COST CONTROL AND PROFITABILITY OF SELECTED MANUFACTURING COMPANIES IN NIGERIA

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Abstract
Profitability in manufacturing companies in Nigeria depends on the ability of the companies to grow their earnings and tame their cost profile through cost control techniques. Many manufacturing companies seem not to understand these costs and the impact they have on profitability. This study examined the effect of cost control on the profitability of selected manufacturing companies in Nigeria. The population of the study was the 78 manufacturing companies listed on the Nigeria Stock Exchange as at 31st December 2017. A sample frame of 23 companies listed on the consumer goods sector was selected out of which five companies were considered for a period of 10 years (2005 – 2017). The study adopted a judgmental sampling technique. Data were obtained from the audited financial statement, and the accounts have already validated by regulatory authorities. The study took descriptive and inferential (regression) statistics. It was found that there is a significant negative relationship between the cost of raw materials (CoRM) and profit before tax of manufacturing companies in Nigeria. The study concluded that cost control has a significant positive effect on the profitability of manufacturing companies in Nigeria for the period under review. Therefore, it is recommended adequate management and alternative sourcing of raw materials.

Keywords: Cost control, Manufacturing companies, Profitability, Raw materials, Salaries, Research and Development

How to cite (APA 6th style)

INTRODUCTION

Manufacturing companies in Nigeria have witnessed an unexpected high operating cost with the attendant reduction in profitability in recent times. The power generating capacity of the energy sector has diminished with an adverse effect on manufacturing companies. Akintoye, Onakoya,
Amos, and Ifayemi (2015) posited that poor infrastructure gave rise to higher costs and compromise the quality of the product, which accounts for the significant competitive disadvantage of most manufacturing companies.

Adeleke (2014) opined that quite a good number of manufacturing companies in Nigeria have ceased to operate, and more prominent companies have acquired many or at best, merged with other more prominent manufacturing companies. Some have relocated their operational base to neighboring countries (Abdul and Isiaka, 2015). Few manufacturing companies that are still operating within the Nigeria market have resulted in using cost control as a strategy for sustaining their earnings. Cost control strategies are expected to be an integral part of any profit-making venture that wants to continue in business especially in the current downturn as no firm will stay in business if it does not put precise mechanisms in place to check its costs so that the expenses do not surpass the estimated projections. If charges are not properly checked the outcome can be detrimental to the smooth running of the business. Company management must match budgeted and actual costs and strive to ensure that they always remain within the estimated projections.

Profitability is germane to the survival of any business entity and is of significant interest to the stakeholders (owners, government, employees, and their host communities). Many companies in Nigeria, especially the manufacturing sector, have not been achieving this expectation to owners, government, employees, and their host communities in recent times (Nwosu, 2014). It is when a company makes a profit that it can fulfill its obligations to the stakeholders, payment of tax to the government, payment of dividend to shareholders, payment of enhanced remuneration to workers and investment in corporate social responsibility in its operating environment. The reverse will be the case for unprofitable companies. Profitability, in no small extent, depends on the capacity of the company to grow its earnings and tame its cost profile through cost control techniques. Until companies operating in the manufacturing industry understand the actual costs associated with raw materials and the impact it has on profitability and can review the benefits of alternative approaches, they will continue to be complacent thereby accepting average profits when much more can be gotten (Prempeh, 2016). Adeleke (2014) opined that many had been acquired or merged with bigger ones to remain in operation). All these increase the rate of labor turnover in manufacturing company and further prevent the effectiveness of the learning curve theory. Therefore, this study focuses on the effect of cost control on the profitability of selected manufacturing firms in Nigeria.

Edom, Inah, & Adanma (2015) indicate that profitability is not synonymous with efficiency. The efficacy of profit maximization objective largely depends on the efficiency and effectiveness of cost control. Cost control ranges from limiting telephone calls to only calls that are for business purposes, internet and utility bills, and employee payroll. Professional services and outsourcing may also be adjusted (Abdul & Isiaka, 2015). The concepts of cost control as it affects profitability will be discussed to bring out the inter-relationships between them. The next section deals with the various theories relating to the variables used in the research. It attempts to review the multiple approaches to cost control and profitability. The concluding part of the chapter deals with the review of various empirical studies both within and outside Nigeria to identify their methodologies, conclusions, and gaps in those studies. The concept of cost control has assumed multiple definitions, especially in recent times. The term means keeping costs within acceptable limits.

The Chartered Institute of Management Accountants (CIMA, n.a), London defines Cost control as; "The regulation by executive action of the cost of operating an undertaking particularly where such action is guided by cost-accounting." Lawyer (2014), defined cost control 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. Siyanbola and Raji (2013) opined that the company might not be able to predict the timing and volume of actual sales, but they can determine the utilization rate of most of their resources by influencing costs. They further stated that cost control is management's effort to influence the actions of individuals who are responsible for performing tasks, incurring charges, and generating revenues.

Olalekan and Tajudeen (2015), in their work titled "Cost Control and Its Impact on the Survival of Nigeria Firms: A Case Study of Nigeria Bottling Company Plc." examined the importance of cost control; its various techniques and their impact on the survival of Nigeria firms. The paper recommended that Just-in-Time (JIT) techniques should be employed to meet production and sales requirement, a good budgeting process and mechanisms for conducting value analysis (incorporating value engineering) permanently should also be put in place to control cost. The study concluded that a company interested in carrying out cost control procedures must necessarily be concerned about cost reduction (PwC, 2017). Again, this research confirms the findings of Abdul and Isiaka (2015), Ayodele and Alabi, (2014), Siyanbola and Raji (2013). Notwithstanding the above connectivity, this work is limited in scope and coverage. It uses only one out of the many firms registered in the country and covers only one of the northern states of Nigeria, Plateau.

The primary focus of this work is to establish the extent to which cost control can be used to address the dwindling profit of selected manufacturing companies in Nigeria. There are empirical studies in the literature on cost control and reduction with different findings. Some of these studies include Siyanbola and Raji, (2013), Olagunju, et al. (2014), Olalekan and Tajudeen (2015), Abdul and Isiaka (2015), these discussions have been extensively centered on cost control with little or no reference to profitability. Also, these researchers have not been able to evaluate the effective cost control has on the profitability of a manufacturing organization in Nigeria. Also, researchers like Oparanma and Ohaka (2015), Kwon, et al. (2014), Hazarika, (2010) had researched into cost management. However, these studies addressed the concept without reference to cost control. Therefore, besides the contribution this study will add to existing knowledge, it intends to address the shortfalls identified above and will also evaluate the relationship between ‘cost control and profitability in the manufacturing industry Nigeria. Therefore, the central hypothesis is:

**H0:** Costs control and reduction have no significant effect on the profitability of manufacturing companies in Nigeria.

This hypothesis was developed to 5 hypotheses about cost control and reduction, which includes the cost of raw material, selling and distribution expense, wage and salary expense, research and development expenditure, and training cost. Each hypothesis was tested through empirical data analysis to provide answers to the stated research questions.

Theoretically, the theory aims at increasing the manufacturing throughput efficiency through the identification of those processes that are restraining the manufacturing system (Goldratt, 2004). Goldratt, (2004) opined that the problems in the theory of constraints are: a large number of unfulfilled orders, high level of unnecessary inventories or lack of relevant ones, a relatively long lead times (time between when an order is placed and when it is received). These are the bottlenecks manufacturing companies likely to face when applying their controls in an attempt to improve their operations to meet the projected profitability. One thing the theory of constraint has succeeded in inculcating in the mind of corporate managers is that an organization
that exploits its potentials in maximizing the output of every machine will not perform well. A sound inventory management system can achieve this. Fawcett, Ogden, Magnan, & Cooper, (2006) cited in Mogere, Oloko, and Okibo (2013) opined that Companies have struggled to invest in the technology and organizational structures needed to achieve to-date systems synchronization that enables coordinated inventory flows.

Keitany, Wanyoike, and Richu (2014) revealed a significant increase in organizational performance as a result of material management and advocated that emphasis should be directed to improve organizational performance. The study recommended the need for effective and efficient inventory control systems and information and communication technology system to excel and guarantee its future, thereby improving organizational performance. The research conducted by Etale and Bingila, (2016) examined the effect of inventory cost management proxied by raw materials cost, work in process cost and finished goods cost on the profitability which was represented by a gross margin. The study revealed that efficient inventory cost management has a positive influence on profitability. Prempeh (2016) worked on the impact of efficient inventory management on the profitability of manufacturing firms in Ghana, using raw material inventory management and profit as variables. The study found a significantly healthy and positive relationship between raw material inventory management and profitability.

Raw materials, according to Asaolu, Agorzie, and Unam (2012), are industrial goods that represent the major component of business cost and profitability. To increase profitability, the need to reduce the cost of raw materials which will eventually lead to a reduction in manufacturing cost should be one of the objectives of any manufacturing organization (Asaolu et al., 2012). Selling price determination for many consumer products is often a function of the cost incurred before the manufactured goods are sold and the desired level of mark-up expected by the manufacturer. Distribution costs (also known as distribution expenses) are usually defined as the costs incurred to deliver manufactured products from the production unit to the wholesaler, retailer or end user. Distribution, according to Sule, Ogbadu, and Achimugu (2013), is the process of ensuring the availability of products to its target market. Therefore, the first hypothesis derived from the main hypothesis is:

H01: Cost of raw materials has no significant effect on the profitability of manufacturing companies in Nigeria.

Evidence from the telecom sector in Saudi Arabia was examined by Sharma and Husain (2015). For marketing expenses and profitability; there was a positive correlation among all the independent variables, i.e., the selling and marketing expense, dealers' commission, advertising expenses and salary, wages, employee benefits paid to the selling and marketing staff of these companies. It is a further confirmation of the study conducted by (Oloko, Anene, Kiara, Kathambi & Mutulu, 2014). The study concluded that selling and marketing expenses hold great significance in companies' profitability.

Distribution is an important marketing function aimed at getting the right product to the right market segment at the right quantity and at the right time (Adeleye, 2005). Regardless of how fantastic your products are, if it is not available at the point of purchase, it cannot be brought (Sule et al., 2013). Therefore, the second hypothesis derived from the main hypothesis is:

H02: Selling and distribution expenses have no significant effect on the profitability of manufacturing companies in Nigeria.
Kesinro, Ojo, and Elueze (2015) examined wage inequality on work performance. Kesinro et al. (2015) opined that manufacturing companies should endeavor to achieve their objectives without neglect to the welfare and the general needs of their employees in other to reduce the labor turnover thereby enhancing the learning curve for maximum profit. The study, however, suffered from a lack of adequate scope and limited sample size as it only related to one of the manufacturing companies located in Ogun State.

The perceived relationship between executive compensation package and profitability was investigated by Oyerogba, Riro, and Memba (2016) with focus on three aspects of executive compensation package which includes the directors’ cash incentive, non-cash incentive and bonus issue of share. The study concluded that cash incentive has the highest coefficient and thus most significant in influencing the earnings per share. Babagana and Dungus (2015) examined the effects of staff remuneration on the performance of Ramat Polytechnic students in Maiduguri Borno state from 1995-2011. The findings showed a strong positive relationship between staff remuneration (fringe benefits and staff nature of working conditions) and the performance of students.

Salaries and wages are one of the most important motivational factors, as Dabre (2014) stated that we should eat from our sweat. Salary and wage administration is the process of compensating an organization’s employees under accepted policy and procedures. The main reason why workers get involved in paid jobs is to earn a living, which is salary or wage (Sule and Amuni, 2014). Salaries and wages are the remunerations paid directly to employees in the form of cash or cash equivalent (cheque or direct deposit) into employees’ bank account for work done or service rendered for the employer. Sule and Amuni (2014) pointed out that salaries and wages are the rewards that individuals receive from the organization in exchange for their labor and that every organization has its policy on them. Choosing a successful salary system depends on considerations of salary levels. Therefore, the third hypothesis derived from the main hypothesis is:

**H03: Salaries and wages have no significant effect on the profitability of manufacturing companies in Nigeria.**

Researchers have, in the last few years increasingly stressed how germane research and development (R&D) is in the manufacturing sector. Technology-based companies in this sector put forth large expenditures for R&D to maintain their competitive advantage and ensure their future viability (Ayaydin and Karaaslan, 2014). The main objective of training and development, according to Asfaw et al. (2015) to improve employees' competencies so that organizations can maximize the efficiency and effectiveness of their human assets. Training is vital to enhance the capabilities of employees, and it has been adjudged the most crucial factor in today's business world because it increases efficiency and effectiveness of both employees and the organization (Khan, Khan and Khan, 2011). Manufacturers these days extend their training plans beyond their staff. Some class among the stakeholders are identified and trained on the use of their products to reduce rejection, which ultimately affects profit. This type of training is in addition to the existing policy on staff development. Although employee performance depends on numerous factors but the most important of them is training. Khan et al. (2011) claimed that employees who have more on the job experience have better performance because there is an increase in both skills & competencies because of on the job experience. Therefore, the fourth hypothesis derived from the main hypothesis is:
H04: Research and development have no significant impact on the profitability of manufacturing companies in Nigeria.

The research conducted by Asfaw et al. (2015) was to determine the impact of training and development on the employees’ performance and effectiveness at district five administration offices, Addis Ababa, Ethiopia. The study employed a cross-sectional institutional based quantitative research method. Ninety-four complete questionnaires with a response rate of 94% were considered for this study using a systematic random sampling technique. The study recommended that employee training and development should be based on a systematically identified knowledge and skill gaps so as they maximize the effort of both the employee and the organization. The research also advocated for an adequate budget for training and development activities. The study concluded that companies would do well and achieve their cost management objectives if employees are involved in training evaluation activities and taking inputs for future similar operations and document best practices to scale up in same settings. Therefore, the fifth hypothesis derived from the main hypothesis is:

H05: Training has no significant effect on the profitability of manufacturing companies in Nigeria.

RESEARCH METHOD

This study employed ex-post facto research design using panel data analyses of financial information extracted from published financial statements and accounts of manufacturing companies listed on the Nigerian Stock Exchange for a period of Ten (10) years (2005 -2017).

The population of this study is the manufacturing industries listed under the Nigerian Stock Exchange (NSE) as at 31st December 2017. The Institute of Chartered Accountants of Nigeria (ICAN) 2006 defined population as being made-up of specific conceivable traits, events, people, subjects or observation. The sample frame for this study comprises of the Twenty-Three listed manufacturing companies under the consumer's good category of the Nigeria Stock exchange as at 31st March 2017. These goods are for direct consumption by the consumer in their respective target market.

Table 1 Lists of Manufacturing Companies Listed on the Nigeria Stock Exchange

<table>
<thead>
<tr>
<th>No</th>
<th>Consumer Goods</th>
<th>No</th>
<th>Consumer Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7-Up Bottling Comp. Plc</td>
<td>13</td>
<td>Multi-Trex Integrated Foods Plc</td>
</tr>
<tr>
<td>2</td>
<td>Cadbury Nigeria Plc.</td>
<td>14</td>
<td>Nig. Flour Mills Plc.</td>
</tr>
<tr>
<td>3</td>
<td>Champion Brew. Plc.</td>
<td>15</td>
<td>Nascon Allied Industries Plc</td>
</tr>
<tr>
<td>4</td>
<td>Dangote Flour Mills Plc</td>
<td>16</td>
<td>Nestle Nigeria Plc</td>
</tr>
<tr>
<td>5</td>
<td>Dangote Sugar Refinery Plc</td>
<td>17</td>
<td>Nigerian Brew. Plc</td>
</tr>
<tr>
<td>6</td>
<td>Dn Tyre &amp; Rubber Plc</td>
<td>18</td>
<td>Nigerian Enamelware Plc</td>
</tr>
<tr>
<td>7</td>
<td>Flour Mills Nig. Plc</td>
<td>19</td>
<td>P Z Cussons Nigeria Plc.</td>
</tr>
<tr>
<td>8</td>
<td>Golden Guinea Brew. Plc.</td>
<td>20</td>
<td>U T C Nig. Plc.</td>
</tr>
<tr>
<td>9</td>
<td>Guinness Nig Plc.</td>
<td>21</td>
<td>Unilever Nigeria Plc</td>
</tr>
<tr>
<td>10</td>
<td>Honeywell Flour Mill Plc</td>
<td>22</td>
<td>Union Dicon Salt Plc</td>
</tr>
<tr>
<td>11</td>
<td>International Breweries Plc.</td>
<td>23</td>
<td>Vitafoam Nig Plc</td>
</tr>
<tr>
<td>12</td>
<td>Mcnichols Plc</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Out of the 23 twenty-three listed manufacturing companies under the consumer's good category of the Nigerian Stock exchange, 5 companies representing 21.74% comprising of Unilever Plc, Cadbury Plc, PZ Cussons Plc, Honeywell Flour, and Flour Mills Plc which were selected based on judgmental sampling techniques represented the sample size (Saraki, 2016). The rationality of using this technique is based on the ease at which their data can be accessed. The manufacturing industry operates with different capital base, different technology, and various goods for different market segments. However, they work in the same environment where market-based factors are common to all of them.

**Method of Data Analysis**
This study adopts both descriptive and inferential statistical analysis. The data collected through secondary sources were tabulated, and findings from the report were presented in tables, analyzed using both descriptive and inferential statistics. Regression analysis and correlation the statistical tools adopted. The regression analysis was applied to the regression models to measure, explain, and predict the linkage between the variables. These methods were used to test the hypotheses, solve research questions determine the relationships among cost control mechanisms and profitability of the manufacturing companies. The correlation test was used to test for multicollinearity of the variables, and the further diagnostic test will be carried out to ensure the suitability of the variable for regression. Also, descriptive statistics examined the means and standard deviations of variables and their pattern over time within the period of this study.

**Model Specification**
The dependent variable is profitability proxied by profit before tax while the independent variable is cost control and reduction measured by the cost of raw materials, selling and distribution expenses, wages and salaries, research and development and training.
The functional relationships are as follows
\[ Y = f(X) \]
\[ Y = \text{Profitability (measured by Profit before Tax)} \]
\[ X = \text{Cost control} \]
Where:
\[ X_1 = \text{CoRM} = \text{Cost of Raw Materials}. \]
\[ X_2 = \text{SWexp} = \text{Salaries and Wages} \]
\[ X_3 = \text{SDMc} = \text{Selling and distribution Expenses} \]
\[ X_4 = \text{RDc} = \text{Research and development Cost} \]
\[ X_5 = \text{TrC} = \text{Training Cost} \]
The model for the study is specified thus:
\[ \text{PRT} = \beta_0 + \beta_1 \text{CoRM} + \beta_2 \text{SDexp} + \beta_3 \text{SWexp} + \beta_4 \text{RDc} + \beta_5 \text{TrC} + \mu \]

**Panel Diagnostic Test**
The variables under study were subjected to the diagnostic test. We first, ran a Hausman test to determine whether we will run Random, Fixed, or Pooled. After that, we ran a serial correlation, Ramsey reset, and heteroscedasticity test.
RESULTS AND DISCUSSION

Descriptive Analysis
Table 2 indicates the descriptive analysis of each variable in this research. From Table 2, there is much variation in the minimum and maximum values of profit before tax, cost of raw materials, selling and distribution expenses, salaries and wages, research and development, and training cost of 0.7000, 0.81648, 1.09444, 1.04424, 0.91666, and 5.33688 and for their maximum values respectively, while their minimum values showed 0.6000, 0.30688, 0.94318, 0.43180, 0.0909, and 2.84004 respectively. This value implies that for the period under study, the cost management and performance measure of the sampled firms has been fluctuating. Also, the mean value of all the variables shows the average natural logarithm values for each of the variable.

<table>
<thead>
<tr>
<th>Variable</th>
<th>PBT</th>
<th>CRM</th>
<th>SDE</th>
<th>SW</th>
<th>RD</th>
<th>TRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.60641</td>
<td>0.01258</td>
<td>0.06177</td>
<td>0.03107</td>
<td>0.53665</td>
<td>0.38747</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.7000</td>
<td>0.81648</td>
<td>1.09444</td>
<td>1.04424</td>
<td>0.91666</td>
<td>5.33688</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.6000</td>
<td>0.30688</td>
<td>0.94318</td>
<td>0.43180</td>
<td>0.0909</td>
<td>2.84004</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.08006</td>
<td>0.03374</td>
<td>0.42142</td>
<td>0.45843</td>
<td>0.14762</td>
<td>0.94775</td>
</tr>
</tbody>
</table>

Source: Researcher’s Study, 2019

The relatively high standard deviation of the variables under study shows higher dispersion or spread in the data series for a profit before tax, cost of raw materials, selling and distribution expenses, salaries and wages, research and development, and training cost of 0.0800641, 0.0337442, 0.421429, 0.4584343, 0.1476226 and 0.9477563, respectively.

Test of Hypotheses and Discussion

Test of Hypotheses 1
Objective 1: to investigate the effect of the cost of raw materials as a component of cost control on the profitability of manufacturing companies in Nigeria.
Research Question 1: To what extent does the cost of raw materials affect the profitability of manufacturing companies in Nigeria?

Table 3: Regression Estimate for Hypotheses 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>75.54246</td>
<td>123.0089</td>
<td>0.614122</td>
<td>0.5464</td>
</tr>
<tr>
<td>CoRM</td>
<td>-0.001078</td>
<td>0.000254</td>
<td>-4.244820</td>
<td>0.0004*</td>
</tr>
</tbody>
</table>

R-squared: 0.486743 Mean dependent var: 427.8286
Adjusted R-squared: 0.459729 S.D. dependent var: 566.0569
S.E. of regression: 416.0669 Akaike info criterion: 14.98997
Sum squared resid: 3289160. Schwarz criterion: 15.08945
Log-likelihood: -155.3947 Hannan-Quinn criter. 15.01156
F-statistic: 18.01849 Durbin-Watson stat: 2.197384
Prob(F-statistic): 0.000438 Ramsey Test: 0.76757(0.1775)*
Jaque-Bera: 0.2486(0.882) Ljung Box Test: 0.112500

*significance at 10%
Source: Researcher’s E-Views Output (processed), 2018
H01: Cost of raw materials has no significant effect on the profitability of manufacturing companies in Nigeria.

\textit{Hypotheses 1 and a-priori expectation}

\[ PBT_{it} = \alpha_0 + \beta_1 \text{CoRM}_{it} + \mu_{it} \]

Hypotheses 1 and a-priori expectation

\[ PBT_{it} = 75.54246 - 0.001078 \text{CoRM}_{it} + \mu_{it} \]

Table 3 shows the simple regression result of objective one indicating that there exists a negative relationship between profit before tax and the cost of raw material. This relationship is indicated by the sign of the coefficients for CoRM which \( \beta < 0 \). This result is under our a priori expectation. R-squared showed that about 48.6% variations in PBT could be attributed to the influence of our explanatory variable (CoRM) alone while the remaining 51.4% variations in the respective dependent variable were caused by other factors not included in this model.

Furthermore, the coefficients showed that₦1 change (increase) in CoRM would cause a 0.01078% decrease in the profitability of sampled companies measured by profit before tax. Also, p-value showed 0.0004 for our independent variables meaning that the simple regression result is statistically significant because this (the p-value) is less than 10%, which is the level of significance adopted for this study. This value shows that the effect of the costs of raw material on profitability measured by profit before tax is statistically significant. Thus, we may reject the null hypothesis. The result shows that the costs of raw material have a significant adverse effect on profitability measured by profit before tax.

Ramsey Reset test is a formal robustness test which helps to test the linearity of our model. A regression criterion is that the model must be linear and from the result presented in Table 3, we do not reject the Null hypothesis, which says that the model is linear. This shows that our model for this study is correctly specified (i.e., no specification biases in the model). What is reported here is the probability value (significant value) of F-statistics.

Ljung Box, on the other hand, is an improved robustness test to confirm the result of our Durbin Watson. They both test the presence of Serial correlation in any particular model. The result of the Durbin Watson is within the threshold of 1.8 and 2.2; this shows that in our series, there is no evidence of autocorrelation. This result is further confirmed by the result from Ljung Box, which shows that the p-value of Q-statistics is higher than our chosen level of significance (10%). This level means that we cannot reject the Null hypothesis for this test, which says there is no evidence of significant or severe serial or autocorrelation.

From the result on Table 3, the probability value of Jaque-Bera is more than 0.05 thus we do not reject the null hypothesis (the null is that the residuals are normally distributed) because our P-value is 0.8830. The guideline is that the residuals should be normally distributed which is the same as our result; hence, we are comfortable with our result because it shows that the residuals of our model are normally distributed.

All the post-estimation test results presented have helped prove that model 1 in this study meets the criteria for deriving a good regression model. At a 10% level of significance, the t-statistics is -4.244820 while the p-value of the t-statistics is 0.0004, which is less than 0.05. Therefore, we don't accept the null hypotheses and accept the alternate hypotheses, which state
that the cost of raw materials has a significant effect on the profitability of manufacturing companies in Nigeria.

The result shows that the costs of raw material have a significant adverse effect on the profitability (measured by profit before tax) of manufacturing companies in Nigeria. This agreement between the a-priori expectation and actual result cannot be taken as a coincidence not only because the cost of raw materials is a charge against profit but also because expenses on them, depending on elasticity, can only be passed to final consumers. This finding is in alliance with the research conducted by (Asaolu et al., 2012; Etale and Bingila, 2016; and Prempeh, 2016). Apart from Asaolu et al., (2012) whose study was based on the food and beverage manufacturing industry, studies such as (Etale and Bingila, 2016; and Prempeh (2016) used only one company as a representation of the industry. This work considered five (5) manufacturing companies with a time frame of a ten (10) year. Within the extant literature reviewed, no study reported the appositive relationship between the cost of raw material and profitability.

**Test of Hypothesis 2**

Objective 2: to assess the extent to which selling and distribution costs affect the profitability of manufacturing companies in Nigeria

Research Question 2: To what extent does selling and distribution cost affect the profitability of manufacturing companies in Nigeria?

H02: Selling and distribution expenses have no significant effect on the profitability of manufacturing companies in Nigeria.

**Hypotheses 2 and a-priori expectation**

\[ PBT_{it} = \alpha + \beta_1 SDE_{it} + \mu_{it} \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>15.80869</td>
<td>1.457080</td>
<td>10.84957</td>
<td>0.0000</td>
</tr>
<tr>
<td>SDE</td>
<td>-0.029430</td>
<td>0.015775</td>
<td>-1.865560</td>
<td>0.0795*</td>
</tr>
</tbody>
</table>

R-squared = 0.199458
Adjusted R-squared = 0.152367
S.E. of regression = 137.3322
Sum squared resid = 137.3322
Log-likelihood = -45.75049
Prob(F-statistic) = 0.055253
Jaque-Bera = 1.9402(0.281)

*significance at 10%

Source: Researcher’s E-Views Output (processed), 2018

Table 4 shows the simple regression result of objective, indicating that there exists a negative relationship between selling and distribution expenses and profitability measured by profit after tax of sampled companies. This relationship is indicated by the sign and size of the coefficients for SDE which \( \beta > 0 \). This result is at variance with our a-priori expectation.

From the simple regression estimates on Table 4, the R-squared showed that about 19.9% variations in profit before the tax can be attributed to the influence of our explanatory variable...
(selling and distribution expenses) alone while the remaining 80.1% variations in the respective dependent variable were caused by other factors not included in this model.

Furthermore, the coefficients showed that ₦1 change (increase) in selling and distribution expenses would cause a 0.029430 Naira reduction in the profitability of selected manufacturing companies in Nigeria. Also, p-value showed 0.0795 for our independent variables meaning that the simple regression result is statistically insignificant because this (the p-value) is less than 10% level adopted for this study. This value shows that the effect of selling and distribution expenses on profit before tax is negative. Thus, we fail to accept the null hypothesis.

Ljung Box is an improved robustness test to confirm the result of our Durbin Watson. They both test the presence of Serial correlation (time series data) or Auto-correlation (panel data) in any particular model. The result of the Durbin Watson is within the threshold of 1.8 and 2.2; this shows that in our series, there is no evidence of autocorrelation. This result is further confirmed by the result from Ljung Box, which shows that the p-value of Q-statistics is higher than our chosen level of significance (10%). This value means that we cannot reject the Null hypothesis for this test, which says there is no evidence of significant or severe serial or autocorrelation. This evidence is indeed a good result for our series.

From the result on Table 4, the probability value of Jaque-Bera is more than 0.05 thus we do not reject the null hypothesis (the null is that the residuals are normally distributed) because our P-value is 0.281. At a 10% level of significance, the t-statistics is -1.865560 while the p-value of the t-statistics is 0.0795, which is more than the significant level of 0.1. Therefore, we accept the alternate hypotheses and reject the null hypothesis, which states that selling and distribution expenses have a significant effect on the profitability of manufacturing companies in Nigeria.

The effect of selling and distribution expenses on profit before tax on manufacturing companies in Nigeria is negative and statistically insignificant at a 10% level. The persistent increase in the pump price of Premium Motor Spirit (PMS) and the poor state of the road network in Nigeria increase the cost of transportation of manufactured products to final customers. However, by this finding, the manufacturing companies have been able to factor in this cost into the prices of product sold to the final consumer (inelastic demand).

This finding aligns with the outcome of research conducted by (Sharma and Husain, 2015) and (Oloko et al., 2014). Sharma and Husain (2015) work was published in Saudi Arabia with four (4) years' time frame. It considers selling and marketing expense, dealers' commission, advertising expenses and salary, wages, employee benefits paid to the selling and marketing staff of these companies as variables for its independent variable. Meanwhile, this study employed five (5) explanatory variables: the cost of raw materials, selling and distribution expenses, wages and salaries, training and research and development as a surrogate for cost control and reduction (independent variable) with a ten-year time frame.

**Test of Hypothesis 3**

Objective 3: to determine the impact of salaries and wages on the profitability of manufacturing companies in Nigeria.

Research Question 3: What impact do salaries and wages have on the profitability of manufacturing companies in Nigeria?

Hypothesis 3: Salaries and wages do not affect the profitability of manufacturing companies in Nigeria.
Table 5: Regression Estimate for Hypotheses 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3.893156</td>
<td>0.109387</td>
<td>35.59078</td>
<td>0.0000</td>
</tr>
<tr>
<td>SW</td>
<td>0.005834</td>
<td>0.005033</td>
<td>1.159080</td>
<td>0.2608*</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.066039</td>
<td>Mean dependent var</td>
<td>3.797400</td>
<td></td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.016883</td>
<td>S.D. dependent var</td>
<td>0.331367</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>0.328557</td>
<td>Akaike info criterion</td>
<td>0.702182</td>
<td></td>
</tr>
<tr>
<td>Sum squared resid</td>
<td>2.051049</td>
<td>Schwarz criterion</td>
<td>0.801661</td>
<td></td>
</tr>
<tr>
<td>Log-likelihood</td>
<td>-5.372915</td>
<td>Hannan-Quinn criter.</td>
<td>0.723772</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>1.343466</td>
<td>Durbin-Watson stat</td>
<td>2.100613</td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.260784</td>
<td>Ramsey-Reset Test</td>
<td>24.180(0.9462)*</td>
<td></td>
</tr>
<tr>
<td>Jaque-Bera</td>
<td>3.420(0.182)</td>
<td>Ljung Box Test</td>
<td>0.1325</td>
<td></td>
</tr>
</tbody>
</table>

*R*significance at 10%
Source: Researcher’s E-Views Output, 2018

**Hypotheses 3 and a-priori expectation**

PRTit = α₀ - β₁SWit + µit

PRTit = 3.893156 + 0.05834SWit + µit

Table 5, shows the simple regression result of objective, indicating that there exists a positive relationship between salary and wages and profitability. This relationship is indicated by the sign and size of the coefficients for salary and wages which β > 0. This result is at variance with our a-priori expectation.

From the simple regression estimates on Table 5, the R-squared showed that about 6.6% variations in profitability could be attributed to the influence of our explanatory variable (salary and wages) alone while the remaining 93.4% variations in the respective dependent variable were caused by other factors not included in this model. Furthermore, the coefficients showed that 1% change (increase) in salary and wages rate would generate an n58,341 rise in the profitability of selected manufacturing companies. Also, p-value showed 0.2608 for our independent variables meaning that the simple regression result is statistically significant because this (the p-value) is more than 10%, level adopted for this study. This value shows that the effect of salary and wages on profitability is positive and statistically significant. Thus, we may reject the null hypothesis.

Ramsey Reset test is a formal robustness test which helps to test the linearity of our model. A regression criterion is that the model must be linear and from the result presented in Table 5 we do not reject the Null hypothesis which says that the model is direct because the p-value is 0.9462 which is more than 10%. This shows that our model for this study is correctly specified (i.e., no specification biases in the model). What is reported here is the probability value (significant value) of F-statistics.

Ljung Box, on the other hand, is an improved robustness test to confirm the result of our Durbin Watson. They both test the presence of Serial correlation (time series data) or Auto-correlation (panel data) in any particular model. The result of the Durbin Watson is within the threshold of 1.8 and 2.2; this shows that in our series, there is no evidence of autocorrelation. This result is further confirmed by the result from Ljung Box, which shows that the p-value of Q-statistics is higher than our chosen level of significance (10%). This level means that we cannot reject the Null hypothesis for this test, which says there is no evidence of significant or severe serial or autocorrelation. This evidence is indeed a good result for our series.
From the result on Table 5, the probability value of Jarque-Bera is more than 0.05 thus we do not reject the null hypothesis (the null is that the residuals are normally distributed) because our P-value is 0.182. The t-statistics is 11.59080 at 10% level of significance, while the p-value of the t-statistics is 0.0208, which is less than the significant level of 0.05. Therefore, we do not reject the null hypotheses, which state that salaries and wages have a considerable effect on the profitability of manufacturing companies in Nigeria.

The effect of salary and wages on the profitability of manufacturing companies is negative and statistically insignificant at a 10% level of significance. The implication is that a boost in wages and salary has the potential to improve profitability. This profitability will also prevent pilferage and promote industrial harmony. Findings from other empirical works are similar to this assertion. For instance, Oyerogba et al. (2014) examined the impact of the compensation package and the profitability of listed companies in Nigeria. The study established a significant positive relationship. In the same dimension, Ojeleye (2017) evaluated the impact of remuneration on employees’ performance. The aforementioned empirical results suggest a positive correlation between wages and salary and profitability, but the result of the study conducted by Saraki (2016) revealed inverse relationship meaning cost control and cost reduction implementation is weak because only one of the manufacturing companies, Unilever Plc was considered as a case study. This study finds five (5) of such companies to bridge this gap.

Test of Hypothesis 4
Objective 4: to examine the extent to which research and development affect the profitability of manufacturing companies in Nigeria
Research Question 4: What is the impact of research and development on the profitability of manufacturing companies in Nigeria?
Hypothesis 4: Research and development have no impact on the profitability of manufacturing companies in Nigeria.

Table 6: Regression Estimate for Hypotheses 4

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1208.728</td>
<td>42.96346</td>
<td>28.13386</td>
<td>0.0000</td>
</tr>
<tr>
<td>RD</td>
<td>4.64E-05</td>
<td>1.8906</td>
<td>2.4545</td>
<td>0.0002</td>
</tr>
</tbody>
</table>

R-squared 0.536368 Mean dependent var 1359.618
Adjusted R-squared 0.511966 S.D. dependent var 186.6993
S.E. of regression 120.4270 Akaike info criterion 12.66990
Sum squared resid 323213.0 Schwarz criterion 12.76938
Log-likelihood -131.0339 Hannan-Quinn criter. 12.69149
F-statistic 21.98075 Durbin-Watson stat 1.924201
Prob(F-statistic) 0.000160 Ramsey-Reset Test 0.1474(0.13628)*
Prob(F-statistic) 0.000160 Ljung Box Test 0.09125*

*significance at 10%
Source: Researcher’s E-Views Output (processed), 2018

Hypothesis 4 and a-priori expectation
PRTit= α0+β1 RDit-1+μit
PRTit= 1208.728+4.6405RDit+μit
Table 6. shows the simple regression result of objective four indicating that there exists a positive relationship between Research & Development Expense of last year and profitability of the current year in the selected listed manufacturing companies. This relationship is indicated by the sign and size of the coefficients for RD which $\beta > 0$. This result is consistent with our a-priori expectation.

From the simple regression estimates on Table 6, the R-squared showed that about 53.6% variations in profitability could be attributed to the influence of our explanatory variable (Research and Development Expenses) alone while the remaining 46.4% variations in the respective dependent variable were caused by other factors not included in this model. Furthermore, the coefficients showed that ₦1 change (increase) in Research and Development would cause a ₦4.6m Naira definite increase in Profitability. Also, p-value showed 0.0002 for our independent variables meaning that the simple regression result is statistically significant because this (the p-value) is less than a 10% significance level adopted for this study. This value shows that the effect of research and development on profitability is statistically significant. Therefore, we reject the null hypothesis.

Ramsey Reset test is a formal robustness test which helps to test the linearity of our model. A regression criterion is that the model must be linear and from the result presented in Table 6, we do not reject the Null hypothesis, which says that the model is linear. This shows that our model for this study is correctly specified (i.e., no specification biases in the model). What is reported here is the probability value (significant value) of F-statistics.

Ljung Box, on the other hand, is an improved robustness test to confirm the result of our Durbin Watson. They both test the presence of Serial correlation (time series data) or Autocorrelation (panel data) in any particular model. The result of the Durbin Watson is within the threshold of 1.8 and 2.2; this shows that in our series, there is no evidence of autocorrelation. This result is further confirmed by the result from Ljung Box, which shows that the p-value of Q-statistics is higher than our chosen level of significance (10%). This value means that we cannot reject the Null hypothesis for this test, which says there is no evidence of significant or severe serial or autocorrelation. This value is indeed a good result for our series.

The effect of research and development on the profitability of manufacturing companies in Nigeria is positive and statistically significant at 10% level of significance. Although this cost could be, the multiplier effect it has on these companies cannot be overemphasized. Investment in research and development is one of the reasons why some manufacturing companies have remained relevant in spite of many challenges. This finding is in alliance with the study conducted in Iran by (Rabiei and Dadkhah, 2014). While the former was based on four years, the latter considered nine years' period. This study, however, found ten years to accommodate this gap.

Test of Hypothesis 5
Objective 5: to evaluate the impact of training on the profitability of manufacturing companies in Nigeria.
Research Question 5: What impact does training has on the profitability of manufacturing companies in Nigeria?
Hypothesis 5: Training does not affect the profitability of manufacturing companies in Nigeria

Hypothesis 5 and A-priori Expectation
\[ \text{PRTit} = \alpha + \beta_1 \text{TRCit} + \mu_{it} \]
\[ \text{PRTit} = 1337.819 + 4.5505 \text{TRCit} + \mu_{it} \]
Table 7: Regression Estimate for Hypotheses 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1337.819</td>
<td>139.3852</td>
<td>9.598002</td>
<td>0.0000</td>
</tr>
<tr>
<td>TRC</td>
<td>4.65E-05</td>
<td>1.44E-05</td>
<td>3.234585</td>
<td>0.0044*</td>
</tr>
</tbody>
</table>

R-squared: 0.355113
Adjusted R-squared: 0.321172
S.E. of regression: 15.01252
Sum squared resid: 15.11194
Log-likelihood: -155.6315
F-statistic: 10.46254
Prob(F-statistic): 0.2929(0.415)*
Ljung Box Test: 0.1425*

*significance at 10%
Source: Researcher’s E-Views Output (processed), 2018

Table 7, shows the simple regression result of objective, indicating that there exists a positive relationship between Training and Profitability in the selected manufacturing companies. This relationship is indicated by the sign and size of the coefficients for TRC which β > 0. This result is consistent with our a-priori expectation.

From the simple regression estimates on Table 7, the R-squared showed that about 35.5% variations in profitability could be attributed to the influence of our explanatory variable (Training Cost) alone while the remaining 74.5% variations in the respective dependent variable were caused by other factors not included in this model.

Furthermore, the coefficients showed that N1 change (increase) in training cost would cause a 4.5 Million definite increase in profitability. Also, p-value showed 0.004 for our independent variables meaning that the simple regression result is statistically significant because this (the p-value) is less than 10%, which is the level of significance adopted for this study. This value shows that the effect of Training on profitability is statistically significant. Thus, we may reject the null hypothesis.

Ramsey Reset test is a formal robustness test which helps to test the linearity of our model. A regression criterion is that the model must be linear and from the result presented in Table 6, we do not reject the Null hypothesis, which says that the model is linear. This shows that our model for this study is correctly specified (i.e., no specification biases in the model). What is reported here is the probability value (significant value) of F-statistics.

Ljung Box, on the other hand, is an improved robustness test to confirm the result of our Durbin Watson. They both test the presence of Serial correlation (time series data) or Autocorrelation (panel data) in any particular model. The result of the Durbin Watson is within the threshold of 1.8 and 2.2; this shows that in our series, there is no evidence of autocorrelation. This result is further confirmed by the result from Ljung Box, which shows that the p-value of Q-statistics is higher than our chosen level of significance (10%). This value means that we cannot reject the Null hypothesis for this test, which says there is no evidence of significant or severe serial or autocorrelation. This evidence is indeed a good result for our series.

The effect of Training on the profitability of manufacturing companies in Nigeria is statistically significant at 10% level of significance. The implication is that the increase in training
of employees and other stakeholders have the potential to improve profitability. This result is expected because practice is the most crucial factor in the business world because it increases the efficiency and the effectiveness of both employees and the organization (Kwon et al., 2014). Although it is costly to give training to the employees, in the long run, it gives back more than it took. Findings from other empirical works are similar to this result. The work of Khan et al. (2011) established a positive significant positive relationship. This work was validated by (Asfaw et al., 2015; Tahir et al., 2014).

**Multiple Effects**

Primary Objective: to evaluate the impact of cost control and reduction on the profitability of manufacturing companies in Nigeria.

Hypothesis: Costs control and reduction have no significant effect on the profitability of manufacturing companies in Nigeria.

\[ \text{PRT}_{it} = \beta_0 + \beta_1 \text{CRM}_{it} + \beta_2 \text{SD}_{it} + \beta_3 \text{WS}_{it} + \beta_4 \text{RD}_{it} + \beta_5 \text{TRC}_{it} + \mu_{it} \]

\[ \text{PRT} = 0.222569 - 0.252370 \text{CRM} - 2.0107 \text{SD} - 0.185734 \text{WS} + 0.417150 \text{RD} + 0.595400 \text{TRC} \]

Table 8 shows the multiple regression results of our main objective indicating that there exists a negative (cost of raw material, selling & distribution, salary & wages) and positive (research & development and training cost) relationship between our independent variables and profitability measured by profit before tax of sampled companies. This relationship is indicated by the sign and size of the coefficients for all our independent variables. This result is in line with our a-priori expectation, which showed a negative but not significant relationship.

**Table 8: Regression Estimate for the Main Hypotheses**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>t-Stat.</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.222569</td>
<td>0.221639</td>
<td>1.004197</td>
<td>0.320</td>
</tr>
<tr>
<td>CRM</td>
<td>-0.252370</td>
<td>4.218801</td>
<td>-0.059820</td>
<td>0.952</td>
</tr>
<tr>
<td>SD</td>
<td>-2.0107</td>
<td>1.2707</td>
<td>-1.584908</td>
<td>0.120</td>
</tr>
<tr>
<td>WS</td>
<td>-0.185734</td>
<td>0.786513</td>
<td>-0.236148</td>
<td>0.814</td>
</tr>
<tr>
<td>RD</td>
<td>0.417150</td>
<td>0.173207</td>
<td>2.410361</td>
<td>0.018</td>
</tr>
<tr>
<td>TRC</td>
<td>0.595400</td>
<td>0.253710</td>
<td>2.3452</td>
<td>0.025</td>
</tr>
</tbody>
</table>

R² = 0.691434
Adj. R² = 0.565467
S.E of Reg = 0.568824
F-Statistic = 2.313569
Prob.(F-Stat) = 0.035893*
Obs = 50
Cross-section = 5

Dependent Variable: PRT

*significance at 10%

Source: Researcher’s E-Views Output (processed), 2018

From the multiple regression estimates on Table 8, the Adjusted R-squared showed that about 56.5% variations in profit before tax could be attributed to the influence of our explanatory variables while the remaining 53.5% variations in the respective dependent variable were caused by other factors not included in this model.

Furthermore, the coefficients showed that ₦1 change (increase) in selling and distribution, cost of raw materials and salary and wages would cause a ₦2.01million, ₦252,370, ₦185734
reduction respectively in the profitability of selected manufacturing companies in Nigeria. Also, the t-stat p-value for these three variables is statistically not significant because this (the p-value) is more than our level of significances adopted for this study. Also, the coefficients showed that ₦1 change (increase) in research and development and training cost would cause a ₦417,150 and ₦595,400 increase respectively in the profitability of selected manufacturing companies in Nigeria. Also, the t-stat p-value for these three variables is statistically significant because this (the p-value) is less than our level of significances adopted for this study. This value shows that the effect of research and development and training cost on profit before tax positive and statistically significant. However, the p-value of the f-statistics at 3.5% lower than the acceptable 10% level of significance indicates that the model is statistically significant. Thus, cost reduction has a significant effect on profitability. Hence, we may reject the null hypothesis. At the level of significance of 10%, the F-statistics is 2.313569 while the P-Value of the F-statistics is 0.035893, which is less than 0.1. This value shows that cost control and reduction have a positive effect on the profitability of manufacturing companies in Nigeria.

CONCLUSION

This study examined cost control as a tool for profitability in selected manufacturing companies in Nigeria. Five models were developed out of which two revealed a negative relationship, and the remaining three turned a positive relationship with profitability in selected manufacturing companies for the period under study. This result implies that the cost of raw materials and selling and distribution expenses revealed an inverse relationship while salaries and wages, training and research and development exhibit a direct relationship.

It is as a result of this recommending that, first, 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. Second, the government should provide adequate infrastructural supports an enabling environment, particularly in the areas of the road network, power, and transport to ease the selling and distribution of manufactured products. Third, prompt payment of employees' salaries and wages should be adhered to by the management of manufacturing companies. This payment, as empirical results have revealed, will foster better and mutual industrial harmony between management and labor union because entities strive to succeed under hostility. Generally, more should be done to guarantee employees commitment to their employers or organizations by making the work more interesting through an effective and efficient reward system. Fourth, manufacturing companies should increase their resources and dedication to staff research and development and training, especially in handling raw materials to develop skills, update knowledge, and prevent wastage.

REFERENCES


