

## Evaluation of the Effect of Cost Volume Profit on the Profitability of Manufacturing Firms in Enugu State Nigeria

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**Key words:** Effect, profit, profitability, manufacturing, OLS, tool

**Abstract:** This study sought to evaluate the effect of cost volume profit on the profitability of manufacturing firms in Enugu state. The specific objectives of the study were to examine the effect of cost volume profit analysis on profitability, cost of production and sales of manufacturing firms. The study adopted the ex-post facto research design and data were obtained from the annual reports and accounts of two manufacturing firms for the period 2003-2012. The Ordinary Least Squares Regression (OLS) were used to test the hypotheses stated. The result emanating from the hypotheses tested were mixed for sampled firms (Innoson Industrial and Technical Company and Emenite Ltd. It was revealed that while contribution margin ratio had positive and significant effect on profitability it had positive and non-significant effect on cost of production and sales. The implication of these findings is that CVP application among manufacturing firms in Nigeria varies and this could be as a result of lack of awareness, low education levels and technical knowhow on the parts of directors. The study therefore concludes that as an analytical tool, it is useful as it enables the firm to determine the quantum of sales that will assist the firm not only to make profit but to break-even. The research therefore recommended that relevant directors should be sent on in-services training and short term courses on CVP application technique. Moreover, government should put a standard that would guide CVP application on manufacturing firms, so as to curtail price fluctuation's among them in Nigeria business environments.

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## INTRODUCTION

The cost volume profit analysis is management acceptable tool for decision making process which is applicable in almost all economic sectors such as manufacturing sector and other business activities. CVP is a tool employed by business managers that will enable them to control business operations effectively why because it gives them an idea on how to concentrate on the relationship among revenue, costs, volume of production, taxes and also profit. This uses a mathematical concept to check the cost behaviour model of accounting ensuring proper representation of a plan to unveil internal laws of variable cost, sales volume, profits, fixed cost and variable cost. Financial information necessary for accounting prediction, planning and decision making are provided with the use of cost volume profit.

Cost Volume Profit (CVP) analysis is an essential technique for planning, organising and decision making. Cost Volume Profit examines the inter-relationship that exists between output levels, variable costs, fixed costs and the target profits. The ease at which cost volume profit is used all over the world has given it an added advantage compared to the other similar analytical tools.

Jerold assert that cost volume profit analysis is an instrument used by the management in their business operations which enables them to measure or ascertain the effect of changes or variation that is occurred in the areas of production volume, cost of production, prices of goods and materials, the product mix if any and above all the company's target, i.e., profit making. In fact, the variables are interrelated and each one of them is affected by a number of internal and external factors. Contributing further, he added that costs may vary due to the choice of the project, scale of operation, extent of automation and new technology, management and workers efficiency. Externally, costs are affected by the market forces.

Edward and Chem are also of the opinion that cost-volume-profit analysis is regarded as the marginal costing and that it is a profit planning technique used in studying the relationship between the volume of costs, price and profit for proper decision making in an organization. They also added that the cost volume profit analysis educates the management of a firm with in-depth analysis on the overall effect on the revenue and the cost of all kinds of both long and short-run changes in financial position that might occur in the use of cost volume profit in checking the volume of production, associated costs and the benefits to be derived.

Cost volume profit analysis which serves as a starting point in the planning and managing the level of profit helps management to ascertain the level of sales volume that would be made, so as to reduce losses, minimize cost and maximize profit in the organisation. Edward and

Chem stress that it helps the management to seek profitable combination of cost and volume. Cost volume profit analysis is not a new phenomenon to the business organizations; rather, it is a dynamic management tool in decision making process that involves planning for profit making. It is therefore, decision-making and profit planning technique that helps the management to forecast and examine the possible effect on both long and short run decision on Variable cost, volume, fixed cost and the selling price to ensure maximization of profit<sup>[1]</sup>.

The future of any organization largely depends on its profit planning and the evaluation of volume of sales to ensure that the organizational goal is achieved. The cost volume profit analysis is of immense importance to the management because it enables them to have in-depth knowledge on the implementation and inter-relationship of the various factors which causes changes in the profit level of firms. Based on the relevance of cost volume profit analysis accountants would be able to quantitatively present their accuracy reports without the use of the rule of thumb. Pictures and diagrams such as charts would also be made possible in their annual reports and account which enabled quick decision and action that would promote company's growth.

Cost volume profit analysis is a method or tool for measuring potential changes in the company's revenues, costs and prices<sup>[2,3]</sup>. They further assert that CVP is used in manufacturing companies to determine how many units of a particular product must be sold in order to break even. The application of this principle is relatively straight forward with the unit selling price being subtracted from the variable cost per unit to arrive at the contribution margin. The total fixed costs are then divided by the contribution margin in order to arrive at the number of break even units required.

They described that this application allows managers to see the behaviour of the cost prior to making a solid commitment or final decision on a specific order. CVP according to them may also be used by managers when considering if a product should be bought or made. This assertion was in agreement with Nweze<sup>[4]</sup> which points out the same avenue for manufacturing firms to strive. In support of the above scholar Bruto by Alleyne and Weekes-Marshall<sup>[3]</sup> stressed that cost volume profit analysis appears to be a practice that is strongly used by manufacturing companies in food business. However CVP should not only be limited to food business because it is a practical tool for management decision making and planning technique for profitability.

Cost Volume Profit analysis (CVP) is one of the financial management tools that provide an efficient overview of the possible impact of wide range of strategic decisions. Such strategic decision involves such things like product mix, market contractions and expansions, outsourcing, considerable process planning among others.

Application of cost volume profit in our contemporary society and its simplicity considering the usage cannot be overemphasized. Importance of application of cost volume profit in manufacturing firms examines these basic cost concepts thus; cost per unit, fixed cost, variable cost and further analyzes the result that potentially affects the basic nature of the firm. Basically cost volume profit application allows management to set a predetermined profit and work towards it. This would enable them to determine the relationship between it and other vital income statement variables. Essentially management would want to know the volume or quantity of goods to be sold in relation to the cost, so as to ascertain what amount of profit would be made over the period.

Selling price as a profit determinant ought not to be commonly known owing to the fact that volume of production may be regarded as market related issue and not management decision variable only. Additionally, because selling price and volume often directly related and certain costs are considered fixed in this note therefore managers should use CVP to determine how variable cost may be and also still allow the firm in producing the desired amount of profit. Variable cost may be affected by modifying product specification or material quality or by being more efficient or effective in the production, service and /or distribution processes. Profit as the major player in the market economy in determining the through position of the firm may either state variable or fixed amount recorded by the firm before tax matters are taking into consideration.

**Statement of the problem:** Over the years, there has been poor application of cost volume profit analysis in manufacturing organization in Nigeria and this has become increasingly noticeable Busan and Dina<sup>[5]</sup>. This is seen as a major impediment affecting production activity of manufacturing organizations; thus, jeopardizing the profitability and business proficiency of the organisations<sup>[6]</sup>.

According to Nwagboso<sup>[7]</sup>, cost volume profit analysis aids manufacturing organisations on the right direction to increase production, sales and the profit volume in return increase the organisation's profit which enables the firm to meet the organisational objectives. However, the reverse is the case due to poor or inadequate application of cost volume profit analysis in these manufacturing organisations.

This notwithstanding cost volume profit analysis is associated with other factors that bring constraints to this inadequate application thus; Inadequate information, it is obvious that those sampled manufacturing firms (Innoson Industrial and Technical Company and Emenite Ltd.) in Enugu state lack innovations and application techniques of modern sophisticated machines that boast the production are not applied. This lack of awareness is very critical because it lowers production volume and also

affects negatively other economic activities of these manufacturing firms. This in a nutshell leads to recession and affects profitability of the firms.

Most manufacturing firms in Nigeria do not apply CVP in their production unit due to low level of education and technical know-how Agbadudu<sup>[8]</sup>. Because of this, no emphasis is placed on the application and hence, leading to low rate of returns. It is also observed that manufacturing firms in Enugu state has suffered serious setbacks owing to low rate of returns and profitability due to inadequate application of cost volume profit on her production.

Firms are established for the purpose of profit making. This notwithstanding affects other variables which ought to assist in profit making; these firms as a result of inadequate information, also staff are not engaged in training and re-training which will enable them gain meaningful experience on the application of CVP that will help to sustain the economic base of the firm and in turn improve the entire economy. Industry characteristics can also affect the application and effectiveness of CVP. Certain features such as; profitability, sales, volume of production cost depends equally on firm size, nature of the firm and its associated business operation.

The application of cost volume profit analysis ought to be a priority in the manufacturing organisations because it predicts and examine the effect of both long and short run decision that concern their product volume, prices, its level of output and the variable costs of those products, the company's fixed costs and above all the target profits. On the other hand, a proper application of CVP by manufacturing organisations pre-supposes that the laid down objective (target profits) are in conformity with plans (production volume) as well as break-even and optimum utilization of resources.

In spite of the benefits derived from the application of CVP analysis, its application to the evaluation of profitability of manufacturing firms in Nigeria are yet to be fully empirically determined. It was based on the forgoing that this study seeks to investigate the extent to which manufacturing firms in Enugu state apply CVP.

**Objectives of the study:** The general objective of the study is to investigate the effect of cost volume profit analysis on the profitability of manufacturing firms in Enugu state:

- Specific objectives of the study include
- To find the extent to which CVP application affects the profit after tax of manufacturing firms
- To evaluate the effect of CVP on production cost of manufacturing firms
- To find the effect of CVP on sales volume of manufacturing firms

**Research questions:** To achieve these objectives of the study, the following research questions are formulated and their answers were sought in the course of the study:

- To what extent does cost volume profit application affect the profit after tax of manufacturing firms?
- How far does cost volume profit affect cost of production of manufacturing firms?
- To what extent does cost volume profit affect the sales volume of manufacturing firms?

**Hypothesis:** The hypothesis that guided the study are stated in null as follows:

- Cost volume profit applications do not have positive and significant effect on the profit after tax of manufacturing firms
- Cost volume profits do not have positive and significant effect on the cost of production of manufacturing firms
- Cost volume profits do not have positive and significant effect on the sales volume of manufacturing firms

**Scope of the study:** This study covers the period 2003-2012. The choice of 2003 as the base year for this study is hinged on availability of data for both firms (Innoson Industrial and Technical Company and Emenite Ltd. The researcher because of cost and time constraints limited the study to the evaluation of the effect of CVP on profitability of manufacturing firms in Enugu state.

## MATERIALS AND METHODS

**Research design:** The study used ex-post facto research design. Kerlinger<sup>[9]</sup> defined ex-post facto research as that in which the independent variable have already occurred and in which the researcher starts with the observation of the independent variable or variables. While Onwumere<sup>[10]</sup> posit that the ex-post facto research design establishes a causal link between them. Thus, the ex-post facto research design is adopted to determine the casual relationship CVP and other independent variables introduced in this study.

**Population:** The population of this study comprised of all manufacturing firms in Enugu state. This includes firms registered with manufacturers association of Nigeria, Enugu chapter.

**Sample techniques:** Purposive sampling as the non-probability method was used to choose the sample size of the study. The selection was owing to the fact that

researcher considered annual reports and accounts that will be accessible those that have high rate of return as to compare with others and also those that have stayed for >10 years. In a nutshell Emenite Ltd. and Innoson Technical Manufacturing Ltd. were selected.

**Method of data analysis:** The model specification of the study was linked to that of production function. Production function is the technical relationship between input and output. In the study, the relationship that will be modeled was that of application of cost volume profit analysis and production functions of Emenite and Innoson Ltd. In other to establish the application of cost volume profit analysis in manufacturing organizations, data generated was collated and analyzed using such statistical tool (OLS) model of regression analysis.

**Model specification:** In this study model was specified in line with the hypothesis stated in line with works by Luther and O'Donovan. Thus, for hypothesis one which states that Cost volume profit application does not have effect on the profitability of manufacturing firms. It was represented as:

$$CVP = b_0 + b_1 \text{Log PAT} + \sum_1$$

Where:

CVP : Cost Volume Profit  
 $b_0$  : Constant of the equation  
 $b_1$  : Coefficient of independent variable  
Log PAT : Profit After Tax  
 $\sum_1$  : Error term

The natural Logarithm of Profit After Tax (PAT) was used to normalize the data. For hypothesis two which states that cost volume profit analysis does not have effect on the cost of production of manufacturing firms. It was represented as:

$$CVP = b_0 + b_1 \text{Log PrCo} + \sum_1$$

Where:

CVP : Cost Volume Profit  
 $b_0$  : Constant of the Equation  
 $b_1$  : Coefficient of independent variable  
LogPrCo: Cost of production  
 $\sum_1$  : Error term

The natural logarithm of cost of Production (PrCo) was used to normalize the data. Lastly, for hypothesis three which states that cost volume profit application does not have effect on the sales of manufacturing firms. It was represented as:

$$CVP = b_0 + b_1 \text{LogSales} + \sum_1$$

Where:

CVP : Cost Volume Profit  
 $b_0$  : Constant of the equation  
 $b_1$  : Coefficient of independent variable  
 LogSales : Sales volume  
 $\sum_1$  : Error term

The natural logarithm of sales volume (Sales) was used to normalize the data.

### Description of variables

**Dependent variable = cost volume profit analysis:** Cost Volume Profit (CVP) for the purpose of this study is taken to be the dependent variable. In other to determine, the CVP of manufacturing firms the contribution margin ratio was used as proxy. The contribution margin ratio is the ratio that establishes the relationship between revenue and variable cost revenue. The contribution margin ratio for the manufacturing firms was computed from the financial statements of the two firms (Emenite and Innoson).

### Independent variables

**Profit after tax:** The net profit of the two manufacturing firms was used as proxy for profitability. The figure was collated and computed from the financial statements of the two firms. The natural log of the profit after tax was adopted.

**Cost of production:** The cost of production of the sampled manufacturing firms was used. The figure was handpicked from the financial statements of the two firms and the natural log of the cost of production was used to normalize the variable.

**Sales volume:** the quantum of sales volume of the manufacturing firms was used. The figure was collated and computed from the financial statements of the two firms and the natural log of the sales was adopted.

**Data analysis:** In achieving the objectives of this study, data was collected from the financial statements of

Emenite and Innoson Ltd. The data for the period 2003-2012 (10 years) were collected, presented and analysed in this chapter. This section is subsequently housing two sections. The first section is the data presentation while in the second section the hypotheses stated were tested. The natural log of the model proxies are depicted in Table 1. These data were used to test the hypothesis stated in this study as well the analyses. The movement of the trend is analysed using the descriptive statistics presented in Table 2.

As indicated from Table 3, the mean value of the LogCVP within the period of this study was 5.4690 while the standard deviation was 0.28623. LogCVP was highest in 2012 when the value was 6.40 while the year with the minimum value was in 2007 when the value was 4.80. As indicated by the Kurtosis which was 2.916<3 which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values was moving away from the mean. The mean value of the LogPAT within the period of this study was 6.5569 while the standard deviation was 0.13916. LogPAT was highest in 2004 when the value was 6.70 while the year with the minimum value was in 2007 when the value was 6.25. As indicated by the Kurtosis which was 1.702<3 which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values was moving away from the mean (Table 4 and 3).

From Table 5, the mean value of the LogPrCo within the period of this study was 6.3314 while the standard deviation was 0.03577. LogPrCo was highest in 2004 when the value was 5.71 while the year with the minimum value was in 2007 when the value was 6.24. As indicated by the Kurtosis which was -0.281<3 which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values was moving away from the mean. Lastly, the mean value of the LogSales within the period of this study was 7.3260 while the standard deviation was 0.22101. LogSales was highest in 2010 when the value was 7.65 while the year with the minimum value was in 2006 when the value was 7.05. As indicated by the Kurtosis which

Table 1: Extract of innoson and emenite financial statement

Years	CVP (N)	Profit (N)	Prod Cost (N)	Sales (N)	CVP (N)	Profit (N)	Prod cost (N)	Sale (N)
2003	131,861	1,480,262	1,623,211	8,726,711	725,488	2,548,887	1,235615	10988720
2004	35,974	4,849,394	1,419,748.90	11,267,190	961,884	322,371	1011726	10957700
2005	401,376	45,92,742	1,962,887.30	141,716,171	67,116	127,093	601719	1705548
2006	45,268	3,773,835	1,646,176.60	10,261,719	194,149	236,838	726508.30	17714269
2007	28,677	1,359,035	1,696,760.80	10,867,600	67,716	816,732	596293.40	2926347
2008	355,247	4,840,356	1,755,000	25,275,671	194,165	303,759	568217.40	4048205
2009	289,307	2,884,068	1675,639.10	18,667,561	20,477	326,188	715218.50	4131390
2010	271,163	4,008,089	1,889,900	31,256,771	91,727	66,789	732169.20	3751546
2011	340,625	3,839,360	1,968,648.90	29,556,716	53,098	380,44	540908.30	26980495
2012	285,080	3,141,751	2,238,070	30,611,796	56,583	480,249	552716.14	27471801

Table 2: Average data of the two sample companies

Years	CVP	PAT	Prod Co	Sales
2003	494,605	2,754,706	2,241,019	14,221,071
2004	516,916	5,010,580	1,925,612	16,746,040
2005	434,934	4,656,289	2,263,747	15,568,945
2006	142,343	3,892,254	2,009,431	11,118,854
2007	62,535	1,767,401	1,994,908	12,330,774
2008	452,330	4,992,236	2,039,109	27,299,774
2009	299,546	3,047,162	2,033,248	20,733,256
2010	317,027	4,041,484	2,255,985	33,132,544
2011	367,174	4,029,582	2,239,103	43,046,964
2012	313,372	3,381,876	2,514,428	44,347,697

Extracted Annual Reports and Accounts of Emenite and Innoson

Table 3: Descriptive statistics

Correlations	N statistic	Minimum statistic	Maximum statistic	Mean statistic	SD statistic	Kurtosis statistic	Statist SE
LogCVP	10	4.80	5.71	5.4690	0.28623	2.916	1.334
LogPAT	10	6.25	6.70	6.5569	0.13916	1.702	1.334
LogPrCo	10	6.28	6.40	6.3314	0.03577	-0.281	1.334
LogSales	10	7.05	7.65	7.3260	0.22101	-1.441	1.334
Valid N (listwise)	10						

Researcher's computation: audited financial statements of the sampled firms

Table 4: Mode proxy data used for regression

Years	Log CVP	Log PAT	Log Pr Co	Log sales
2003	5.694259	6.440075	6.35044544	7.152932
2004	5.71342	6.699888	6.28456876	7.223912
2005	5.638423	6.66804	6.35482785	7.192259
2006	5.153335	6.590201	6.30307304	7.04606
2007	4.796123	6.247335	6.29992276	7.09099
2008	5.655455	6.698295	6.30944038	7.436159
2009	5.476463	6.483896	6.30819043	7.316668
2010	5.501096	6.606541	6.35333613	7.520255
2011	5.564872	6.60526	6.35007408	7.633943
2012	5.496059	6.529158	6.40043922	7.646871

Researcher's Excel Computation

Table 5: Presents the correlation statistics for the model proxies.

Models	Correlations	Log CVP	Log PAT	Log PrCo	Log sales
LogCVP	Pearson correlation	1			
	Sig. (2-tailed)				
	N	10			
LogPAT	Pearson correlation	0.716(*)	1		
	Sig. (2-tailed)	0.020			
	N	10	10		
LogPrCo	Pearson correlation	0.293	0.026	1	
	Sig. (2-tailed)	0.411	0.944		
	N	10	10	10	
LogSales	Pearson correlation	0.395	0.311	0.613	1
	Sig. (2-tailed)	0.259	0.382	0.059	
	N	10	10	10	10

\*Correlation is significant at the 0.05 level (2-tailed) Researcher's SPSS Result: audited financial statements of the sampled firms

was -1.441<3 which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values was moving away from the mean.

**Correlation statistics:** As revealed from Table 5, there was a positive correlation between LogCVP and LogPAT (R = 0.716). This indicates that a percentage increase in LogCVP increases Log PAT by 0.716 for a two tail test and significant at 2%. There was also a positive correlation between LogCVP and LogPrCo (R = 0.293). This also reveals that a percentage increase in LogCVP increases LogPrCo by 29% for a two tail test.

LogCVP also had a positive correlation with LogSales (R = 0.395). It shows that a percentage increase in LogCVP increases LogSales by 40% for a two tail test.

Again as indicated from Table 6, there was a positive correlation between LogPAT and LogPrCo (R = 0.026) indicating a percentage increase in LogPAT increases LogPrCo by 2% for two tail test. Also, LogPAT had positive correlation with LogSales (R = 0.311) revealing that an a percentage increase in LogPAT increases LogPrCo by 31%. Lastly, LogPrCo had positive correlation with LogSales (R = 0.613) revealing that a percentage increase in LogPrCo increases LogSales by 61%.

Table 6: Presents the results of hypothesis one models

Regression result of hypothesis one

Models	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	t-values	Sig.
(Constant)	4.654	0.657		7.080	0.000
LogCVP	0.348	0.120	0.716	2.898	0.020

<sup>a</sup>Dependent Variable: LogPAT Researcher's SPSS Regression result

Table 7: ANOVA result of hypothesis one

Models	Sum of squares	df	Mean square	F	Sig.
Regression	0.089	1	0.089	8.399	0.020(a)
Residual	0.085	8	0.011		
Total	0.174	9			

<sup>a</sup> Predictors: (Constant), LogCVP; b. Dependent Variable: LogPAT; Researcher's ANOVA result

Table 8: Regression result of hypothesis two

Models	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	t-values	Sig.
(Constant)	6.131	0.231		26.508	0.000
LogCVP	0.037	0.042	0.293	0.868	0.411

<sup>a</sup> Dependent variable: LogPrCo; Researcher's SPSS Regression result

**Test of hypothesis:** This section (4.3) deals with the test of researcher's hypotheses. Four steps were utilized in the exercise. The steps involved first, restating the hypotheses in null and alternate forms; second, stating the decision rules; third, interpreting the results of the estimated models and fourthly using the decision criteria to accept or reject the null/ alternate hypothesis as relevant.

#### Test of hypothesis one

##### Step one: restatement of hypotheses in null and alternate forms

- $H_{01}$ : Cost volume profit applications do not have any effect on the profitability of manufacturing firms
- $H_{a1}$ : Cost volume profit applications have any effect on the profitability of manufacturing firms

**Step two: decision rule:** Accept  $H_a$  and reject  $H_0$  where the coefficient estimate of the independent variable (is positively signed and statistically significant ( $<0.05$ )).

Accept  $H_0$  and reject  $H_a$  where the coefficient estimate of the independent variable (is positively signed and statistically significant ( $>0.05$ )).

##### Step three: Interpretation of results of estimated models:

As revealed from Table 7, LogCVP has positive and significant impact on LogPAT (coefficient of LogCVP = 0.348, t-value = 2.898). The probability value of 0.02  $<0.05$  confirms the significance of the result. The coefficient of determination which measures the goodness fit of the model as revealed by ( $R^2$ ) indicates that 71.6% of the variations observed in the dependent variable were explained by variations in the dependent variable.

Table 7 shows the output of the ANOVA analysis and whether we have a statistically significant difference

between LogCVP and LogPAT. It was observed that the significance level is 0.021 ( $p = .020$ ) which is below 0.05. Therefore, there is a statistically significant difference in the mean of LogCVP and LogPAT. Othe calculated result includes the F-variable which follows the F-distribution was significant.

**Step four: decision:** The null hypothesis which states that cost volume profit applications have positive and significant effect on the profitability of manufacturing firms is rejected while the alternate hypothesis which states that cost volume profit applications have positive and significant effect on the profitability of manufacturing firms is accepted.

#### Test of hypothesis two

##### Step one: restatement of hypotheses in null and alternate forms

- $H_{02}$ : Cost volume profits do not have effect on the cost of production of manufacturing firms
- $H_{a2}$ : Cost volume profits have effect on the cost of production of manufacturing firms

**Step two: decision rule:** Accept  $H_a$  and reject  $H_0$  where the coefficient estimate of the independent variable (is positively signed and statistically significant ( $<0.05$ )).

Accept  $H_0$  and reject  $H_a$  where the coefficient estimate of the independent variable (is positively signed and statistically significant ( $>0.05$ )).

##### Step three: Interpretation of results of estimated models:

Table 8 presents the results of hypothesis two models. As revealed from Table 8, LogCVP has positive and non-significant impact on LogPrCo (coefficient of

Table 8: Regression result of hypothesis two

Models	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	t-values	Sig.
(Constant)	6.131	0.231		26.508	0.000
LogCVP	0.037	0.042	0.293	0.868	0.411

<sup>a</sup> Dependent variable: LogPrCo; Researcher's SPSS Regression result

Table 9: ANOVA result of hypothesis two

Models	Sum of squares	df	Mean square	F	Sig.
Regression	0.001	1	0.001	0.753	0.411 <sup>a</sup>
Residual	0.011	8	0.001		
Total	0.012	9			

<sup>a</sup>Predictors: (Constant), LogCVP b dependent variable: LogPrCo Researcher's ANOVA result

Table 10: Regression result of hypothesis three

Models	Unstandardized coefficients		Standardized coefficients		
	B	SE	Beta	t-values	Sig.
(Constant)	5.659	1.373		4.120	0.003
LogCVP	0.305	0.251	0.395	1.216	0.259

<sup>a</sup>Dependent Variable: LogSales; Researcher's SPSS Regression Result

Table 11: ANOVA result of hypothesis three

Models	Sum of squares	df	Mean square	F	Sig.
Regression	0.069	1	0.069	1.478	0.259 <sup>a</sup>
Residual	0.371	8	0.046		
Total	0.440	9			

<sup>a</sup>Predictors: (Constant), LogCVP; b Dependent variable: LogSales Researcher's ANOVA result

LogCVP = 0.037,  $t = 0.868$ ). The probability value of  $0.411 > 0.05$  confirms the non-significance of the result. The coefficient of determination which measures the goodness fit of the model as revealed by ( $R^2$ ) indicates that 29.3% of the variations observed in the dependent variable were explained by variations in the dependent variable.

Table 9 shows the output of the ANOVA analysis and whether we have a statistically non-significant difference between LogCVP and LogPrCo. It was observed that the non-significance level is 0.411 ( $p = 0.411$ ) which is above 0.05. Therefore, there is a statistically non-significant difference in the mean of LogCVP and LogPrCo.

**Step four: decision:** The null hypothesis which states that cost volume profits do not have positive and significant effect on the cost of production of manufacturing firms is rejected while the alternate hypothesis which states that cost volume profits have positive and significant effect on the cost of production of manufacturing firms is accepted although it is non-significant.

### Test of hypothesis three

#### Step one: restatement of hypothesis in null and alternate forms

- $H_{03}$ : Cost volume profits do not have effect on the sales volume of manufacturing firms
- $H_{a3}$ : Cost volume profits have effect on the sales volume of manufacturing firms

**Step two: decision rule:** Accept  $H_a$  and reject  $H_0$  where the coefficient estimate of the independent variable (is positively signed and statistically significant ( $< 0.05$ )).

Accept  $H_0$  and reject  $H_a$  where the coefficient estimate of the independent variable (is positively signed and statistically significant ( $> 0.05$ )).

**Step three: interpretation of results of estimated models:** As revealed from Table 10 LogCVP has positive and non-significant impact on LogSales (coefficient of LogCVP = 0.305,  $t = 1.216$ ). The probability value of  $0.259 > 0.05$  confirms the non-significance of the result. The coefficient of determination which measures the goodness fit of the model as revealed by ( $R^2$ ) indicates that 39.5% of the variations observed in the dependent variable were explained by variations in the dependent variable.

Table 11 It shows the output of the ANOVA analysis and whether we have a statistically non-significant difference between LogCVP and LogSales. It was observed that the non-significance level is 0.259 ( $p = 0.259$ ) which is above 0.05. Therefore, there is a statistically non-significant difference in the mean of LogCVP and LogSales.

**Step four: decision:** The null hypothesis which states that cost volume profits do not have any effect on the sales volume of manufacturing firms is rejected while the alternate hypothesis which states that cost volume profits do not have effect on the sales volume of manufacturing firms is accepted although it is non-significant.



## DISCUSSION

**Hypothesis one:** To achieve objectives one of this study, the collated values were obtained from the financial statement of those sampled manufacturing firms in Enugu state. A cursory look at the data, indicated that the minimum values within the period of this study was 4.80 while log CVP was highest in 2004 when it was 5.71342 while the year with the least log CVP was 2007 and 2009 when the value was 4.796123. As was revealed by the kurtosis of statistics there was a negative kurtosis indicating that the means of the distribution is negative that overall, there was an inconsistent increase contribution margin ration from 2003-2012. Though as indicated by the kurtosis which was  $2.92 < 3$  which is the normal value indicated that the degree of peakedness within the period of this study were not normally distributed as most of this the values was moving away from the means.

The findings revealed that the means value of these manufacturing profitability ration was 6.556% while the maximum value was 6.70 the profitability ratio was highest in 2004 when the value was 6.699888, ratio indicating that the degree of departure from the mean of distribution is positive revealing that overall, there was a constant increase profitability ratio from 2003-2012. Through as indicated by the kurtosis which was  $2.916 < 3$  which is the normal value indicated that the degree of peakedness. Within the period of this study were normally distributed as most of the values hover around the mean. From the hypothesis tested, the coefficient of profitability ratio is positive and also has a non-Significant effect on profitability of this manufacturing firm in Enugu state from 2013-2012. For this result therefore, it shows that as profit ability ratio varies over the gear of the study, it recorded highest in the year, 2004 when it was 6.699888 increases by 47 % unit with a profit ability of obtaining at value of  $2.898 > 80\%$  thus in significant at 0.05 critical value. The 22 the regression result line fits the data goodness of a fit. From the model above the  $R^2$  value of 0.716 means that 70.3% in cheats that there was a percentage increase in the dependent variable (ILWP) was explained by the independent variable and the remaining 29.7% was also explained by variable not included within the model.

The adjusted  $R^2$  tell us that after taking account of the number of other un-included repressors, profitably ratio still explained by the same variation with the other variable in the profitability of those manufacturing firms. The f-values (2.853) (p-0.02) at a critical values of 0.05. This therefore implies that the entire model is significant.

Also as the hypothesis tested for the sampled manufacturing firms the coefficient of contribution margin ratio is positive and again has a significant effect

on profitability of the firm from 2003-2012. For this result therefore, it shows that as contribution varies across time by one unit, the log of profitability obtained at a value 77.700 significant at 0.05 critical values. From the above model, the  $R^2$  value of 0.716 mean that 71.8% percentage variable in the dependent variable was explained by the independent variables.

For research hypothesis one cost volume profit applications have effect on the profitability of manufacturing firms. The findings are consistent with works by Henry<sup>[11]</sup> who describes the relationship that exists between CVP analysis and profit maximization theory. They submit that the maximization of the normal profit of the firm should be relative to cost incurred in the production. This assumption equips the management in line of profit making which enables them to determine the difference that exist among the revenue and costs this regard. It is therefore, the management's prediction and planning process to ensure that the most profitable course of action is taken vehemently.

Agbadudu<sup>[8]</sup> Malomo and Henry<sup>[11]</sup> were of the view that decision making process has to look at the blueprint of the available resources and the associated cost to incur, this guides manager's action on the right direction and assumption on best approach to maximize profit this is line with findings of hypothesis one.

**Hypothesis two:** To achieve objective two, the figures generated from the financial statement of the two firms indicate that the mean value for the sampled firms cost of production ratio within the period of this study was 7.14 while the medium value was 7.39. The cost of production ratio was highest in 2011 when the value was 7.54 while the year with the least cost of production ratio was in 2010 when the value was 6.51. As revealed by the skewness of cost of production ratio, there was a negative skewness of the cost of production ratio indicating that the degree of departure from the mean of the distribution is negative revealing that overall; there was an inconsistent decrease in cost of production ratio from 2003-2012. Though as indicated by the Kurtosis which was  $1.36 < 3$  which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values moved away from the mean.

Again for the sampled manufacturing firms, the mean value of cost of production ratio within the period of this study was 6.83 while the medium value was 6.91. The cost of production ratio was highest in 2006 when the value was 7.02 while the year with the least cost of production ratio was in 2003 when the value was 6.18. As revealed by the skewness of cost of production ratio, there was a negative skewness of the cost of production ratio indicating that the degree of departure from the mean of the distribution is negative revealing that overall; there

was an inconsistent decrease in cost of production ratio from 2003-2012. Though as indicated by the Kurtosis which was  $6.58 > 3$  which is the normal value indicates that the degree of peakedness within the period of this study were normally distributed as most of the values hover away from the mean.

To achieve objective two, the hypothesis tested revealed that the coefficient of contribution margin ratio is negative and also has a non-significant effect on cost of production of those firms from 2003-2012. For this result therefore, it shows that as contribution margin ratio varies across time by one unit, cost of production of the sampled firm's decreases by 0.768 units with a probability of obtaining a  $t=0.806$  insignificant at 0.05 critical values. The  $R^2$  is a summary measure of how well a sample regression line fits the data (goodness of fit). From the model above, the  $R^2 = 0.775$  means that 77.5% percentage variations in the dependent variable was explained by the independent variables and the remaining 23.5% was explained by variables not included in the model. The adjusted  $R^2$  tells us that after taking account of the number of other unenclosed repressors, contribution margin ratio still explains 64.0% variation in cost of production of Innoson Ltd. The (F-650.0) which follows the F distribution was significant ( $p=0.003$ ) at a critical value of 0.05. This implies that the entire model is significant.

Also, for it was observed that the coefficient of contribution margin ratio is positive and also has a insignificant effect on cost of production of the firms from 2003-2012. For this result, therefore, it shows that as contribution margin ratio varies across time by one unit, cost of production of Emenite Ltd. increases by 0.196 units with a probability of obtaining a  $t$  value of 0.814 insignificant at 0.05 critical values. The  $R^2$  is a summary measure of how well a sample regression line fits the data (goodness of fit). From the model above, the  $R^2$  value of 0.876 means that 87.6% percentage variations in the dependent variable was explained by the independent variables and the remaining 12.4% was explained by variables not included in the model. The adjusted  $R^2$  tells us that after taking account of the number of other un-included repressors, contribution margin ratio still explains 83.8% variation in cost of production of Emenite Ltd. The F-value (663.0) which follows the F distribution was significant ( $p$ -value of 0.01) at a critical value of 0.05. This implies that the entire model is significant. The researcher concluded that contribution margin ratio had negative and non-significant effect on cost of production of Innoson Ltd; however, contribution margin ratio had positive and non-significant impact on cost of production of the firms within the period of this study.

Hall demonstrated the use of CVP Model incorporating the cost of capital and if properly done will be used in computing the breakeven sales in quantity

which measures the range of activity of the firms. In the same vein it shows the discounted income statement regarding the unit change in the sales volume recorded. Haven identified the importance of CVP Model in-cooperating the cost of capital to a product cost function, facilitates the measures to take in alternative arrangement in terms of cost structures. It helps in estimating the impact of product's profitability in checking the level of improvement recorded in the firm's process of developing programme relating to the production.

Also, James results that the implication of cost volume profit analysis as a gateway to decision-making under uncertainty in the manufacturing organizations. The study discovered that using the model correlation analysis as a research design, the strength of the company and the volume of production solely depend on the application of cost volume profit analysis. In review of this related literature, the cost volume profit analysis application questions were developed and solved on the forgoing to determine the relationship between the volume costs and profits which the results on the recent performance of the company were discussed. The study concludes and recommends that for effective management decision-making cost volume profit analysis should be applied. This was true with findings of hypothesis two for the sampled firms.

For hypothesis two it was revealed that cost volume profits have positive and significant effect on the cost of production of manufacturing firms, although it is non-significant. This is consistent with the findings on hypothesis two Hall demonstrated the CVP model incorporating the cost of capital, so as to have a clear picture on the computation of product's breakeven sales quantity in order to measure the range of product's income with respect to a unit change in sales. The CVP model incorporating the cost of capital facilitates measures the trade-off in alternative investments and cost structures, as estimating the impact upon a product's profitability from a programme of process improvement.

Also, James, results that the implication of cost volume profit analysis as a gateway to decision-making under uncertainty in the manufacturing organizations. The study discovered that using the model correlation analysis as a research design, the strength of the company and the volume of production solely depend on the application of cost volume profit analysis. In review of this related literature, the cost volume profit analysis application questions were developed and solved on the forgoing to determine the relationship between the volume costs and profits which the results on the recent performance of the company were discussed. The study concludes and recommends that for effective management decision-making cost volume profit analysis should be applied. This was true with findings of hypothesis two for manufacturing firms in Nigeria.

**Hypothesis three:** For objective three, the mean value of the manufacturing firm's sales volume ratio within the period of this study was 6.67 while the medium value was 6.59. The sales volume ratio was highest in 2011 when the value was 7.44 while the year with the least sales volume ratio was in 2005 when the value was 6.23. As revealed by the skewness of sales volume ratio, there was a positive skewness of the sales volume ratio indicating that the degree of departure from the mean of the distribution is positive revealing that overall; there was a consistent increase in sales volume ratio from 2003 to 2012. Though as indicated by the Kurtosis which was  $2.54 < 3$  which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values moved away from the mean.

The mean value of Emenite Ltd. sales volume ratio within the period of this study was 6.34 while the medium value was 6.33. The sales volume ratio was highest in 2006 when the value was 6.98 while the year with the least sales volume ratio was in 2010 when the value was 5.67. As revealed by the skewness of sales volume ratio, there was a negative skewness of the sales volume ratio indicating that the degree of departure from the mean of the distribution is negative revealing that overall; there was an inconsistent decrease in sales volume ratio from 2003-2012. Though as indicated by the Kurtosis which was  $1.07 < 3$  which is the normal value indicates that the degree of peakedness within the period of this study were not normally distributed as most of the values moved away from the mean.

As observed the test of hypothesis, the coefficient of contribution margin ratio is positive and also has a significant effect on sales of the firms from 2003-2012. For this result therefore, it shows that as contribution margin ratio varies across time by one unit, sales of the sampled firms increases by 1.81 units with a probability of obtaining a t value of 2.75 significant at 0.05 critical values. The  $R^2$  is a summary measure of how well a sample regression line fits the data (goodness of fit). From the model above, the  $R^2 = 0.886$  means that 88.6% percentage variations in the dependent variable was explained by the independent variables and the remaining 11.4% was explained by variables not included in the model. The adjusted  $R^2$  tells us that after taking account of the number of other unenclosed repressors, contribution margin ratio still explains 82.2% variation in sales of the firms. The ( $F = 757.1$ ) which follows the F distribution was significant ( $p = 0.02$ ) at a critical value of 0.05. This implies that the entire model is significant. This suggests that in line with works by Louis in that using correlation coefficient as research design states that the extent of the individual production contributions to volume, sales and

profit inrelation to the cost of production. In review of this, the cost volume profit analysis application developed and solved the problem on the ground and determined the effective contributions of individual product line in relation to cost volume profit.

As it was observed that the coefficient of contribution margin ratio is positive and also has a significant effect on sales of the firms from 2003-2012. From this result therefore, it shows that as contribution margin ratio varies across time by one unit, sales of the sampled manufacturing firms increases by 1.392 units with a probability of obtaining at value of 4.06 significant at 0.05 critical values. The  $R^2$  is a summary measure of how well a sample regression line fits the data (goodness of fit). From the model above, the  $R^2 = 0.673$  means that 67.3% percentage variations in the dependent variable was explained by the independent variables and the remaining 32.7% was explained by variables not included in the model. The adjusted  $R^2$  tells us that after taking account of the number of other un-included repressors, contribution margin ratio still explains 83.8% variation in sales of the firms. The ( $F=1650.0$ ) which follows the F distribution was significant ( $p = 0.003$ ) at a critical value of 0.05. This implies that the entire model is significant. The researcher concludes that contribution margin ratio had positive and significant effect on sales of the two manufacturing firms within the period of this study.

They concluded and recommend that the purpose of cost volume profit is to show the sensitivity of profits to changes in volume. Cost volume profit analysis emphasises maximizing contribution and focuses on the difference between costs that vary output and costs that remains constant as observed from the works by Kee<sup>[12]</sup> (2001), Haring and Smith, Blocher and Chen<sup>[13]</sup>, Stefan<sup>[14]</sup>.

For hypothesis three it was shown that cost volume profits have positive and significant effect on the sales volume of manufacturing firms, although, it is non-significant. Again, This result was buttress by Luther and O'Donovan found out that application of cost volume profit analysis in order to determine the constant level of fixed unit of the product likewise selling price and that of variable costs would indicates the level of activity that would display sales curve intersecting with the cost curve as an indication of firm's prosperity. They concluded and recommend that the purpose of cost volume profit is essentially to analysis the profit sensitivity to changes that occur in respect of volume of the output. Cost volume profit further emphasises condition of some costs by saying that maximizing contribution implies that there would be a focus among those costs that varies because of volume in spite of volume of output. Cost volume profit analysis emphasizes in maximizing contribution on profit

and focuses on the existing difference among production cost that will vary with level o output and those costs that remain constant as observed from the works by Kee<sup>[12]</sup> Bloch<sup>[13]</sup> and Stefan<sup>[14]</sup>.

## CONCLUSION

This uses a mathematical concept to check the cost behaviour model of accounting ensuring proper representation of a plan to unveil internal laws of valuable cost, sales volume, profits, fixed cost and variable cost. Financial information necessary for accounting prediction, planning and decision making are provided with the use of cost volume profit.

Cost Volume Profit (CVP) analysis is an essential technique for planning, organising and decision making. Cost Volume Profit examines the inter-relationship that exists between output levels, variable costs, fixed costs and the target profits. The ease at which cost volume Profit is used all over the world has given it an added advantage compared to the other similar analytical tools. Cost Volume Profit (CVP) analysis is a widely used tool for the managerial planning and decision making and according to Jerold (1995), it infers that cost volume profit analysis is an attempt to measure the effects of changes in the volume, cost, price and the product mix on profits. Also Edward and Chem (2004) are also of the opinion that cost-volume-profit analysis is regarded as the marginal costing and that it is a profit planning technique used in studying the relationship between the volume of costs, price and profit for proper decision making in an organization. They also added that the cost volume profit analysis provides the management with comprehensive overview of the effect on the revenue and the cost of all kinds of short-run financial changes that might occur in the use of cost volume profit; in checking the volume of production, associated costs and the benefits to be derived.

This study examined the effect of cost volume profit on profitability, cost of production and sales of manufacturing firms in Nigeria the result was mixed for both firms. As indicated while contribution margin ratio had any effect on profitability of manufacturing firms in Nigeria, it was found to have positive and non-significant impact on cost of production and Lastly, contribution margin ratio had any effect on sales manufacturing firms in Nigeria the researcher concluded that as an analytical tool, it is useful as it enables the firm to determine the quantum of sales that will assist the firm not only to make profit but to break-even.

## RECOMMENDATIONS

**The following are recommended. These are:** Cost volume profit analysis should be used as a major decision

making process that will involve planning for profit making in the organisation. Managers should be engaged in training and re-training exercise to ensure usage of modern machines in her production.

Cost and management accountants should be trained to acquire the required skills for proper application of CVP in ensuring that management actions and decisions are made in order to promote the company's growth. This enable all stakeholders to fully understand the cost elements involved in the business. Directors of manufacturing firms should place emphasis on the application of CVP in order to increase sales volume so as to sustain the economic base of the firm.

**Areas of further research:** The researcher is of the opinion that there are numerous variables that can be used as proxy for application of CVP in manufacturing organizations and therefore challenges contemporary researchers to investigate into those proxies that will improve the application of CVP by Nigerian manufacturers.

Again, the study concentrated on 2 manufacturing organizations. Emenite and Innoson; there is need to venture into (5) manufacturing organizations. These constitute major limitations to this study, calling for further investigation on:

- The analysis of CVP applications in manufacturing organizations
- The analysis of CVP application as a basis for post industrial society in manufacturing organizations in Nigeria
- The effect of poor application of CVP in manufacturing organization to her productivity
- Assessment of application of CVP in a manufacturing environment focusing on incorporating cost of capital into a product areas of interest are desire for further investigations for contemporary scholars.

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