590000	3.071538	8.818482	16.90000
Minimum	12.98719	0.050000	2.478815	7.751475	0.030000
Std. Dev.	0.914057	0.383891	0.110192	0.215323	2.188182
Skewness	0.399271	3.492353	0.303924	0.014382	6.561574
Kurtosis	1.556598	17.93819	4.156132	2.646424	46.88002
Jarque-Bera	12.47162	1246.371	7.819717	0.576781	9614.334
Probability	0.001958	0.000000	0.020043	0.000469	0.000000
Sum	1600.933	56.46000	304.1953	923.6805	109.4200
Sum Sq. Dev.	91.06962	16.06362	1.323504	5.053660	521.9071
Observations	100	100	100	100	100

Source: Researchers' computation (2024)

*Note: *1% level of significance **5% level of significance*

The summary statistics show that on the average mean the return on assets in Nigeria is about 0.513273. The average of cost of inventory is 14.55393, while averages mean of cost of labour, overhead cost, cost of sales and overhead cost are 2.765412, 8.397095 and 0.994727 respectively. The standard deviations of these cost control are 0.914057, 0.383891, 0.110192, 0.215323 and 1.001731 2.188182, and return on assets, cost of inventory, cost of labour and cost of sales. The values of the standard deviations indicate that there is wide spread in the performance of firms in Nigeria. This is more with cost of inventory, cost of labour and cost of sales. This is also evident in the wide gap between the maximum and minimum values. For example, the maximum value of return on assets is 14.13016 while the minimum is 2.503168, with difference of 11.626992. Similarly, the maximum of cost of labour is 6.565472 while the minimum is 2.000128. These performance variations are rather at the high side. Even in the case of cost of sales the maximum is 5.080534 and the minimum is 1.972691

4.2 Regression Result

Dependent Variable: LROA
 Method: Panel Least Squares
 Date: 10/27/24 Time: 17:49
 Sample: 2012 2022
 Periods included: 10
 Cross-sections included: 10
 Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.03133	18.08879	0.609843	0.5445
COI	3.834443	7.420436	2.516741	0.0074
COL	0.178215	0.505993	0.352209	0.7260
COS	0.388009	0.350438	2.107213	0.0030
COC	0.167415	0.504433	3.352209	0.0000
R-squared	0.523848	Mean dependent var	2.964842	
Adjusted R-squared	0.447145	S.D. dependent var	2.082218	
S.E. of regression	2.130736	Akaike info criterion	4.430467	
Sum squared resid	249.7019	Schwarz criterion	4.604996	
Log likelihood	-127.9140	Hannan-Quinn criter.	4.498735	
F-statistic	0.335914	Durbin-Watson stat	1.253698	
Prob(F-statistic)	0.852600			

Source: E-view version 8. Researchers Computation 2024

Interpretation of the Result

The R-Squared, which is the co-efficient of determination or measure of goodness of fit of the model, tests the explanatory power of the independent variables in any regression model. From our result $R^2 = 53\%$, This showed that our model displayed a poor fit because the R^2 is far from 100%, the explanatory variables can impact up to 53% out of the expected 100%, leaving the remaining 66% which would be accounted for by other variables outside the model as captured by the error term.

The f-statistics measures the overall significance of the explanatory parameters in the model. From our table 4.4 above the calculated value of the f-statistics is 7.498162, its probabilities is 0.005607, which is less than 0.05. We accept and state that there is a significance relationship between the variables. This means that the parameter estimates are statistically significant in explaining the relationship in the dependent variable.

The a priori expectation is determined by the existing accounting theory and it indicates the signs of the accounting relationship under consideration. From the result of our estimated model it was discovered that cost of inventory has a positive sign given its value as 3.834443. This implies that decrease in cost of inventory increase the return on asset by 3.8%.

Cost of labour has positive sign given its value as 0.178215, this means that increase in Cost of labour increase the return on asset by 0.17%, and this conforms to our a priori expectation. Cost of sales has a positive sign given its value as 0.388009. This suggests

that positive sign also increases the Cost of sales increases return on asset product by 0.38%. This conforms to our theoretical expectation.

The t-statistics helps in measuring the individuals' statistical significance of the parameters in the model from the result report. It is observed from table 4.4 above that cost of inventory is statistically significant with its value as 2.516741; this implies that it has not contributed insignificantly to firm performance. Cost of labour statistically in significant (0.352209), this also shows that it has not contributes to firm performance. However, cost of sales is also statistically significant, is also statistical significance at 5% level of significance. Overhead cost is statistically significant at 5% level of significant.

4.3 Hypothesis Testing

Hypothesis one

The need to examine the relationship between the collected data and the stated hypothesis has called for this section. This result would be compared with the statistical criteria to see if the preconceived notion in this research work holds or not.

Ho₁: Cost of inventory has no significant effect on output efficiency of manufacturing firm in Nigeria

From the result of our test in table 4.3 above, we found out that the value of our t-test for long term is 2.516741 with a probability of 0.0074 this probability value is less than the desired level of significance (0.05). We reject the null hypothesis and accept the Alternative hypothesis, which says that Cost of inventory has significant effect on output efficiency of manufacturing firm in Nigeria

Hypothesis Two

Ho₂: Cost of labour has no significant effect on output efficiency of manufacturing firm in Nigeria

From the result of our test in the table 4.3 above, we found out the value of our T-test for working capital is 0.352209 with a probability of 0.7260 this probability value is greater than the desired level of significance (0.05). We reject the alternative and accept the null hypothesis, which says that Cost of labour has no significant effect on output efficiency of manufacturing firm in Nigeria

Hypothesis Three

Ho₃: Cost of sales has no significant effect on output efficiency of manufacturing firm in Nigeria

From the result of our test in the table 4.3 above, we found out the value of our T-test for fixed assets is 2.107213 with a probability of 0.0030 this probability value is less than the desired level of significance (0.05). We reject the null and accept the alternative hypothesis, which says that. cost of sales has significant effect on output efficiency of manufacturing firm in Nigeria

Hypothesis Four

Ho₄: Overhead cost has no significant effect on output efficiency of manufacturing firm in Nigeria

From the result of our test in the table 4.3 above, we found out the value of our T-test for fixed assets is 3.352209 with a probability of 0.0030 this probability value is less than the desired level of significance (0.05). We reject the null and accept the alternative

hypothesis, which says that overhead cost has significant effect on output efficiency of manufacturing firm in Nigeria

.5.0 CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

This study examines the effect of cost reduction techniques and output efficiency in Nigeria manufacturing firm between the periods of 2013-2022. In this sense, it was hypothesized that cost control affects the financial performance of manufacturing firm in Nigeria. To achieve the objective of the study, necessary pool data are collected from financial report of selected firms. They were on return on assets, cost of inventory, cost of labour and cost sales, Overhead cost. Regression model was employed to analyze the data through computer base package E-view. Our variables were subjected to correlation test, descriptive statistic. Therefore the result of our estimated model revealed the following important findings

- i. It was observed that cost of inventory has a positive sign and statistically insignificant with output efficiency of manufacturing firm
- ii. It was also observed that cost of labour has a positive sign and statistically insignificant with output efficiency of manufacturing firm of manufacturing firm
- iii. It was also noticed that cost of sales has a positive effect and is statistically significant with output efficiency of manufacturing firm
- iv. It was also noticed that overhead cost has a positive effect and is statistically significant with output efficiency of manufacturing firm

5.2 Recommendation policy and practice

Based on the results of this study I recommend

- Company policy makers and transaction advisors should be keen on making cost management policies to be applied since they greatly impact on financial performance of the company.
- Company policies regarding to inventory cost of companies should incorporate various cost management strategies since they greatly impact financial performance.
- Financial policies regarding cost of sales strategies should be formulated and be used keenly and with a lot of controls to avoid critical financial losses.
- The management should maintained and moderate the overhead cost, in a way it won't affect the company's performance.

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