



Cost-volume-profit Analysis and Decision Making in the Manufacturing Industries of Nigeria

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ABSTRACT

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This study determined the effect of cost-volume profit analysis in the decision making of manufacturing industries. The study combined both survey research and longitudinal research design. Both primary and secondary data were used for collection. They were analyzed using regression and correlation techniques. The results revealed that the sales value of a product and the quantity of the product manufactured has a positive effect on profit made on the product, also that there is a significant relationship between the cost of production and profit. The re-order and economic order quantity were also determined as a base for assessing decision making opportunities. Based on the result, the researcher recommends that manufacturing industries should always adopt cost-volume profit analysis in their decision making.

Keywords:

Cost Volume-Profit Analysis

Decision making

Manufacturing industries

1. Introduction

Cost-volume-profit analysis according to Glautieret al (2001) is the systematic examination of the inter-relationship between selling prices, sales and production volume, cost, expenses and profits. The above definition explains cost-volume-profit analysis to be a commonly used tool providing management with useful information for decision making. Cost-volume-profit analysis will also be employed on making vital and reasonable decision when a firm is faced with managerial problems which have cost volume and profit implications. Such problems are in the areas of profit planning, product planning, make or buy decision, expansion or contraction product line, utilization of productive capacity in a period of economic boom or depression.

More especially cost-volume-profit analysis is used by managers to plan and control more effectively and also to concentrate on the relationship among revenues, cost, volume changes, taxes and profit. It is also known as break-even analysis. Finally this study is aimed at examining the effect of cost-volume-profit analysis on decision making process of some selected manufacturing industries in Nigeria.

The major problem encountered by manufacturing industries when cost-volume-profit analysis stands as a basis for decision making is managerial inefficiency and this includes ignorance of this concept ie inability of the management to employ it in their decision making and also not knowing the importance of cost-

volume-profit analysis. Manufacturing industries are not relevant in their decision making process. Most manufacturing industries in Nigeria do not determine the extent to which cost-volume-profit analysis affect their various decisions. Manufacturing industries is faced with the problem of how to make use of the available scarce resources in order to achieve the objective of profit maximization. Another major problem manufacturing industries in Nigeria face, is when the application of cost-volume-profit analysis techniques are meant to apply, they don't apply it in their enhancement of managerial efficiency of manufacturing industries. To what extent is cost-volume-profit analysis considered relevant in the decision making process of manufacturing industries? To what extent does the application of cost-volume profit analysis technique in decision making process enhance managerial efficiency of manufacturing industries? To what extent does cost-volume-profit analysis affect the various decisions of manufacturing industries? To what extent does each of the identified approaches to cost volume profit analysis is being adopted in manufacturing industries? What is the decision making opportunities of the selected industries based on their re-order level and economic order quantity?

2. Conceptual Framework

Adenji (2008) states that cost-volume-profit analysis are predetermined costs, target costs or carefully pre planned costs which management endeavors to achieve with a view to establishing or attaining maximum efficiency in the production

process. According to him, cost-volume-profit analysis is cost plans relating to a single cost unit. Because cost-volume-profit analysis purports to be what cost should be, any deviation represents a measure of performance. The predetermined costs are known as cost-volume-profit analysis and the difference between the cost-volume-profit analysis and actual costs are known as a variance. Drury (2000) defines cost-volume-profit analysis as predetermined cost; they are cost that should be incurred under efficient operating conditions. The cost-volume-profit analysis may be determined on a number of bases. The main uses of cost-volume-profit analysis are in performance measurement, control, stock valuation and in the establishment of selling prices. Cost-volume-profit analysis is a target cost which should be attained. The buildup of cost-volume-profit analysis is based on sound technical and engineering studies, knowing the production methods and layouts, work studies and work measurement, materials specification and wage and material price projections. A cost-volume-profit analysis is not an average of previous costs. They are likely to contain the results of past inefficiencies and mistakes. Furthermore, changes in methods, technology and costs make comparison with the past of doubtful value for control purposes. In order to assist the decision making of manufacturing industries in cost-volume-profit analysis control, the cost-volume-profit analysis system must first of all indicate what is attainable by efficient performance and then highlight any area where attainable efficiency is not being achieved. The definition of cost-volume-profit analysis as per the institute of chartered accountants official terminology is "a predetermined calculation of how much cost should be under specific working conditions in manufacturing industries. It is built up from an assessment of the value of cost element and correlates technical specifications and the quantification of materials, labor and other costs to prices and/or wages expected to apply during the period which the cost-volume-profit analysis is expected to be used.

Cost-volume-profit analysis, according to Glautier et al (2001), is the systematic examination of the inter-relationship between selling prices, sales and production volume, cost, expenses and profits. The above definition explains cost-volume-profit analysis to be a commonly used tool providing management with useful information for decision making. Cost-volume-profit analysis will also be employed on making vital and reasonable decision when a firm is faced with managerial problems which have cost volume and profit implications. Cost-volume-profit analysis according to Hilton R.W (2002:230) is a mathematical representation of the economics of producing a product. The relationship between a product's revenue and cost function expressed within the cost-volume-profit analysis are used to evaluate the financial implication of a wide range of strategic and operational decisions.

According to Garrison et al (2003) cost-volume-profit analysis is a study of inter-relationship between the following factors: prices of products, volume or level of activity, per-unit variable cost, total fixed cost, mix of products sold. Also state further the cost-volume-profit analysis is a key factor in many decisions including choice of products lines, pricing of product, marketing strategies and utilization of productive facilities

Principles and Assumption of Cost-Volume-Profit Analysis

Underlying the operation of cost-volume-profit analysis is a principle which states that "at the lowest level of activity cost exceed income but as activity increases income rises faster than cost and eventually the two amount are equal, after which income exceed cost until diminishing returns bring cost above income

once again. This principle describes cost-volume-profit analysis with curvilinear. Cost and revenue curves which thought theoretically sound lack practicability. Accountant found the need to bring in addition information relating to cost behavior and sales policy this was to ensure that practical model be developed out of these principles.

The followings are the underlying assumptions of cost-volume-profit analysis according to Horngren et al (2006)

- The behavior and revenues is linear.
- Selling price is constant.
- All cost can be divided into their fixed and variable element.
- Total fixed cost remains constant.
- Total variable cost is proportional to volume.
- Volume is the only driver of cost.
- Prices of production inputs (eg materials) are constant.

Methods of Cost-Volume-Profit Analysis

There are two main approaches used in analysis cost-volume-profit.

Inter-relations. They include:

- The Graphical Approach
- The Algebraic Approach
- The Net Income Equation
- The Contribution Margin Equation
- The Margin Of Safety Equation
- The Contribution Margin Ratio

The Graphical Approach

The cost-volume-profit graph can be very useful because it highlights cost-volume-profit relationship over wide range of activity and give managers a perspective that can be obtained in other way. Such graph is referred to as preparing a break even chart. This is correct to the extent that breakeven point is clearly shown on the graph. Garrison et al (2003).

Steps in Preparing Cost-Volume-Profit Graph

This involves three steps:

Draw a line parallel to the volume axis to represent total fixed expenses; choose some volume of sales and plot the point representing total sales amount at the activity level you have selected; again choose some volume of sales and plot the point representing total sales amount at the activity level you have selected. The anticipated profit or loss at any given level sales is measured by the vertical distance between the total revenue and the total expenses line cross Garrison et al (2003) (figure 1). Some managers prefer an alternative format to the cost-volume-profit graph as illustrated in figure 2.

The Profit Graph

This is another approach to cost-volume-profit graph. It is sometime preferred by some managers because it focuses more directly on how profit change with changes in volume. It has the added advantage of being easier to interpret than the traditional approach. It has the disadvantage of not showing as clearly how cost are affected by changes on the levels of sales.

Steps in constructing profit graph

Locate total fixed expenses on the vertical axis, assuming a level of activity. This point would be in the "loss area", equal to the total fixed expenses expected for the period. Plot a point representing expected profit or loss at any chosen level of sales.

After this point plotted draw a line through it back to the point on the vertical axis representing the total fixed expenses.

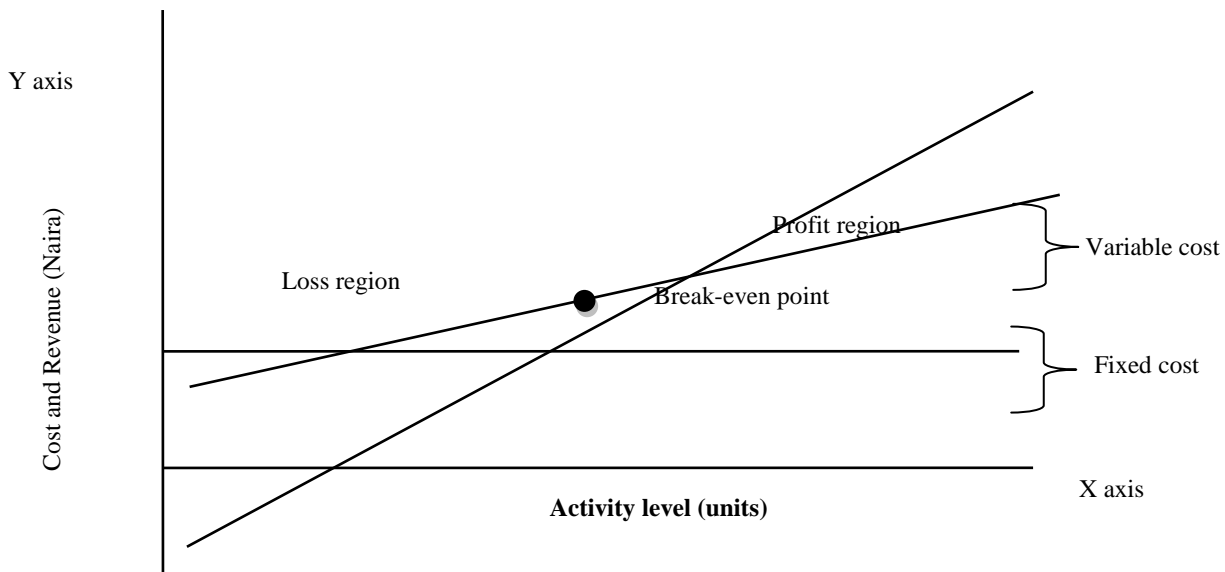


Figure 1: Cost-Volume-Profit Graph (Traditional Approach)

Source: Garrison et al (2003)

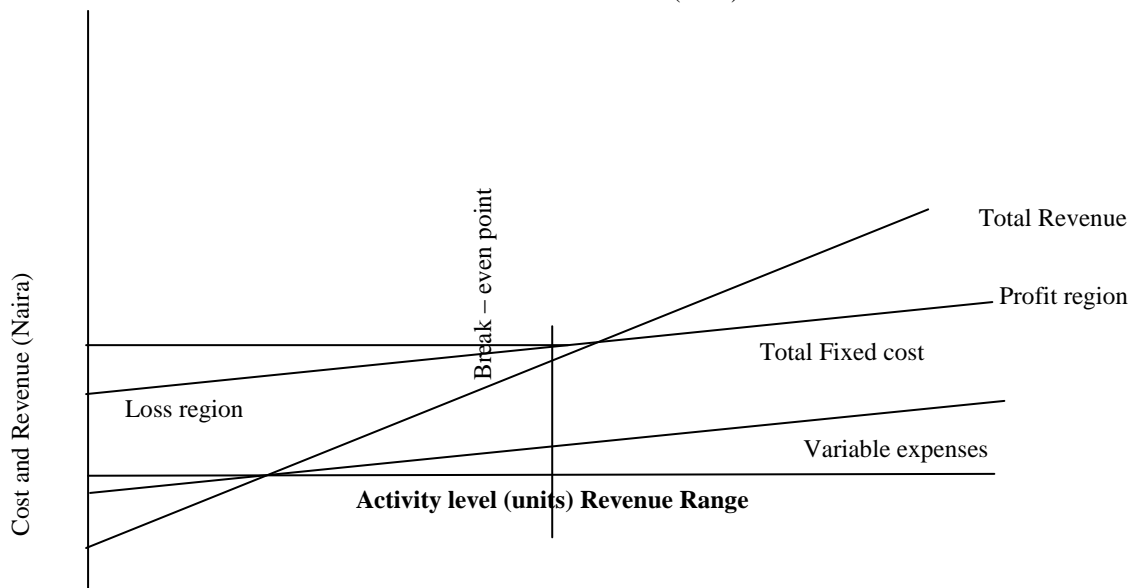
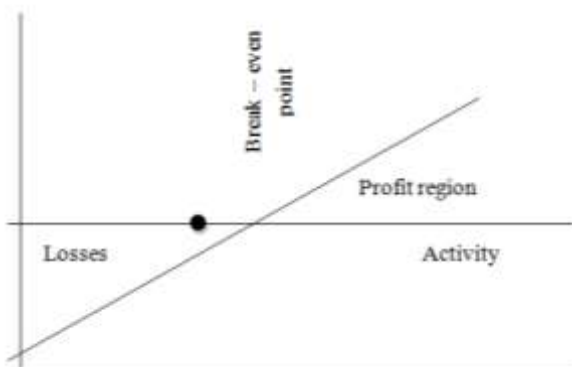


Figure 2: Cost-Volume-Profit Graph (Modern Approach)

Source: Garrison et al (2003)

Figure 3: Break-even point

Source: Garrison (2003)



Note: The break-even point is where the profit line crosses the break-even line.

The Algebraic Approach

The issues involved on this approach are the putting of marginal income statement format in formula, the incorporation of the contribution concept into the marginal costing income statement formula and the mathematical arrangement re-arrangement and evaluation of some of the basic cost-volume-profit factors. (unit selling price, unit variable cost, fixed cost, sales volume). The marginal income statement employs the marginal costing technique where too much attention may be given to variable

costs at the expense of disregarding fixed costs; in the long run fixed cost must be recovered.

The formulae and ratios that constitute then algebraic approach include the following;

- The net income ratio
- The contribution margin equation
- The variable cost ratio
- The contribution margin ratio
- The tax adjusted ratio

The Net Income Equation

This is a form of marginal costing statement used in processing cost-volume-profit data. Marginal costing differentiates between fixed costs and variable cost. In decision making, marginal costing is used simply because fixed cost is considered as a sunk cost or historical cost which is incurred whether profit is made or not.

The formula is stated thus;

$$NI = S - V_c - F_c$$

This can be regarded as;

$$S = V_c + F_c + NI$$

Where:

$$S = \text{sales}$$

$$V_c = \text{variable cost}$$

$$NI = \text{Net income}$$

At breake-even point, the equation changes because at that point, net income is zero, (no profit or loss).

Therefore

$$s = \frac{F}{S - V}$$

The net income includes the break-even point, margin of safety and profit and loss at a given level of activity and it is computed thus:

$$IN = S_n - V_n - F_n$$

Required quality to be produced and sold to obtain a target income; in order to compute the quality required to be manufactured and sold to obtain a target income this equation must be used:

$$Q = \frac{FC + NI}{CM}$$

$$CM$$

Where: $CM = S - V$. Garrison (2003)

The Contribution Margin Equation

Contribution margin is the amount by which revenue exceed the variable cost of producing that revenue. Contribution margin per unit is the different between selling price and variable cost per unit. Horngren et al (2006). Contribution margin is very important in decision making and it states that the planner ought to think in terms of contribution margin rather than in terms of absolute profit. It should be noted that each additional unit sold of a particular product contributes to a margin towards profit. The contribution margin equation could be stated thus

$$Cm = S - V$$

Where:

CM= contribution margin

S= sales

V= variable cost

In contribution margin approach break-even point is calculated as

$\frac{FC}{CM}$

CM

Sales unit to earn a desired profit to be

$\frac{FC + \text{Target profit}}{CM}$

CM

The Margin of Safety Equation

Margin of represents the difference between break-even point and budgeted activity level. It indicate how much sales may decrease before a company will suffer a loss. Adeniji (2004). The formula for calculating margin of safety is:

- Most (unit) = Budgeted unit – Break –even Point (unit).
- Most (sales volume) = Budgeted sales – Break-even point (Sales volume)

The Contribution Margin Ratio

This is the ratio of contribution to a particular sale value is describe as contribution margin ration. Also referred to as profit-volume ratio. It is designed to measure the level of contribution derivable from a specific amount of sales. It will be determined as follows.

- CMR (unit) = $\frac{\text{Selling price} - \text{Variable cost per unit}}{\text{Selling price}}$

Selling price

- CMR (Total) = $\frac{\text{Total sales} - \text{Total variable cost}}{\text{Total sales}}$

Total sales

- CMR = $\frac{\text{fixed cost} + \text{profit}}{\text{Contribution} + \text{variable cost}}$

Contribution + variable cost

Note: - This occurs where selling price is completely omitted.

- CMR = $\frac{\text{change in profit}}{\text{Changes in sales volume}}$

Changes in sales volume

Operating Leverage

Operating leverage refers to the extent to which an organization uses fixed cost in its cost structure. According to Horngenet el (2006) operating leverage describes the effect that fixed cost have on changes operating income as changes occur in units sold and hence in contributed margin. Operating leverage is a measure of how sensitive net operating income is to percentage changes in sales. Operating leverage act as multiplier. If operating leverage is high, a small percentage increase in sales can produce a much larger percentage in net operating income *Garrison et el* (2003) . Organizations with a high proportion of fixed cost in their cost structures have high operating leverage.

The degree of operating leverage is given level of sales is computer by following formula;

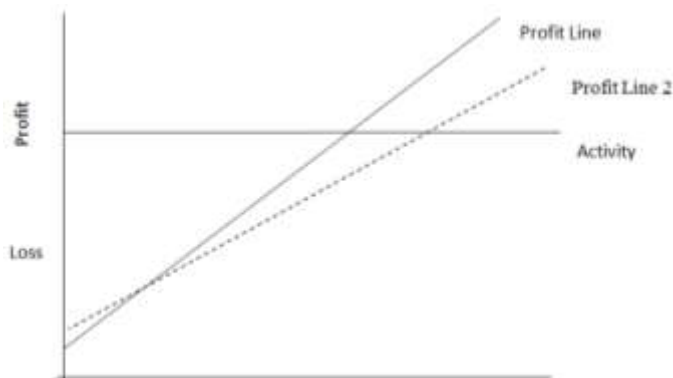
Degree of operating leverage = $\frac{\text{contribution margin}}{\text{Net operating income}}$

Net operating income

Uses of Cost-Volume Profit Analysis

Besides providing management with general information on the cost-volume-profit relationship of their firms, accountant can be also use it to provide management with useful information necessary for selling, certain planning, control and special decision problems. The decision areas where this analysis is include:- profit planning budgetary control, control, product replacement, pricing decision, selecting of distribution channels, setting volume, sensitive retain on investment target, entry into foreign marking performance measurement. (Meigs and Meigs, 1996)

Profit Planning: A firm first decides its sales, cost and activity before computing the profit that will emerge, but it profit planning, the firm first decides what profit it wants and then considers the sales, cost and activity required to produce that profit. The items under consideration on profit planning are cost-



volume-profit variables. Garrison et al (2003). Here to conduct the basic cost-volume-profit analysis (graphical or algebraic) using a forecast or planned economic structure of the firm as data source and then examining how planned profit will change if fixed cost, variable cost and sales volume are varied.

Figure 4: Cost-Volume-Profit Chart (Profit Planning Graph)

This will enable management know if the inherent economic structure of the firm and what direction changes are required. It is appropriate to present profit planning in cost-volume-profit analysis in charts, the sample of such chart is shown below.

This chart merely shows a single line that cuts the activity line at break-even point where the firm is neither making profit nor loss. The profit planning cost-volume-profit analysis also involves the use of equation determine the minimum amount that industries need to achieve its cash dividend payout target for the year.

The equation is given as

Revenue required to meet the dividend payment

$$\frac{F + PAD}{CMR} (1 - d)$$

Where

CMR

Where

F = Fixed cost

PAD = Profit after divided

d = dividend

CMR = contribution margin

The revenue gotten shows whether the firm will be able to pay the dividend or not, where its gets the revenue targeted, then it can pay such dividend.

Product Mix Decision: The selection of which products to products, which to abandon, and which to postpone is one of the most critical decision confronting a firm's management. The products selected from the product mix decision determine the revenue, profit and cash flow of firm's operations. Perhaps equally important, the products selected determine on part the firm's competitive position vis-à-vis its competitive position from the products selected currently provide the funds required to develop and produce products in the future.

Cost-volume-profit analysis is used to measure the economics characteristics of manufacturing a proposed product. Based on accounting data, the cost-volume-profit analysis is used to determine the sales quantity needed to break-even as well as the sales quantity required to earn a desired profit margin. Manager then compare a product's expected sales with the sales quantities required to break-even and earn a target profit margin to determine whether the product should be produced.

Budgetary Control: Budgetary control is the establishment of a budget relating to the responsibility of the executives and to the requirement of the policy and the continuous comparison of actual with budgeted result. J. O. Kalu (lecture note book pg 11). Budgetary control takes off from where budget planning stops and aspirations continued in budget are achieved. Budgetary control is concerned with use of budget to control a firm's operational activity either to secure by individual action the objective of policy or to provide a basis for its revision.

Cost-volume-profit analysis can be used in area of budgetary control to compare budgeted sales, volume, cost and profit with actual. The analysis of the variance is being computed only for cost-volume-profit. The process of comparing actual result with planned results and reporting budgetary control sets or control framework which helps expenditure to be kept within agreed limits. Deviations are also noted so that corrective measure can be taken provided with a given data, one can compute the break-even point, margin of safety and p/v ration for the budgeted and actual revenue. This helps management to know when it is deviated from its target point, it causes and how to take corrective measures.

Pricing Decision: Pricing decision are strategic decision that affect the quality produced and sold, and therefore the cost and revenues. To make these decisions, managers need to understand cost behavior patterns and cost drivers, they can then evaluate the value chain and over a products life cycle to achieve profitability. (Horngren et al 2006).

According to Horngren et al (2006) the major influence on pricing decision are customers competitors and cost. Customers influence price through the effect on the demand for a product or services, based on factors such as the features of a product and its quality. Competitors influence pricing decision due to the fact that no business operates in a vacuum but in an environment with many competitors, the company uses knowledge of their rivals technology, plant capacity and operating policies to estimates its competitor's cost. A valuable information to set its own price. Cost also influences pricing decision because they affect supply. The lower the cost of producing a product, the greater the quality of product the company is willing to supply and managers who understand the cost of producing their companies products set

prices that make the products attractive to customers while maximizing their companies operating income. In using cost-volume-profit analysis in this area, it is necessary to examine the cost of products produced and the planned profit before making the pricing decision.

Problems of Cost-Volume-Profit Analysis

Regardless of the uses and the estimated benefit of cost-volume-profit analysis to the management of a firm in various areas, there are a lot of factors which affect the use and validity of cost-volume-profit analysis labour specialization and standardization. In other words manufacturing can be described as changing raw materials into finished goods.

- Consumer goods
- Industrial goods

Consumer Goods: Consumer goods are goods that are ready for consumption after its production. These goods are bought from retail stores for personal, family or household use. They differentiated on basis of durability. Durable goods are products that have a long life such as furniture garden tools etc. Non – durable goods are those that are quickly use up or worn out or can become outdated such as food items, school supplies etc. Consumer goods can also be grouped into sub-categories on the basis of consumer buying habits. Convenience goods are items that buyers want to buy with less amount of effort, that is as conveniently as possible as possible. Most of these goods are low value that are frequency purchased in small quantities eg candy bars, soft drinks, newspapers Shopping goods are purchased only after the buyers compares the product of more than one store or looks at more than one assortment of goods before making a deliberate buying decision. They are of higher value than convenience goods they are infrequently and are durable. Price, quality, style, colour are typical factors for buying them eg lawn movers, bedding, camping equipment etc. Specialty goods are items that are unique or unusual-at least in the mind of the buyer. Buyers known what they want and are willing to exert considerable effort to obtain it. Such goods include wedding dresses, antiques, fine jewelries, electronics, automobiles etc(Kalu et al 2004).

Industrial Goods: industrial goods are products that firms purchase to make other products, which they later sell. Some are used directly in the production of products for resale, and some are used indirectly goods are classified on the basis of their use and they include: Installations are major capital items that are typically used directly in the production of goods, some installations such as convey or systems, robotics equipment and machine situations others like stamping machines large commercial ovens are built to a standard design but can be modified to meet individual requirement.

Raw Materials are products that are purchase on their raw state for the purpose of processing them into consumer or industrial goods e.g are iron, ore, crude oil, diamond, copper, wheat, leathers, some are converted directly into another consumer product while others are converted into an intermediate product to be resold for use in another industry.

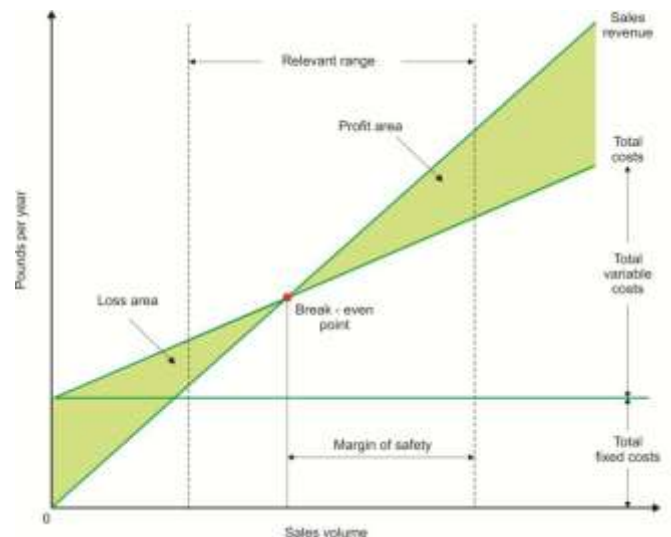
Accessory Equipment are capital goods that are less expensive and have short life span eg hand tools, compacted desk calculators, forklifts, typewriters etc. Fabricated parts are items that are purchased to be placed in the final product without final processing. Fabricated materials on the other hand require additional processing before being placed in the end products. Eg are batteries, sun roofs, spark plugs, steel, upholstery fabric etc

Industrial supplies are frequently purchased expense items. The contribute directly to the production the production process. They include computer paper light bulbs, lubrication oil, cleaning and office supplies etc. Kaluet el (2004)

3. Theoretical Framework

Analysis of the interdependence of the cost-volume-profit analysis is incorporated into the system of calculating the variable costs. In fact, the system calculation within the variable costs rests on a contribution theory of managing business outcome and its methodology encompasses the successful combination of costs and sales volume in order to optimize financial results. The cost-volume-profit analysis is operationalized through the critical break-even point of profitability. Break-even point can be mathematically calculated and graphically presented with certain conditions. For our further analysis we consider more useful to graphically display the break-even point. According to some, undoubtedly, great authorities in the area of cost management, cost-volume-profit analysis cannot be imagined without the following assumptions;

- Total costs can be divided into the fixed and variable component, respecting the level of activity,
- Behavior of total revenue and total cost is linear in relation to the volume of activities within the relevant range,
- The selling price per unit, unit variable and total fixed cost is known and unchanging.
- The analysis refers to a product, and if there is a wider range of products, the implementation structure is constant,
- Total costs and revenues are facing each other without involving the time value of money,
- Changes in the level of revenues and costs should be



treated as the consequence of changes in the number of products or services that are produced and sold. Number of manufactured units of products (services) is carriers of revenues and costs.

Figure 5: Cost-Volume-Profit Graph

In addition to these assumptions other can be made, such as: stability of the general price level, unchanging labor productivity, the overall synchronization between production and sales is indisputable, and also the principle of reability costs (fixed and variable).

The main purpose of Cost- volume- profit analysis and profitability break-even point is to provide information to the management in planning the target profit within the relevant range of activities under conditions of short- term.

4. Empirical Framework

Cost-volume-profit analysis is management tools that would be employed in making plausible decisions which have cost-volume (level of activity) and profit implications. There is no doubt that if management do not sufficiently apply cost-volume-profit analysis in their decision making process, it will result to substandard decisions low performance and profitability. The purpose of this study was to discover if the application of cost-volume-profit analysis techniques has any effect on profitability, to explore the relationship between cost-volume-profit analysis and the profitability of manufacturing industries and also to determine whether cost-volume-profit analysis techniques principles are being adopted and practiced in Nigerian manufacturing industries. Underlying the operation of cost-

5. Methodology

The simple linear module has to do with the causal relationship between two variables one dependent and the other independent which related with a linear function. The formula is represented thus

$$Y = \alpha + \beta x$$

Where; x = the dependent variable; Y = the independent variable; α = the point where the regression line or equation crosses y - axis; β = the slope of the regression line.

This technique was used to test the reliability of data in Ho1 and Ho2.

Decision rule: if T cal > T tab we reject the null hypothesis but if T cal < T tab, we accept the null hypothesis.

This technique measures the degree of relationship existing between variable. The correlation co-efficient(r) lies between 1 and -1 (-1<R<1).

The formula is given as

$$r_{xy} = \frac{n\sum xy - \sum x \sum Y}{\sqrt{(n\sum x^2) - (\sum x)^2(n\sum Y^2) - (\sum Y)^2}}$$

$$\text{Or } r_{xy} = \frac{\sum xy}{\sqrt{(\sum x^2)(\sum Y^2)}}$$

$$T - \text{calculated } r = \frac{\sqrt{n-2}}{\sqrt{1-r^2}}$$

Where r = coefficient of correlation

n = number of years

x = dependent variable

y = independent variable

This technique was used to rest the reliability of data in Ho2. The decision rule is to rejected Ho if T cal> T tab and accept Ho if cal< T tab.

volume-profit analysis is principles which state that, at the lowest level of activity cost exceed income but as activity increase income rises faster than cost and eventually the two amount are equal, after which income exceed cost unit diminishing returns bring cost above income once again. This principle describe cost-volume-profit analysis with curvilinear. Cost and revenue curves which though theoretically sound lack practicability. The study combined both survey research and longitudinal research design. Determine whether cost-volume-profit analysis techniques principles are being adopted and practiced in Nigerian manufacturing industries. Underlying the operation of cost-volume-profit analysis is principles which state that, at the lowest level of activity cost exceed income but as activity increase income rises faster than cost and eventually the two amount are equal, after which income exceed cost unit diminishing returns bring cost above income once again. This principle describe cost-volume-profit analysis with curvilinear. Cost and revenue curves which though theoretically sound lack practicability. The study combined both survey research and longitudinal research design.

6. Data Analysis

The R value of .856(85.6%) is shown to be significant at 5% level (**table 1**), implying the existence of a strong positive relationship between sales value of bottled and sachet water will invariably increase the profit made on them. The coefficient of determination (R^2) indicates that about 73.2 change in the profit made on bottled and sachet water are attributable change in the sales value of bottled and sachet water. The F-ration 27.380 is significant at 5% probability level and highlights the appropriateness of the model specification. With t-value of 5.233 being significant at 5% level. The researcher therefore rejects the null hypothesis concludes that sales values of bottled and sachet water significantly affect the profit made on them.

Table 1: Regression analysis result on the effect of sales value of a product on profit made on the product

Variable	Profit of Bottled water and Sachet water	
	co-efficient	P- value
Constant	817248.3	658902.2
t	1.240	
Sales value of bottled water and sachet water	.146	0.028
t	5.233***	
R	.856***	
R^2	.732	
f.ratio	27.380	

Note *** = significant at 5% level

Values in parenthesis are standard errors

Source: Extracted from appendix B

Testing for relationship between cost of production and profit made.

H_0 : There is no significant relationship between cost of production and profit made by manufacturing industries.

In testing this hypothesis, correlation analysis was employed and test results were extracted from appendix C.

From appendix C the correlation co-efficient of .884*** is significant at 0.01 level, this indicates the existence of positive high association between cost of production of bottled and sachet water and profit made on them. The researcher therefore reject

null hypothesis and concludes that there is a significant relationship between cost o productions on bottled and sachet water and profit made on them.

Testing for the effect of the quantity of a product manufactured and profit made on product.

H₀: The quantity of a product manufactured does not significantly after profit made on the product.

In testing this hypothesis, regression analysis was employed and test results were extracted Appendix D

Table 2: Regression analysis result on the effect of sales value of a product on profit made on the product

Variable	Profit of Bottled water and Sachet water	
	co-efficient	
Constant	1354238	Constant
t	1.735	t
Quantity produced of bottled and sachet water	8.089	Quantity produced of bottled and sachet water
t	3.692 ^{***}	t
R	.759 ^{***}	R
R ²	.577	R ²
f.ratio	13.630	f.ratio

Note ^{***} = significant at 5% level

Values in parenthesis are standard errors

Source: Extracted from appendix B

The R value of .759(75.9%) is shown to be significant at 5% level, implying the existence of a strong positive relationship between the quantity of bottled and sachet water manufactured and profit made on them.

Change in the quantity of bottled and sachet water manufactured will equally change the profit made on them .the co-efficient of determination (R²) indicated that above 57.7% increases in profit of a bottled and sachet water are attributable to change in the quantity manufactured of bottled and sachet water.

The f-ratio of 13.360 is significant at 5% probability level and highlight appropriateness of the model specification. With t-values of 3.692 been significant at 5% level. The researcher concluded that the quantity manufactured of bottled and sachet water significantly affect the product made on them, thereby rejecting H₀.

7. Conclusions and Recommendations

Based on the research conducted in this study, it has been observed that cost-volume-profit analysis is a veritable tool in the decision making process of manufacturing industries most especially in a competitive environment like ours. It was also observed that cost-volume-profit analysis has a very large effect on decision made by the management of manufacturing industries in Nigeria. In the course of this study the researcher examined the effect of cost-volume-profit analysis on kechis water (a division of Ulovr international Resources), and Big Chief Fast Food industries limit Umuahia and the following findings were made.

1. The study revealed that cost-volume-profit analysis is considered to a large extent in the decision making process of manufacturing industries and hence affect the various decisions made by manufacturing industries. It was also found these

manufacturing industries adopt both graphical and algebraic approaches to cost-volume- profit analysis.

2. The study further revealed that the application of cost-volume-profit analysis techniques in decision making process to a very large extent enhance managerial efficiency of manufacturing industries. In addition it was revealed that the benefits derived from the application of cost-volume-profit analysis include: efficient cost control, high productive capacity and increase in profitability.

3. The study also revealed that the sale value of a product and the quantity of a product manufactured has an effect o the profit made on the product and there is a relationship between the cost of production and profit made by manufacturing industries. Finally the re-order level and economic order quantity of the selected manufacturing industries were determined.

9. Conclusion

In this research study, the researcher has attempted to examine critically the effect of cost-volume-profit analysis on the decision making process of manufacturing industries in Nigeria. We discover from the study that the management of manufacturing industries in Nigeria have not adequately and successful applied the technique of cost-volume-profit analysis in their industries and this has lead to this technique not having its full effect in the decision making process of manufacturing industries. Deductive from the study finding is that some management and staff of these manufacturing industries are ignorant of the concept of cost-volume-profit analysis and hence do not apply it. This research study has also made findings that cost-volume-profit analysis is a commonly used tool providing management with useful information for decision making and it will also be employed in making vital and reasonable decision when a firm (especially manufacturing firm) faced with managerial problems which have cost, volume and product implication.

Recommendations

In the light of our finding in this study, some recommendations been made, they include:

- Each of these element; cost, volume and profit should be taken cognizance in the process of making managerial decisions. They should not be treated in the isolation this is because plausible decisions are unrealizable by employing any of the elements in isolation but rather be analyzed in a form called cost-volume-profit analysis.
- The management of manufacturing industries and other users of cost-volume-profit analysis should determine the best approach to cost-volume-profit analysis (whether graphical or algebraic) to adopt.
- Manufacturing industries should present previous years' cost-volume-profit result in a trend analysis and this should be used for comparison with present and with other industries performance.
- In order to enhance managerial efficiency in manufacturing Industries, cost-volume-profit analysis technique should be applied in their decision making process.
- The benefit of efficient cost-control, high productive capacity and increase in profitability will only be derived if there should be adequate application of cost-volume-profit analysis.
- In order to maximize profit, manufacturing industries should endeavor to increase the quantity of output

produce and also increase sales volume which will then increase sales value.

- Manufacturing industries should endeavor to embrace the consultancy service offered by research and consultancy unit of most university and higher institution in Nigeria. This will make decision maker to update their knowledge in strategic decision making.
- Manufacturing industries should employ experts with requisite knowledge of the concept and application of management accounting principles and techniques.
- Manufacturing industries should in addition to cost-volume-profit analysis employ other managerial tools like activity based costing, inventory/ stock control, linear programming etc. in their decision making process.

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