

Cost Reduction Techniques and the Productivity of Listed Manufacturing Firms in Nigeria

Ayeni-Agbaje, Rafiat Abiodun (Ph.D)

Department of Accounting, Ekiti State University. Ado Ekiti. Ekiti State

Ogundipe, Francis Bamidele

Department of Accounting, Ekiti State University. Ado Ekiti. Ekiti State

Bamidele, Vincent Olawale*

Accounting Department, Federal College of Education (Technical) Gusau.
Zamfara State. Nigeria

Correspondence*: vincentolawale@gmail.com

DOI: 10.56201/ijssmr.v10.no11.2024.pg.340.355

Abstract

The study investigated the effects of cost reduction techniques on the productivity of listed manufacturing firms in Nigeria. The study specifically aimed to assess the effect of waste reduction on the productivity of listed firms in Nigeria and also assessed the effect of inventory management on the productivity of listed firms in Nigeria. The population for this study was hundred and seventy-nine (179) existing listed manufacturing firms on the Nigerian Exchange Group as at 30th May, 2023. This study used purposive sample technique to select twenty (20) listed manufacturing firms from the population of this study. Panel data which consists of cross-sectional and time series of the 20 sampled listed manufacturing firms and a ten (10) years' time series (2014–2023) were sourced from the published annual financial statements of the selected firms. The study made use of descriptive and inferential analysis. Panel estimation regression technique was used to analyze the Data. Hausman test as well as other diagnostic test were also conducted in this study. The findings in this study showed that waste reduction exerted a positive and significant effect on the productivity of listed manufacturing firms in Nigeria with coefficient value of 120.362 ($p=0.0421<0.05$), the result also showed that inventory management exerted a positive and significant effect on the productivity of listed manufacturing firms in Nigeria with coefficient value of 154.965 ($p=0.0390<0.05$). The study concludes that waste reduction has a positive and significant effect on the productivity (PMG) of listed manufacturing firms in Nigeria, the study also conclude that inventory management has a positive and significant effect on the productivity (PMG) of listed manufacturing firms in Nigeria.

Keywords: Cost Reduction, Cost Reduction Techniques, Inventory Management, Productivity, Waste Reduction, Manufacturing Firms

1.1. Introduction

Given the challenges confronting industrial sectors, continuous research into the effectiveness of cost reduction techniques in bolstering firms' productivity is crucial (Johnson, 2019). Consequently, examining cost reduction methods and productivity within the manufacturing firms in Nigeria has become imperative, as numerous organizations have fallen prey to premature business closures. Cost reduction and productivity is very important for all the manufacturing firms, the extent to which firms manage or reduce their cost will go a long way in determining the volume or level of profit which they will attain. Cost reduction is the process of regulating the cost of operating a business, (Adam, 2015; Lasisi & Nuhu, 2015 and Lawal, 2017). It is also the process of avoiding wasteful use of valuable resources and encouraging efficiency and cost consciousness.

The dynamic nature of our times has put so much pressure on businesses that their survival can no longer be taken for granted but must be sought. The main difficulties encountered by firms are the increase in the cost of operation that could lead to inevitable cost control and reduction scheme which make it difficult for most organizations to operate at the cost-efficient frontier. Every firm that wants to survive and retain its customers must seek to improve on its price, quality and packaging. Therefore, in order not to exceed their budget and not to run at a loss, as well as not to reduce the quality of their products, firms need to reduce their cost to the lowest minimum, (Lawal, 2017). Emphatically, if costs are too high, firms may observe the share price depressed and may invariably affects inventors. The shareholders are also demanding a required rate of return on their investment from the firm. Therefore, cost reduction should not be left out.

Cost reduction implies good performance in maintaining or reducing costs, or cost-per-unit of output. It appears to be used mostly in references to companies and organizations. Cost accounting has a main purpose of accumulating costs of an organizational products and services. Managers of manufacturing firms can use cost control and performance techniques in arriving at inventory valuation, selling prices and majorly for profit determination. According to Adeniyi (2017), despite the seeming increase of attention in the operation of firms' activities in Nigeria, together with the institutional support, firms' performances falls below expectations (Adebayo & Onyeiwu, 2018). These shortfalls are owing to unstable market forces, multiplicity in taxes/levies and incessant increase in electricity tariff. Therefore, cost reduction is necessary in the operations of firms to adequately utilize their limited resources.

The primary goal of cost reduction is to manage the expenses of the firms ranging from miscellaneous expenses such as phone bills, internet and utility bills to employees and other professional services that are being rendered to them .To be profitable , companies must not only earn revenues, but also control reduction. If costs are too high, profit margins will be too low, making it difficult for a company to succeed against its competitors. In cases of public companies, if costs are too high, the company's may find that its share price is depressed and that it is difficult to attract investors.

1.2. Statement of the Problem

The inability of firms to reduce cost is the major challenge which apparently has unfavorable effect on income generation by and in turn reduces their profitability. Despite the control measures that some firms apply, some still experience problems of high production costs which at the end increase the selling price, (Olagunju & Imeokparia, 2012). Cost reduction is important and has always been an important issue but perhaps most important in today's unpredictable market. Though, cost reduction is the practice of managing and/or reducing business expenses. Cost reductions identifying what a firm cost and evaluate whether those costs are reasonable and affordable. Then, if necessary, they can look for ways to cut costs through methods such as cutting back, moving to a less expensive plan or changing service providers. Therefore, management should influence the actions of managers who are responsible for performing tasks, incurring charges, and generating revenues, (Siyanbola & Raji 2013).

Universally, a lot of studies have been carried out on the significance of cost reduction on the performance of firms in developed, developing and under developed countries with different variables. For instance, Rosli and Basit (2017) investigated the effect of cost control on firm performance in America during the period of 2011 and 2015 with predictor and outcome variables such as Research and Development costs, marketing cost and return on investment. Interestingly, all these studies report a mixed effect of cost control on the performance of firms and little or no attention has been given to cost reduction techniques on the lens of waste reduction and inventory management thereby creating a gap for more studies to be conducted. In view of the above statement of the problem, the specific objectives of the study were to;

- i. examine the influence of waste reduction on the productivity of listed manufacturing firms in Nigeria;
- ii. evaluate the effect of inventory management on the productivity of listed manufacturing firms in Nigeria;

1.3 Hypotheses of the Study

In line with the objectives of the study, the following research hypotheses were postulated to guide the study and presented in null form

- i. There is no significant influence of waste reduction on the productivity levels of manufacturing firms in Nigeria.
- ii. Inventory management does not significantly affect the productivity of manufacturing companies in Nigeria

2.0 Literature Review

2.1 Conceptual Review

2.1.1 Costs

Akenbor and Agwor (2015) defined cost as any monetary sacrifice made to secure a benefit. Resources must be sacrificed for any organization to achieve its objectives. Without cost, there can be no productive activity that will generate the profitability objective of the firm. To an accountant, cost is defined as a resource forgone to achieve a specific goal. This can be expressed as the monetary amount which must be paid to acquire goods and services. Cost is the amount of expenditure incurred on, or attributable to a specific thing or activity. The cost of anything ordinarily is money spent to acquire those things. Adeniyi, (2007) explained that cost control is the regulation of cost of operating a business and it's concerned with keeping costs within acceptable limit. He said these limits will usually in a formal operational plan or budget. He proceeded to state that, if actual cost differs by an excessive amount, cost control action will be necessary

2.1.2 Cost Reduction

Cost reduction denotes the systematic effort to minimize the expenditure required to produce goods or services without compromising their value or performance (Jones & Johnson, 2016). Cost reduction is the practice of identifying and implementing measures to decrease the overall expenses incurred by an organization, thereby enhancing its profitability (Brown, 2020). Cost reduction techniques encompass a variety of methods and approaches employed by organizations to streamline operations, eliminate waste, and optimize resources in order to lower expenses and increase profitability.

Cost reduction is concerned the determination of unit cost, measurement and correction of the performance of subordinates to make sure that the objectives of the enterprise and the means to obtain them are accomplished effectively and economically, (Brown, 2020). Cost reduction is defined as keeping costs within the desired level or planned level, with essential mechanisms being budgeting and budgetary control, cost control has exercised these comparing actual costs with planned costs so that the two can be compared according to the location taking a corrective action.

Lawyer (2014) defined cost reduction as a broad set of accounting methods and management techniques to improve business efficiency by reducing cost or at least restricting their rate of growth. Akeem (2017) opined that cost reduction is concerned with an element of marginal cost which involves the determination of unit cost, measurement and correction of the performance of subordinates to make sure that the objectives of the enterprise and the means to obtain them are accomplished effectively and economically. Cost reduction is also explained as the regulation of the cost of operating a business and is concerned with keeping costs within acceptable limits. These will usually be specified as standard cost or target cost limits in formal operational plan.

2.1.3 Cost Reduction Techniques

Cost reduction techniques are systematic procedures and practices adopted by companies to identify inefficiencies, negotiate better deals, and improve processes with the aim of reducing overall expenses and enhancing competitiveness (Davis & White, 2017). Cost reduction techniques refer to the specific methodologies and tools utilized by organizations to analyze, rationalize, and optimize their cost structures, resulting in increased efficiency and profitability (Kumar & Sharma, 2018). The examples of the identified cost reduction techniques include waste reduction, inventory management, efficient materials utilization, investment in technology and supply chain management practices and the like. Explained below are the identified techniques of cost reduction.

2.1.3.1 Waste Reduction

Waste reduction is a critical aspect of cost reduction strategies, aiming to minimize unnecessary consumption of resources, materials, and energy within an organization's operations (). This technique involves minimizing or eliminating waste in production processes, which can lead to cost savings by reducing material and resource usage Lee (2019). By identifying and eliminating waste, companies can significantly cut costs and improve efficiency (Hicks, 2017). Waste can manifest in various forms, including overproduction, defects, excess inventory, unnecessary processing steps, and underutilization of resources (Egbide et al., 2019). Implementing lean principles, such as just-in-time manufacturing and continuous improvement, can help identify and eliminate waste throughout the production process (Womack et al., 1990)

2.1.3.2 Inventory Management

Inventory management is the process of minimizing that inventory holding costs (Egbide et al., 2019). The technique such as inventory turnover ratio measures how quickly a company sells its inventory within a specific period. Inventory turnover ratio measures the efficiency of inventory management by assessing how quickly a company sells and replenishes its inventory (Sekeroglu & Altan, 2014). Inventory management techniques such as inventory turnover ratio, ABC analysis, Economic Order Quantity (EOQ), and Vendor-Managed Inventory (VMI) can help minimize the excess in inventory holding and reduce the associated costs (Carter, 2020). A higher inventory turnover ratio indicates that goods are selling quickly, reducing holding costs and minimizing the risk of obsolescence (Akeem, 2017). By improving inventory turnover, companies can free up working capital, reduce storage costs, and enhance cash flow (Sekeroglu & Altan, 2014). Strategies to increase inventory turnover include implementing just-in-time inventory systems, optimizing procurement processes, and improving demand forecasting accuracy.

2.1.4 Productivity

Productivity is a measure of efficiency that quantifies the ratio of output to input, indicating the level of output generated per unit of input within a given timeframe (Gupta, 2020). Productivity refers to the capability of an organization to generate maximum output from the available resources, encompassing labor, capital, technology, and time (Clark & Turner, 2015). Productivity represents the effectiveness of resource utilization in achieving desired outcomes, reflecting the

ability of an entity to produce goods and services efficiently relative to inputs (Smith & Johnson, 2018). Investing in employee training and empowerment is critical for implementing cost reduction techniques successfully (Bailey, 2021). By equipping employees with the necessary skills and knowledge, manufacturing firms in Nigeria can foster a culture of continuous improvement and innovation. Empowered employees are more likely to identify cost-saving opportunities, suggest process improvements, and contribute to overall productivity gains through their increased efficiency and effectiveness in performing their roles (Lee, 2019).

2.1.5 Measurement of Productivity

2.1.5.1 Net profit margin:

Net profit margin is the profit after all the expenses divided by total revenue. It is a profitability or performance ratio that relates to firms' productivity because level of firms; productivity is greatly affected by what is produced and sold (Akeem, 2017). This is a measure that looks at a company's profits before the company must pay corporate income tax. It deducts all expenses from revenue including interest expenses and operating expenses except for income tax. It also measures a company's profitability that looks at the profits made before any tax is paid. It measures a company's operating and non-operating profits before taxes are considered. Many companies attempt to improve profitability and cash flow by reducing investment in current assets through methods such as effective credit underwriting and collection of receivables, and just in time inventory management. In addition, companies try to finance a large portion of their current assets through current liabilities, such as accounts payable and accruals, in an attempt to reduce costs, (Akeem, 2017).

2.2 Theoretical Review

Kaizen Costing Theory

Kaizen Costing theory was developed in 2001 by Yashuhiro Monden as the costing counterpart to the Kaizen approach, (Industrial and Financial Systems, 2001). This concept refers to the process of 'continuous improvement'. The principle behind Kaizen Costing application is on achieving small, gradual but continuous improvements in the production process at minimal cost, Ansari and Lockwod, (2004) observed that Kaizen Costing ensures that products meet or exceeds customer demands for 'quality, functionality, and prices' in order to sustain the product's competitiveness. This can be achieved through a sequential elimination of all the processes that would increase the product's cost of production without a corresponding increase in value, (Rof, 2012). The philosophy emphasizes continuous improvement in our ways of life; social life and home life. This technique has made tremendous changes in management policies not only in Japan, but all over the world, (Ogundele 2004). Blocher et al., (1999) defined Kaizen costing technique as the application of continuous improvement specifically to reduce costs; it focuses on making production and service delivery processes more efficient. Kaizen costing is used for making improvement to a process through small incremental amounts, rather than through large innovations. Unlike target costing, Kaizen costing is applied during the production stage of the product life cycle (Target cost is applied during the design stage). Adeniji (2011) asserted that Kaizen costing is the process of continuous improvement, encouraging constant reductions by

tightening the 'standard'. The cost reduction objective is to set for each process, and then adopt value analysis and value engineering to achieve set objectives. With target costing, the focus is on the product and cost reductions are achieved primarily through product design.

2.3. Empirical Review

Oyerogba et al., (2014) examined the relationship between cost management practices implemented by manufacturing firms. The study used correlation method to utilize data from 40 manufacturing companies quoted on the stock exchange during the period of 2003-2012 for their analysis. Findings showed that there is a positive significant relationship between cost management practices and firm's performance in the manufacturing sector. The findings also showed that cost-effective manufacturing firms maintain low administrative overhead cost. The study recommended that the manufacturing firms should implement cost reduction strategy with emphasis on production and administrative overhead costs, if they intend to achieve their profit maximization.

Lee (2019) examined analyzing lead time reduction in project management through a case study approach. The data were collected from project management teams or organizations executing various projects. Lee collected project plans, schedules, progress reports, and performance metrics from project teams. Interviews with project managers and stakeholders might have been conducted. Case study analysis was employed to examine factors contributing to lead time reduction. Critical path analysis, Earned Value Management (EVM), and qualitative analysis techniques might have been utilized. Lee identified strategies such as improved project planning, better resource allocation, and effective communication as key factors in reducing lead time. The study concluded that reducing lead time in project management requires a combination of efficient planning, resource management, and communication strategies. It highlighted the importance of proactive management and stakeholder involvement. Lee recommended implementing tools and techniques such as Critical Path Method (CPM), Agile methodologies, and project management software to streamline project processes and minimize lead time.

Oyadonghan and Ramond (2014) examined the effect of labour cost management on firms' profitability in Nigeria by concentrating on the hospitality industry in Bayelsa State. The study used survey design to gather its data. The study used correlation analysis (SPSS version 20) to analyze the data. The study revealed that there is a significant relationship between labour cost management and firm profitability. It recommended that effective labour cost management systems should be put in place by firms to enhance their profitability and that firms should channel more efforts towards prevention and appraisal activities. This will reduce the extent to which they spend on internal and external failures and lead to increase in profitability

Furthermore, the effects of marketing, selling and distribution expenditures on firm performance was examined by Fatih (2015) on 22 companies that were listed on the BIST Textile, Leather Index from 2009 to 2013. The impact levels were determined by cross sectional time series analysis technique. The study found that random effect model was appropriate for Model 2, whereas fixed effect model was suitable for Model 1 and Model 3. In addition, a concave relationship existed between marketing expense and firm performance was found.

The impact of efficient inventory management on the profitability of manufacturing firms was considered in Ghana by Prempeh (2015) using administrative cost and profit as variables. Cross sectional data from the annual reports of four manufacturing firms listed on the Ghana Stock Exchange were analyzed using Ordinary Least Squares (OLS) and Multiple Regression Techniques. The study found a significantly strong and positive relationship between administrative cost and profitability of manufacturing firms.

3.0 Research methods

The study employed an ex-post facto research design because it entailed collection of quantitative data from the chosen firms' annual financial reports, and the investigation was focused on determining the causal relationship between variables. Descriptive and inferential research design was also utilized and it concentrated on the effect of cost reduction on productivity of listed manufacturing firms in Nigeria. The population for this study was hundred and seventy-nine (179) existing listed manufacturing firms on the Nigerian Exchange Group as at 30th May, 2023. These selected manufacturing firms were chosen based on fact that they have gradually become prominent in the last few years, based on Nigerian Exchange Group performance indicator. This study used purposive sample technique to select twenty (20) listed manufacturing firms from the population of this study. Panel data which consists of cross-sectional and time series of the 20 sampled listed manufacturing firms and a ten (10) years' time series (2014–2023) were sourced from the published annual financial statements of the selected firms.

Model Specification.

This study adapted the research conducted by Egbide et al., (2019), which examined the relationship between cost reduction strategies and the growth of manufacturing companies in Nigeria. The adapted model is specified as:

$$VAF = f(CRM, ADC, CSTR, SDC, FZ) \text{ ----- (3.1)}$$

Where:

- VAF_{it} = Value of the Firm;
- CRM_{it} = Cost of raw material;
- ADC_{it} = Administrative Costs;
- $CSTR_{it}$ = Cost of sale turnover ratio.
- SDC_{it} = Selling and Distribution costs;
- FZ_{it} = Firm size

The adapted model stated in 3.1 was modified. After the modifications, the model was specified in 3.2 as follows:

$$PMG = f(WR, IMGT) \text{ ----- (3.2)}$$

The regression equation was written as:

$$PMG_{it} = \beta_0 + \beta_1 WR_{it} + \beta_2 IMGT_{it} + e_{it} \text{ ----- (3.3)}$$

Where:

- PMG = Profit margin of listed manufacturing firms

WR = Waste reduction of listed manufacturing firms;
IMGT = Inventory management of listed manufacturing firms;

A priori Expectations

This study relies majorly on theoretical and empirical relationships that existed between the variables to suggest the following assumptions. The assumptions were tested in line with the formulated hypotheses. The relationship between cost reduction and productivity of listed manufacturing firms in Nigeria were expected to be significantly positive. The mathematical expression is represented as:

$$\frac{\partial PMG}{\partial WR} > 0, \text{ Waste reduction is expected to be positive to productivity. .}$$

$$\frac{\partial PMG}{\partial IMGT} > 0, \text{ Inventory management is expected to be positive to productivity.}$$

4.0 Data Analysis and Discussion of result

The study made use of descriptive and inferential analysis. Descriptive analyses employed were mean, median, standard deviation, maximum and minimum value, skewness, kurtosis, and jarque bera. Inferential analyses used was panel estimation regression technique. Hausman test was conducted to ascertain the best panel estimation technique used for the study and the result shows that random effect estimation technique is more appropriate to be used.

4.1. Descriptive Analysis

Table 4.1: Descriptive Statistics for the variables

	PMG	WR	IMGT
Mean	0.299700	0.757000	0.183000
Median	0.047000	0.830000	0.130000
Maximum	0.883000	0.940000	0.470000
Minimum	0.016000	0.380000	0.040000
Std. Dev.	0.341063	0.205700	0.156857
Skewness	0.556966	-0.994680	0.981555
Kurtosis	1.510321	2.490734	2.484442
Jarque-Bera	28.83324	35.14100	34.33000
Probability	0.000001	0.000000	0.000000
Sum	59.94000	151.4000	36.60000
Sum Sq. Dev.	23.14848	8.420200	4.896200
Observations	200	200	200

Source: Authors’ Computation, 2024

Table 4.1 provides a comprehensive analysis of the impact of cost reduction strategies on the productivity of manufacturing firms in Nigeria. The average profit margin (PMG), serving as a proxy for productivity, stands at 0.299700 (30%), notably surpassing the industry benchmark of 20%. Moreover, the average value for waste reduction (WR) is 0.757000 (76%), indicating a

strong proficiency among Nigerian manufacturing firms in waste reduction. However, it is noteworthy that the standard deviation (SD) of WR is 0.205700, suggesting some variability around this mean. In terms of inventory management (IMGT), the mean value is 0.183000 (18.3%), implying that there is room for improvement in the firms' inventory management practices. Similarly, the standard deviation (SD) for IMGT is 0.156857, indicating effective management of inventories within the firms.

4.2 Panel Unit Root Tests: ADF - Fisher Method

Table 4.2: Unit Root @ 5% Level

Variables	t-statistics	Probability	Cross-Section	Observation
PMG	43.9552	0.3077	20	200
WR	142.261	0.0000	20	200
IMGT	144.096	0.0000	20	200

Source: Authors' Computation, 2024

Table 4.2 presents the outcomes of the ADF-Fisher unit test, unveiling significant findings regarding the impact of cost reduction strategies on the productivity of manufacturing firms in Nigeria. To begin, the Profit Margin (PMG), serving as a proxy for productivity, demonstrates a t-statistic of 43.9552 and a probability of 0.3077, suggesting the existence of a unit root at its level, necessitating further examination for PMG. Conversely, Waste Reduction (WR) exhibits a t-statistic of 142.261 with a probability value of 0.0000, indicating the absence of a unit root at the level, thus signifying effective waste reduction. Similarly, Inventory Management (IMGT) shows a t-statistic of 144.096 with a probability value of 0.000, suggesting the lack of a unit root, highlighting the companies' proficiency in managing inventory.

4.3 Regression Analysis

Table 4.3 Random-Effects Result

SERIES: WR, IMGT.

Random-effects (GLS), using 200 observations Included 20 cross-sectional units Time-series length = 10 Dependent variable: PMG				
Variables	Co-efficient	Std. Error	t-Statistic	Probability
Constant	119.355	6.31412	18.90	0.0251
WR	120.362	6.35595	18.94	0.0421
IMGT	154.965	8.29046	18.69	0.0390
R-squared	0.80859			
Adjusted R-squared	0.808591			

Source: Authors' Computation, 2024

Table 4.3 presents an R-square value of 0.808591, indicating that profit margin (PMG), serving as a proxy for productivity, accounts for 81% of the variations observed in waste reduction (WR), and inventory management (IMGT). The remaining 19.5% is attributed to error. The adjusted R-squared value of 0.803658 suggests that all explanatory variables collectively contribute to an 81%

enhancement in the productivity level of manufacturing firms in Nigeria, measured in terms of profit margin. Furthermore, the coefficient analysis indicates significant relationships. The coefficient for waste reduction (WR) is positive and statistically significant (120.362, $p=0.0421$), signifying that a one-unit increase in waste reduction leads to a 120% increase in the productivity level of manufacturing firms in Nigeria, as measured by profit margin. Similarly, the coefficient for inventory management (IMGT) is positive and statistically significant (154.965, $p=0.0390$), indicating that a one-unit increase in inventory management corresponds to a 154% rise in productivity level.

Table 4.4: Stability Tests:

Tests	Statistics	Probability	Decision
F-Stat(24, 175)	F=30.80311	0.000	No
Cross-sectional dependence	Pesaran CD Z = 43.589	0.543	No cross-sectional dependence
Wald test for heteroskedasticity	$X^2 = 2.03148$	1.000	No heteroskedasticity
Durbin-Watson	2.606535		No Serial Correlation

Source: Authors' Computation, 2024

Table 4.4 presents the findings from the stability tests conducted in the study. The F-statistics value, recorded at 30.80311, coupled with a probability value of 0.000, indicates a significant linear relationship between the explanatory variables and the profit margin. This suggests that the chosen variables are indeed suitable for the study's purposes. Additionally, the Pesaran CD test outcome reveals a Z value of 43.589 and a probability value of 0.543, suggesting the absence of fundamental errors in the models utilized. Consequently, further treatment is unnecessary. The Wald test conducted for Heteroskedasticity produces a Chi-square statistic of 2.03148 with a probability of 1.000. This implies the lack of Heteroskedasticity within the series. Moreover, the Durbin-Watson value of 2.606535 surpasses the minimum threshold of 2, indicating no serial correlation in the data. These results collectively underscore the robustness of the models in accurately assessing the impact of cost reduction strategies on the productivity of manufacturing firms in Nigeria.

4.5. Hypotheses Testing

This section assessed the hypotheses of the study using the most appropriate random effect model, as delineated below:

Hypothesis I: There is no significant influence of waste reduction on the productivity levels of manufacturing firms in Nigeria.

Table 4.5: The Result of Hypothesis I

Null Hypothesis	Variables	Probability	Decision
The beta value is statistically significant	PMR ON WR	120.362 (0.0421<0.05)	H ₀ is rejected

Source: Authors' Computation, 2024

Table 4.5 presents the findings pertaining to hypothesis one, which elucidate a constructive (120.362) and statistically significant (0.0421<0.05) effect of waste reduction (WR) on the profit margin (PMG). Consequently, the null hypothesis positing no substantial effect of waste reduction on the productivity levels of manufacturing firms in Nigeria is refuted, underscoring that a unitary rise in waste reduction corresponds to a 120% augmentation in the productivity levels of manufacturing firms in Nigeria.

Hypothesis II: Inventory management does not significantly affect the productivity of manufacturing companies in Nigeria

Table 4.6: The Result of Hypothesis II

Null Hypothesis	Variables	Probability	Decision
The beta value is statistically significant	PMR ON IMGT	154.965 (0.0390<0.05)	H ₀ is rejected

Source: Authors' Computation, 2024

Table 4.6 presents the results of hypothesis testing regarding hypothesis two, indicating a notable positive effect (154.965) that is statistically significant (0.0390<0.05) for inventory management (IMGT) on the profit margin (PMG). Consequently, the null hypothesis, suggesting that inventory management significantly influence the productivity of manufacturing enterprises in Nigeria, is rejected. This rejection implies that enhancing inventory management by one unit correlates with a substantial 154% increase in the productivity levels of manufacturing firms in Nigeria.

4.7. Discussion of the Results

The findings from the study highlight several crucial insights into the relationship between cost reduction strategies and productivity in manufacturing firms in Nigeria. Firstly, the analysis reveals a strong association between various cost reduction strategies and productivity, as indicated by the high R-square value of 0.808591. This suggests that factors such as waste reduction, inventory management, optimizing resource utilization, investment in technology, and supply chain management practices collectively contribute to 81% of the changes in productivity levels measured by profit margin.

Moreover, waste reduction shows statistically significant positive coefficients, indicating that improvements in this area lead to significant increases in productivity as indicated in table 4.5 where the coefficient of waste reduction of 120.362 has a p-value of 0.0421 which is lesser than the significant level of 5% ($p < 0.05$) the study thereby rejected the null hypothesis that there is no

significant effect of waste reduction on manufacturing firms' productivity levels in Nigeria. This implies that a one-unit increase in waste reduction correlates with a 120% rise in productivity levels for manufacturing firms in Nigeria. Rejecting the null hypothesis implies that waste reduction does indeed have a meaningful effect on the productivity levels of manufacturing firms in Nigeria. Specifically, the statement that "a one-unit increase in waste reduction leads to a 120% increase in productivity level" suggests a strong and direct relationship between these variables. This finding underscores the importance of waste reduction initiatives not only for environmental sustainability but also for improving the productivity of manufacturing firms in Nigeria. These results are in line with the earlier designed prior expectations of the positive effect of waste reduction on productivity of manufacturing firms the results are similar to the outcomes of the studies conducted by Gulfen and Sule (2016), Lawal (2017), Johnson (2019), Egbide et al., (2019), Lee (2019), Garcia (2019), White (2019), Brooks (2019)

More so, the coefficients of inventory management show statistically significant positive coefficients, indicating that improvements in this area lead to significant increases in productivity. The results presented in Table 4.6 indicated that hypothesis two, which examined the relationship between inventory management (IMGT) and profit margin (PMG), has produced a positive and statistically significant outcome. The obtained statistic (154.965) suggests a substantial effect, further supported by the significance level ($0.0390 < 0.05$), indicating statistical significance. Consequently, the null hypothesis, positing insignificant influence of inventory management on the productivity of manufacturing companies in Nigeria, is rejected. This implies that enhancing inventory management by one unit corresponds to a significant 154% increase in the productivity level of manufacturing firms in Nigeria. These findings underscore the importance of effective inventory management practices in enhancing productivity within the manufacturing sector of Nigeria. These results are in line with the earlier designed prior expectations of the positive effect of inventory management on productivity of manufacturing firms the results are similar to the outcomes of the studies conducted by Carter (2020), Brown (2020), Reed (2020), Powell (2021), Patel (2021), Bailey (2021), Akinleye (2022)

Therefore, all these results are in line with the results of the studies conducted by Gulfen and Sule (2016), Lawal (2017), Johnson (2019), Egbide et al., (2019), Lee (2019), Garcia (2019), White (2019), Brooks (2019), Carter (2020), Brown (2020), Reed (2020), Powell (2021), Patel (2021), Bailey (2021), Akinleye (2022), Brown (2022) where the found positive impact of cost reduction on productivity of manufacturing firms. These results could have significant implications for policymakers, managers, and stakeholders in the Nigerian manufacturing sector, highlighting the potential benefits of investing in waste reduction strategies. Additionally, further research could explore the mechanisms through which waste reduction contributes to increased productivity and profitability in manufacturing firms, potentially uncovering additional insights and avenues for improvement.

5.0. Findings

The study found that waste reduction show statistically significant positive coefficients, indicating that improvements in this area lead to significant increases in productivity with the coefficient value of (120.362 ($p < 0.05$)). This implies that a one-unit increase in waste reduction correlates with a 120% rise in productivity levels for manufacturing firms in Nigeria. More so, the coefficients of inventory management show statistically significant positive coefficients, indicating that improvements in this area lead to significant increases in productivity with a test statistic of 154.965 and a p-value of 0.039 (which is less than the commonly used significance level of 0.05), it is evident that there is a significant effect of inventory management on the profit margin of manufacturing companies in Nigeria. The findings highlight the importance of adopting a holistic approach to cost reduction, encompassing various factors such as waste reduction, inventory management, resource utilization, technology investment, and supply chain management practices. By addressing these areas effectively, firms can enhance their productivity levels and achieve sustainable growth in the dynamic business environment.

5.1. Conclusion

Hence, upon the analysis, the study concludes that:

This research work was carried out to show the effect of cost reduction techniques on the productivity of listed manufacturing firms in Nigeria. The study deduced that waste reduction exerts a positive and statistically significant effect on the productivity (PMG) of listed manufacturing firms in Nigeria according to the result of the regression analysis in this study.

The result of the regression analysis in this study also indicated that inventory management exerts a positive and significant effect on the productivity (PMG) of listed manufacturing firms in Nigeria.

5.2. Recommendations:

Based on the findings and conclusion in this study, the study recommended that:

- i. Managers of listed manufacturing firms should prioritize investments in waste reduction and inventory management practices to unlock significant productivity gains.
- ii. Managers of listed manufacturing firms should ensure that there is need for target interventions to improve resource utilization and supply chain management practices within firms.

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