Comparative Analysis of Simple and Multiple Regressions of selected indicators on Net-Profit of Manufacturing Companies in Nigeria

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Abstract

This study considered some indicators of Net profit of 10 selected manufacturing companies in Nigeria. The indicators used were Firm Size, Waste Management (Sale of scraps/obsolete, stocks/products) and Age of the companies from 1985 to 2020. The companies considered were Dangote cement plc, premier paints plc, Berger paints plc, Beta gloss plc, First Aluminilum plc, Chemical & Allied products plc, Lafarage plc, DN Meryer plc, Cuftex plc and Portland paints plc. These indicators were used one after the other in a simple linear regression form and then with a multiple linear regression with all the indicators. The Ordinary Least Square (OLS) was applied and the results shows that generally all these models used were not good for the analysis and age of these 10 selected companies contributes more than Firm Size and Waste Management but in a negative angle. As the age of the companies' increases, the Net profit of these companies decreases by 0.00613.

1. Introduction

A business objective is the starting point for any business organization to thrive and it provides direction for action. It is also a way of measuring the effectiveness or otherwise of the actions taken by the management of the organization. The main goal or objective of any business organization is to make and maximize profit while other secondary objectives include going concern, growth, corporate social responsibility benefits to employees and so on. Though other objectives are also considered very important as listed above, profit maximization is usually the

ultimate because it maximizes the shareholder's wealth which is the ultimate aim of investing in a business. People will naturally prefer to invest in highly profitable businesses. Therefore, in the long run only the profit maximizers survive in the business environment. However, for adequate profit to be recorded from a business there is a need for adequate control of cost.

Robert (2007) stated that a company with an adequate cost structure possesses a higher chance of attaining its profit target. Prices of goods, raw materials and services are gradually increasing day by day, and due to the fact that the sole aim of a businessman, producer or manufacturer is to make profit, they end up making use of low-quality materials for production so as to reduce the cost of production and maximize profit. Moreover, with the increase of competitors around, most of the producers have thought it wise to manufacture or package quality products and also enhance their profit level.

Adeleke, (2014) Cost control/reduction and profitability is the mainstay of every business entity and therefore represents the bottom line for every company. For a firm to be profitable, a clear and thorough understanding of all the factors that drive profit, as well as cost is very important. Cost control is important and has always been an important issue but perhaps most important in today's unpredictable market with few exceptions, at no other time in history has the business market been more dynamic. Unlike large scale enterprises, small and medium scale enterprises (SMEs) have been starving by financial needs, poor implementation and monitoring of projects, time and cost overrun, nonpayment of loans and harsh economic conditions. (Adam, 2005). Moreover, one of the most important traits for business success in a recession economy is especially Nigeria is that more and more manufacturing companies had been chased out of the market and are thus using cost control and cost reduction as a competitive weapon. However, a business enterprise must survive, grow, and prosper. Cost Control and Cost Reduction both are the activities necessary for ensuring that these objectives are fulfilled. With the current Economy situation of a developing economy such as Nigeria, there is now a cut-throat competition from various business concerns of the countries. As a result, there is now a race to secure a place for survival. This has increased the importance of Cost Control and Cost Reduction. Hence it is required to study the different tools and techniques used for Cost Control and Cost Reduction. For the same, we need to start with understanding deeply the concept of cost. Once we understand the

meaning of cost, its controllability, main areas where cost arises, then we can think of how to control or reduce the cost. We can classify the cost according to their nature, behavior then we can easily know the cost which can be controlled or reduced.

One of the benefits of cost control is the ability of a company to keep cash flow at necessary levels of operations, that is, with cost control, excessive amount of cash is not too tied up in inventory, it prevents oversupply of stock or overstaffed departments and this keeps cash available for other purposes including navigating economic waves, expansion needs or repairs and maintenance of equipment. Many construction companies use outside assessments to analyze their efficiency including the result of cost control effort, this does not only bring new viewpoints to the process, but also provide an important internal review. Sometimes it is difficult to be objective when you deal with the management of a business on a day to day basis, but professional analysts can bring a broader scope to operations resulting in improved cost control strategies. This elevated the interest of the researcher to bring to light how this goal can be achieved through an intensive study of the role of cost control and cost reduction on the profitability of a manufacturing company in Nigeria.

Cost Control: This involves all efforts to keep the actual cost incurred in line with the pre-determined cost, and by the comparison of actual cost with their predetermined costs to revel unreasonable cost in order that step may be taken to identify and if possible remove the responsible factor.

Cost Reduction: An attempt to bring costs down from a previously accepted level. It is also a systematic effort to improve profit margins by eliminating all forms of waste and unnecessary expense without impairing the generation of revenues.

Profit maximization: A process that companies undergo to determine the best output and price levels in order to maximize their return. The company will usually adjust influential factors such as production costs, price of goods and output level as a way of reaching its profit goal.

Just-In-Time (JIT): A manufacturing system that reduces the time that products spend in the production process by eliminating waste.

Akintoye, *et al.* (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.

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).

The reverse will be the case for unprofitable companies. Profitability, to 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 companies 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, & Adanma (2015) indicate that profitability is not synonymous with efficiency. The efficacy of the 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).

2. Materials and Method

This study, first considered simple linear regression with Net Profit as the response and Firm size as the predictor given as

$$NP = \beta_0 + \beta_1 FS + e \qquad (3.1)$$

Where NP=Net Profit of the selected companies

FS=Firm Size

β_0 and β_1=are the parameters of the model in (3.1)

and e=random error.

The second model to be used is a simple regression model given as

$$NP = \beta_0 + \beta_1 WM + e \qquad (3.2)$$

Where NP=Net Profit of the selected companies

WM=Waist Management (Sale of scraps/obsolete, stocks/products)

β_0 and β_1=are the parameters of the model in (3.2)

and e=random error.

The third model to be used is a simple regression model given as

$$NP = \beta_0 + \beta_1 AGE + e \qquad (3.3)$$

Where NP=Net Profit of the selected companies

AGE=sum of the ages of these companies from 1985-2020.

β_0 and β_1=are the parameters of the model in (3.3)

and e=random error.

While the fourth model is a multiple linear model given as

$$NP = \beta_0 + \beta_1 FS + \beta WM + \beta_2 AGE + e \qquad (3.4)$$

The models in (3.1) to (3.4) shall be separately used to form matrix form of the equations

$$Y = X\beta + e \qquad (3.5)$$

We applied the least square equation given as seen in Onu (2021) and Onu $et\ al.$ (2021) as

$$\underline{\beta} = (X'X)^{-1}X'Y \qquad (3.6)$$

From (3.6) we obtain the parameters.

The coefficient of determination is given as

$$R^2 = \frac{SSR}{SST}$$

(3.7)

Where $SSR = \sum(\hat{y} - \bar{y})^2$

And $SST = \sum(y - \bar{y})^2$

The R^2 lies between -1 and +1, if -1 there is a high negative relationship between the variables, if +1 there is a high positive relationship between the variables and if 0, there is no relationship between the variable(s).

3. Results and Discussion

Analysis 1

Regression Analysis: NP versus FS

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	1	4.897	4.897	1.81	0.215
FS	1	4.897	4.897	1.81	0.215
Error	8	21.623	2.703		
Total	9	26.520			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.64403	18.47%	8.27%	0.00%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	4.000	0.593	6.75	0.000
FS	-0.000000	0.000000	-1.35	0.215

Regression Equation

NP = 4.000 - 0.000000 FS

Analysis 2

Regression Analysis: NP versus WM

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	1	0.0102	0.01016	0.00	0.957
WM	1	0.0102	0.01016	0.00	0.957
Error	8	26.5095	3.31368		
Total	9	26.5196			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.82035	0.04%	0.00%	0.00%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	3.630	0.632	5.74	0.000
WM	-0.000000	0.000000	-0.06	0.957

Regression Equation

NP = 3.630 - 0.000000 WM

Analysis 3

Regression Analysis: NP versus AGE

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	1	4.748	4.748	1.74	0.223
AGE	1	4.748	4.748	1.74	0.223
Error	8	21.772	2.722		
Lack-of-Fit	6	18.571	3.095	1.93	0.379
Pure Error	2	3.201	1.600		
Total	9	26.520			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.64970	17.90%	7.64%	0.00%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	6.23	2.04	3.05	0.016
AGE	-0.00613	0.00464	-1.32	0.223

Regression Equation

NP = 6.23 - 0.00613 AGE

Analysis 4

Regression Analysis: NP versus WM, FS, AGE

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	3	7.7956	2.5985	0.83	0.523
WM	1	0.2868	0.2868	0.09	0.772
FS	1	2.9941	2.9941	0.96	0.365
AGE	1	2.7577	2.7577	0.88	0.383
Error	6	18.7241	3.1207		
Total	9	26.5196			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
1.76654	29.40%	0.00%	0.00%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value
Constant	5.94	2.21	2.69	0.036
WM	0.000000	0.000000	0.30	0.772
FS	-0.000000	0.000000	-0.98	0.365
AGE	-0.00490	0.00521	-0.94	0.383

Regression Equation

NP   =   5.94 + 0.000000 WM - 0.000000 FS - 0.00490 AGE

Discussion of Result

In the model of NP vs FS

It was revealed that the contribution of firm size alone to the Net profit of these companies is insignificant and the regression equation is also insignificant. The R-squared value of this model is 18.47% which means that the model was only able to explain the variation in the Net profit of these companies by 18.47% while the remaining value of 81.53% was left unexplained. This shows that this model is not a good model for this analysis. From the estimation of parameters, it was revealed that firm size contributes approximately nothing to the Net profit of these companies. The MS error value is 2.703. The regression is insignificant in the study.

In the model of NP vs WM

It was found that the contribution of waste management (WM) to the Net profit of these companies was insignificant, even more insignificant than the Firm size. The MS error was found to be 3.314 almost 0.611 higher than the MS value of the Firm size. The regression equation is found insignificant in the study. The R-squared value was observed to be 0.04% and adjusted R-squared was 0.00%. The waste management was found to be contributing nothing to the Net profit.

In the model of NP vs AGE

It was observed that the regression equation and the Age were insignificant and the MS error was found to be 3.095. The R-squared value was 17.90% and adjusted R-squared was 7.64%. The Age of the companies contributed negatively to the Net profit, that is to say, as the Ages of the companies' increases, the Net profit decreases by 0.00613.

In the multiple linear model

It was found that all the variables are not significant both the regression equation. The MS error was 3.1207, the R-squared and R-squared adjusted values were respectively 29.40% and 0.00%. This shows that the higher value of R-square was as a result of the increasing number model parameters. The true nature of this model was 0.00% revealed by the adjusted R-squared. Firm size and Waste management contributed nothing to the Net profit of these companies, while Age contributed negatively by about 0.00490.

Conclusion

The study showed that, the Waist Management which is measured with Sale of scraps/obsolete, stocks/products and the Firm size have no contribution to the Net Profits of the selected Manufacturing Firms in a simple regression models but Age of the Firms has negative contribution to the Net Profit of the Companies in Nigeria. It was also found that even in a multiple linear regression model, the Waist Management and the Firm size also did not show any contribution to the Net Profit of the Companies in Nigeria.

Recommendation

It is recommended in this study that, in studying the Net Profit of Companies in Nigeria, care should be taken to select predictors that can measure the profitability of the selected Companies, as these predictors selected here did not perform well in determining the Net Profit of these Companies in Nigeria.

Contributions to Knowledge

1. This study has shown that predictor(s) that contributed little to a response in a simple linear Regression Model, may also contribute little in a multiple linear Regression Model.
2. It also Reveals that in a simple linear Regression Model, Waist Management and Firm size individually had no contributions to the Net Profit of the selected Companies in Nigeria.
3. Where the Age of the Companies had negative contributions to the Net Profit of the selected Companies in Nigeria. This means that as the companies gets older, the Net Profit of these Companies decreases.

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