

**LINEARITY ASSUMPTION AMONG PROFITABILITY, SALES AND  
CURRENT OPERATING ASSETS  
(A STUDY OF QUOTED FOOD AND BEVERAGES INDUSTRIES IN  
NIGERIAN STOCK EXCHANGE)**

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**ABSTRACT**

*This study examined the assumption that there is linearity between gross profit, turnover, inventory, sales outstanding and purchases outstanding. This relationship was examined using correlation and regression analysis. In this study, twelve (12) manufacturing companies quoted in the Nigerian Stock Exchange under Food and Beverages sector of the economy for a period of five(5) years from 2006-2010. Regression analysis using statistical packages for social science software (IBM SPSS Statistics Version20) was run to test four hypotheses. It was observed that out of the four hypotheses, two were rejected, that is  $H_01$ , and  $H_04$  which showed that there is linear relationship between profitability and turnover purchases respectively.*

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Key words: Linearity, correlation, regression, profitability, current operating assets, sales.

**INTRODUCTION**

It is universally believed that the objective of a company is to maximize the value of shareholders wealth. This objective is realized by maximizing the profit of a company by executing projects with positive net present value. Hence, every manager of a company is particularly concerned with the efficiency of the asset utilization in an effort to improve the performance of the business (Siminica, Circiumaru and Simion, 2012). The pressure exercised by the shareholders coupled with paucity of funds has propelled the management of company to look for ways to increase its efficiency in order to maintain the competitiveness. To achieve this, the companies need to assess the relationship among profitability, sales and current operating assets.

Therefore, profitability is the essence of business and without it a gradual decline will set in that will eventually lead to the demise of the company. Profitability is a function of efficient management of the resources and sales (turnover) of a company. Hence,  $P=f(FA, CA \text{ and } TO)$ . Where FA=Fixed Assets, CA= Current assets and TO= Turnover. Assets are the resources being employed to generate income. This can be divided into two types, namely fixed assets and

current assets. Fixed assets are the resources that cannot be converted into cash within an accounting year that is a year. Examples are Land and Building, Plant and Machinery, Motor vehicle, etc. Current assets on the other hand are those resources that are being used up in the course of business operation. That is, they can be converted into cash within an accounting period. Hence, they are called circulating capital because the amount keeps changing year in year out. Examples are cash, debtors, stock (inventories) and prepayment. Turnover (Sales) is goods or services invoiced to third party net of return.

Current asset is divided into current operating asset and current financing asset. This is analyzed as follows:  $CA = COA + CFA$  (Fleuriet, Kehdy and Blanc, 2003). Current financial assets include essentially financial elements such as cash, bank, short-term financial investments, etc. This group “does not show, as a consequence, any pre-established behaviour, varying more strictly as a function of the economic situation and of higher or lower risk the firm wishes to take” (Assaf and Silva, 2002). Current Operating (or Cyclical) Assets (COA) is composed of accounts related to the firms’ operating activities, such as inventories, account receivable, and bad debt provision, being influenced by the business volume or by characteristics of the operating cycle phases, such as inventory management decisions or sales policy.

The main thrust of the paper is to examine the linearity assumption among profitability, turnover and current operating assets and current operating liability. However, the specific objectives are as follows:

To examine the relationship between profitability and turnover.

To examine the relationship that may exist between profitability and inventory

To see if there is association between profitability and level of debtor.

To examine if there is relationship between profitability and level of creditors

## **RESEARCH QUESTIONS AND HYPOTHESES**

From the foregoing, the pertinent questions are the following:

To what extent is the relationship between profitability and turnover?

What relationship exists between profitability and level of inventory?

To what extent is the relationship between profitability and debtors?

What association exists between profitability and creditors?

Emanating from the above research questions the following hypotheses are postulated

Hypothesis 1

H<sub>0</sub> 1: No significant relationship between profitability and turnover.

H<sub>1</sub> 1: There is significant relationship between profitability and turnover.

Hypothesis 2

H<sub>0</sub> 2: No significant relationship between profitability and inventory.

H<sub>1</sub> 2: There is significant relationship between profitability and inventory.

Hypothesis 3

H<sub>0</sub> 3: No significant relationship between profitability and debtors.

H<sub>1</sub> 3: There is significant relationship between profitability and debtors.

Hypothesis 4

H<sub>0</sub> 4: No significant relationship between profitability and creditors.

H<sub>1</sub> 4: There is significant relationship between profitability and creditors.

The reason for the above stated hypotheses is informed from the fact that the components of current operating assets are the ones that are driving the operating activities of the manufacturing company. This operating activity is measured by gross operating profit.

## **REVIEW OF RELEVANT LITERATURE**

### **Conceptual Frame work**

Profitability is the final measure of economic success achieved by a company in relation to the capital invested in it. This economic success is determined by the magnitude of the net accounting profit (Pimentel, Brag and Casa, 2005). Profit is the excess of the amount of sales and other income after deducting all costs (Arif and Muhammad, 2011).

Current operating assets are the ones affecting the operation of manufacturing outfit and is driven by days inventory are held, days sales outstanding and days payment outstanding (Shin and Soenen, 1998). Turnover (Sales) used to show the income gained before costs are subtracted (Arif and Muhammad, 2011). According to International financial reporting standards as issued at 1 January 2009, turnover represents the net value of goods and services invoiced to third parties.

Current operating assets are the ones that driving the operation of business activities. It is divided into current operating assets (COA) and current finance assets. However, it is only the current operating assets that impact the activities of business. The drivers are: Days inventories are held, Days sales outstanding and Days payment outstanding. A curious look at these drivers will reveal that they are directly connected with the operation of the organization.

### **EMPIRICAL STUDY**

There are many researches that had been carried out on profitability and working capital in different form. However, little work has been done in the area of linearity assumption among profitability, turnover and current operating asset which is a sub-set of current asset. Various researches carried out used profit after tax to measure the profit enjoyed by shareholders by using return on equity (ROE) ratio. The reason is that ROE is comparable between one company to the other and can indicate the profitability of one industry with the other (Helfert, 2001). Fairfield and Teri (2001) have made a study of the return on assets in the context of making predictions. They demonstrated that “disaggregating return on assets into assets turnover and profit margin does not provide incremental information for forecasting the change in return on assets one year ahead, but that disaggregating the change in return on assets into the change in asset turnover and the change in profit margin is useful in forecasting the change in return on assets one year ahead”. Teruel and Solano (2007) study the trend in working capital of small and medium enterprises of Spain. They collected data for a period 1996-2002. They used return on asset as a dependent variable and the number of days account receivable and number of days inventories are held and cash conversion cycle as independent variables. The control variables used are firm size and sales growth. The result showed inverse relationship between number of days account receivable and the number of days inventories are held with the profitability of small and medium scale enterprises. Uya (2009) tried to establish a relationship between cash conversion cycle, profitability and size of the firm. The focus was on listed companies on Istanbul stock exchange. Data for 166 companies from seven different industries for the period of one year (2007). He used total assets and net sales as a variable to measure the size and return on equity as a variable to measure profitability. The result showed a negative relationship between cash conversion cycle and profitability. Samiloglu and Demirgunes (2008) also considered Turkish firms for their study. Not only has their study validates the findings of

Uyar, they also found that profitability and growth in sales moves in a direct relationship with each other.

The research on the use of Du Pont analysis to measure the profitability of a company has been used by many researchers. One of them is Listiadi, (2007) who described that Du Pont analysis to investigate the company's profitability that uses return on equity analysis is best used to measure the return on shareholder's capital. Chen and Mahajan(2008) investigated the effects of macroeconomic conditions on corporate liquidity in 45 countries from 1994-2005. The results show that macroeconomic variables such as gross domestic product growth rate, inflation, short term interest rate and government deficit affect corporate cash holdings. Company tends to hold more cash when the macro economy is declining. This means that when the macroeconomic condition is declining, then the value of return on equity ratio will also decline because the cash is used for investment.

The other findings made by Lawrence, Diewert and Fox (2004) described that firm's profit is affected by the change in productivity, price and firm's size. The result of their findings showed that when the companies increase their size to increase their productivity, the shareholders will enjoy higher return even though the product price decreases. This means that when the companies size increase, the profit of the companies will also increase.

## **METHODOLOGY**

The idea of this research is to show linearity assumption among profitability, turnover, inventory, debtors and creditors. The study employed the use of secondary data collected from the Report and account of Food and Beverages companies listed on the Nigerian Stock Exchange from 2006-2010 as published according to the regulation of the Companies and Allied Matters Decree 1990 and other regulatory bodies. As at February, 2012 there are 21 quoted companies under food and beverages sector of the economy. The companies are grouped into four categories namely: Beverages-Breweries/Distillers, Breweries- Non Alcoholic, Food Product and Food Product Diversified. The whole population will be studied so as to give room for generalization.

Regression equation model is used to know the effect of turnover, current operating assets (represented by this dummy variable, inventories, debtors and creditors. This is represented by this model:

$$GP = \alpha + \beta_1(TO) + \beta_2(INV) + \beta_3(SO) - \beta_4(PO)$$

Where:

GP indicates Gross Profit.

$\alpha$  indicates intercept.

$\beta_1$  indicates turnover expected to be positive.

$\beta_2$  indicates coefficient of inventories expected to be positive.

$\beta_3$  indicates coefficient of sales outstanding expected to be positive.

$B_4$  indicates coefficient of payment outstanding, and expected to be negative.

## **DATA ANALYSIS**

Before proceeding to analysis of data, it is highly necessary to check whether the model formulated fit the data. This is explained below:

**Goodness of fit of the model**

This is demonstrated in the table below:

**Table 1 ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1073895901 13.273	4	26847397528 .318	32.460	.000 <sup>b</sup>
	Residual	8270913490 8.917	100	827091349.0 89		
	Total	1900987250 22.191	104			

a. Dependent Variable:Gross profit

b. Predictors: (Constant), Purchases outstanding,Sales outstanding, Inventory held , Turnover

The last column shows the goodness of fit of the model. The lower this number, the better for the fit. Typically, if “sig.” is greater than 0.05, it is concluded that the model could not fit the data. In this case (sig.0.000) which is less than 0.05. Therefore, the model can fit the data. Hence, the model explains the deviations in the dependent variables

**Adjusted R- square**

This measures the proportion of the **variance** in the dependent variables (TO, INV, SO and PO,) that was explained by variations in the independent variable (GROSSPR). Adjusted R Square (R<sup>2</sup>) should be above 0.250 (25%) so as to be able to explain the percentage of the variation in the dependent variable that can be explained by variation(s) in the independent variable(s). This is confirmed by the table below.

**Table2 Model summary**

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate	R Square Change	F Change	df 1
1	0.752 <sup>a</sup>	0.565	0.548	28759.19590	0.565	32.460	4

a. Predictors: (Constant), Creditor, Debtor, Inventory, Turnover

**Collinearity**

Collinearity means that two or more of the independent/explanatory variables in a regression have a linear relationship. This causes a problem in the interpretation of the regression results. If the variables have a close linear relationship, then the estimated regression coefficients and t-statistics may not be able to properly isolate the unique effect/role of each variable and the confidence with which these effects can be presumed to be true.

Collinearity is indicated if the R-square is high (greater than 0.75 and only a few t-values are significant. In this study R- square is 0.565. Therefore, there is no presence of collinearity in the model.

**Hypotheses Testing**

For quantitative analysis two methods were used. At first, correlation is used to measure the degree of association between different variables under consideration. It is possible to identify many important variables associated with gross profit and its attendants association.

As multiple variable are influencing the problem under consideration Pearson consideration is used for data to see the relationship between variables such as those between gross profit and turnover, inventory, sales outstanding and purchases outstanding.

The table below shows the correlation between gross profit and turnover, inventory level, sales outstanding and purchases outstanding.

**Table 3 Correlations**

		GP	TO	Inv	SO	PO
GP	Pearson Correlation	1	0.736**	0.638**	0.359**	0.404**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	N	105	105	105	105	105
TO	Pearson Correlation	0.736**	1	0	0.520**	0.690**
	Sig. (2- tailed)	0.000		.873**	0.000	0.000
	N	105	105	0.000	105	105
				105		
Inv.	Pearson Correlation	0.638**	0.873**	1	0.391**	0.573**
	Sig. (2- tailed)	0.000	0.000		0.000	0.000
	N	105	105	105	105	105
SO	Pearson Correlation	0.359**	0.520**	0.391**	1	0.290**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
	N	105	105	105	105	105
PO	Pearson Correlation	0.404**	0.690**	0.573**	0.290**	1
	Sig. (2- tailed)	0.000	0.000	0.000	0.000	0.000
	N	105	105	105	105	105

\*\*Correlation is significant at the 0.01 level (2- tailed)

The analysis started with the result of correlation between turnover and gross profit. The result of the correlation analysis shows a positive coefficient 0.736 with a p-value of (0.000). It indicates that the result is significant at  $\alpha=0.01$  or it is confident at 99% level. This simply means that as turnover increases gross profit increases. The same trend is the result of correlation between inventory, sales outstanding and purchases outstanding. This shows that as inventory level increases, gross profit increases. In the same vein as sales outstanding and purchases increases, gross profit increases.

**Regression Analysis**

For the purpose of identifying the important variables influencing the dependent variable, regression analysis is employed. In panel data (pooled) regression, time series and cross sectional observations are combined and estimated. In other words, several cross sectional units are observed over a period of time in a panel data setting. A number of different regression coefficients are estimated for selected independent variables.

This regression is estimated using the pooled least squares method and the model that was applied is as follows:

$$GP = \alpha + \beta_1(TO) + \beta_2(INV) + \beta_3(SO) - \beta_4(PO)$$

$$GP = -10,784.335 + 0.849(TO) - 0.330(INV) - 1.110(SO) - 0.993(PO) \text{ see table below}$$

**Table 4 t- value**

t	-2.259	5.709	-0.405	-0.713	-2.261
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The equation above shows that turnover shows positive relationship toward gross operating profit, while inventory, sales outstanding and payment outstanding, negative relationship toward gross operating profit simultaneously. Moreover, the equation model indicates that simultaneously, the dependent variable has the value of t -2.259 and it significantly affects gross profit (sig.=0.026 i.e less than 0.05). This shows that the independent variables become the influencing factors toward gross operating profit.

**Table 5 Coefficients<sup>a</sup>**

Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	-10,784.335	4,773.998		-2.259	0.26
Turnover	0.849	0.149	0.957	5.709	0.000
Inventory	-0.330	0.816	-0.056	-0.405	0.687
Sales outstanding	-1.110	1.558	-0.056	-0.713	0.478
Purchases outstanding	-0.993	0.439	-0.208	-2.261	0.026

a Dependent Variable: Gross profit

Source: Processed data

**Result of Hypothesis**

**Hypothesis 1**

H<sub>0</sub> 1: No significant relationship between profitability and turnover.

H<sub>1</sub> 1: There is significant relationship between profitability and turnover.

**Table 6 Relationship between profitability and Turnover**

Independent Variable	T	Sig.
Turnover(TO)	5.709	0.000

To test whether there is significant relationship between gross operating profit and turnover, t test is used. Through the result from data processing, the value of t statistic obtained is equal to 5.709 and the level of significance is 0.000 (sig<5%). This shows that there is significant relationship between profitability and turnover. Therefore, H<sub>0</sub>1 is rejected.

**Hypothesis 2**

H<sub>0</sub> 2: No significant relationship between profitability and inventory.

H<sub>1</sub> 2: There is significant relationship between profitability and inventory.

**Table 5. The relationship between Gross profit and inventory**

Independent Variable	T	Sig.
Inventory	-0.405	0.687

Source: Processed data

To test whether there is significant association between gross profit and inventory, t test is used. Through the result from data processing, the value of the statistic obtained is equal to -0.405 and

the level of significance is 0.687 (sig.>10%). This shows that there is no significant relationship between gross profit and inventory. Therefore, H<sub>02</sub> is accepted.

Hypothesis 3

H<sub>0 3</sub>: No significant relationship between profitability and debtors.

H<sub>1 3</sub>: There is significant relationship between profitability and debtors.

**Table 5 The relationship between gross profit andSO (Sales outstanding)**

<b>Independent Variable</b>	<b>T</b>	<b>Sig.</b>
SO(Sales outstanding)	-0.713	0.478

Source: Processed data

To test whether is significant association between gross profit and SO (Sales outstanding), t test is used. The result shows that the result of the t statistic obtained equal to 0.713 and the level of significance is 0.478 (sig.>5%). This shows that there is no significant association between gross profit and SO (Sales outstanding). Hence H<sub>03</sub> is accepted.

Hypothesis 4

H<sub>0 4</sub>: No significant relationship between profitability and creditors.

H<sub>1 4</sub>: There is significant relationship between profitability and creditors.

**Table 6.The relationship between Gross profit and purchases outstanding**

<b>Independent Variable</b>	<b>T</b>	<b>Sig.</b>
PO(Purchases outstanding)	-2.261	0.026

Source: Processed data

To test whether there is significant relationship between gross profit and PO(Purchases outstanding, t test is used. The result as shown above indicated that the value of t obtained is equal to -2.261 and the level of significance is 0.026 (sig.<5%). This portrays significant relationship between gross profit and purchases outstanding. Therefore, H<sub>04</sub> is rejected.

**Table 7.Summary of Hypothesis and Related Results**

H <sub>01</sub>	No significant relationship between profitability and turnover	Rejected
H <sub>02</sub>	No significant relationship between profitability and inventory	Accepted
H <sub>03</sub>	No significant relationship between profitability and sales outstanding	Accepted
H <sub>04</sub>	No significant relationship between profitability and purchases outstanding	Rejected

From the summary of the hypotheses the research objectives have been realized and the research questions answered.

## **DISCUSSION OF RESULT**

In the first hypothesis, the null hypothesis was rejected. This means that there is significant relationship between gross profit and turnover. The relationship is positive, meaning that as turnover increases, profit will also increase.

In the second hypothesis, the null hypothesis was accepted, which means that there is no significant relationship between profitability and inventory held. There is positive relationship between profitability and the inventory held. This result confirms the outcome of the result reached byDeloff (2003), Teruel and Solano (2007), Falope and Ajilore (2009).

The third null hypothesis was accepted and the alternative hypothesis was rejected. The result of the hypothesis shows that there is no significant relationship between profitability and sales outstanding. There is significant negative relationship between gross operating profit and sales outstanding. This contradicts the outcome of the research carried out by Falope and Ajilore (2009), Mathuva, 2009).

In the fourth hypothesis, the null hypothesis is accepted, meaning that there is no significant relationship between gross operating profit and purchases outstanding. The result revealed that there is negative relationship between gross operating profit and the purchases outstanding. However, this confirms the result of researched carried out by Deloff (2003) where he found out that profitability has negative relationship with purchases outstanding, Falope and Ajilore (2009) where it was found that there is inverse relationship between profitability and average collection period.

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This study has examined the issue of linearity assumption between profitability and the component of business activities in food and beverages manufacturing companies quoted in the Nigerian Stock Exchange. A sample of 21 companies which is the whole manufacturing companies in food and beverages companies quoted in the Nigerian Stock Exchange. To be able to correlate the gross profit with turnover, inventory level, sales outstanding and purchases outstanding, gross profit/loss was chosen as a measure of profitability while turnover, inventory held, sales outstanding and purchases outstanding as a function of profitability.

Regression analysis using statistical packages for social science software (IBM SPSS Statistics Version20) was run to test four hypotheses. It was observed that out of the four hypotheses, two were rejected, that is  $H_{01}$ , and  $H_{04}$  which showed that there is linear relationship between profitability and turnover purchases respectively.

Gross profit and inventory held has positive relationship which makes sense in a way that higher inventory is needed to meet the higher demand, buying in bulk also reduces the ordering cost and high trade discount is associated with it. Low inventory level might reduce the carrying cost but it will create problem in case of sudden rise in demand and if a company is not able to satisfy the demand of its customers, the possibility that the customer can switch to the competitors. This will reduce the level of sales and profitability.

It was also observed that longer days purchases outstanding gives higher profit. It is quite logical because it is known that account payables (creditors) are the cheapest way to finance a business and larger duration of account payable will allow the a company to offer long period of credit to its customer that will eventually lead to increase in sales and profitability. Additionally, the company need not borrow if the length of credit granted by the suppliers is greater than the period granted the customers.

#### **Recommendation**

This research result can give insight to investors and companies themselves on measuring their companies' performance based on how well the companies manage the components of the business activities to increase profit.

Manager can raise the profitability of food and beverages companies in Nigeria by keeping the level of financial assets at a higher level, by reducing the collection period, by building more inventories and by prolonging the payment period. However, a good management of working capital is highly necessary for the smooth running of business.

Equally important, it was found out that financial assets and liabilities are erratic, whereas operating assets are not. Current assets and current liabilities were also tested for their

relationships with operation. Efforts must be geared toward the management of the short term resources and liability so as to be able to achieve the objective of the company- maximization of shareholders wealth which is indirectly achieved by making huge profit

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