The Effect of Inventory Management on Profitability of Cement Manufacturing Companies in Kenya: A Case Study of Listed Cement Manufacturing Companies in Kenya

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Abstract: **Inventory is a vital part of current assets mainly in manufacturing concerns. Huge funds are committed to inventories as to ensure smooth flow of production and to meet consumer demand. However, maintaining inventory also involves holding or carrying costs along with opportunity cost. Inventory management, therefore, plays a crucial role in balancing the benefits and disadvantages associated with holding inventory. Efficient and effective inventory management goes a long way in successful running and survival of a business firm. Given the milestone contribution of the Cement manufacturing firms to the economy of Kenya, this research is necessary to evaluate the effects of inventory management on the profitability of the Cement manufacturing firms in Kenya. A cross sectional data from 1999 to 2014 was gathered for the analysis of the annual reports for the three sampled firms listed at Nairobi Securities Exchange (NSE). The ordinary least squares (OLS) stated in the form of a multiple regression model was applied in the data analysis to establish the relationship between inventory management and firm's profitability. The variables used include inventory turnover, inventory conversion period, Inventory levels, storage cost, size of firm, gross profit margin, Return on assets and growth of firm. The results provide a negative relationship between inventory turnover, inventory conversion period and storage cost with profitability of the company. In addition, inventory level was found to be directly related to firm's size and storage cost. The study recommends that the Cement-manufacturing firms in Kenya should strive to ensure that the right stock is kept in their warehouses to hedge against excessive holding cost and stock-outs.**

Keywords: **Inventory Management on Profitability of Cement Manufacturing Companies, Inventory Conversion Period and Storage Cost With Profitability.**

1.   INTRODUCTION

Inventory constitutes a major portion of current assets especially in manufacturing companies and retail/trading firms. In order to maintain inventory levels of such magnitude, huge financial resources are committed to them (Mittal, 2014). As such, inventory also constitutes a major component of working capital. To a large extent, the success or failure of a business depends upon its inventory management performances. Inventory management, therefore, should strike a balance between too much inventory and too little inventory (Gupta & Gupta, 2012). The efficient management and effective control of inventories help in achieving better operational results and reducing investment in working capital. It has a significant influence on the profitability of a concern thus inventory management should be a part of the overall strategic business plan in every organization (Gupta & Gupta, 2012).

Inventory plays a significant role in the growth and survival of an organization in the sense that ineffective and inefficient management of inventory will mean that the organization loses customers and sales will decline. Prudent management of inventory reduces depreciation, pilferage and wastages while ensuring availability of the materials as at when required (Ogbadu, 2009). Efficient and effective management of inventories also ensures business survival and maximization of profit which is the cardinal aim of every firm. More so, an efficient management of working capital through proper and timely inventory management ensures a balance between profitability and liquidity trade-offs (Aminu, 2012). Specific performance indicators have been proved to depend on the level of inventory management practices (Lwiki et al., 2013).

Inventory management is recognized as a vital tool in improving asset productivity and inventory turns, targeting customers and positioning products in diverse markets, enhancing intra and inter-organizational networks, enriching technological capabilities to produce quality products thereby imparting effectiveness in inter-firm relationships. Proper inventory management even results in enhancing competitive ability and market share of small manufacturing units (Chalotra, 2013). Well managed inventories can give companies a competitive advantage and result in superior financial performance (Isaksson & Seifert, 2013). Management of inventory is also fundamental to the success and growth of organization as the entire profitability of an organization is tied to the volume of products sold which has a direct relationship with the quality of the product (Anichebe & Agu, 2013).

In Kenya, the cement manufacturing sector is identified as one of the core industrial sectors, with ample scope to boost the other sectors of the economy, especially the building and construction industry. There are six cement-manufacturing firms namely: Bamburi Cement Limited, Rhino Cement Foundation, East African Portland Cement Company, Mombasa Cement Company, Savanna Cement and National cement company ltd. Apparently, more than 90% of all cement manufacturers in Kenya today are located within Machakos County and mainly in Athi River. With a ready market, cement ready market in Nairobi and Machakos among many other adjacent towns in Kenya, there is really no doubt that cement companies in this part of Kenya will always continue to flourish (KAM, 2013) hence increased production and high inventory levels.

Problem Statement:

In the quest to maximize return on investment, many organizations fail to scrutinize their investment in inventory. This is unfortunate because improving the way an organization controls and manages inventory may have the greatest potential for improving the organization's bottom line (Schreibfeder, 2004). According to Temeng et al (2010), organizations have continuously ignored the potential savings from proper inventory management, treating inventory as a necessary evil and not as an asset requiring management.

Cement is an essential component of infrastructure development and most important input of construction industry, particularly in the government's infrastructure and housing programs, which are necessary for the country's socioeconomic growth and development. It is also the second most consumed material on the planet (WBCSD 2002). Recently, Kenya has experienced a tremendously growth which has led to increased commercial construction boom as a result of increased foreign investment, and extensive government and donor-funded spending on the country's mega infrastructure projects. There has been a growing demand of cement from, within and from outside the country from places such as Southern Sudan, Rwanda and Burundi (Kenya National Bureau of Statistics, 2012). As such, the increased demand has increased sales for cement companies but it poses a great challenge with regards to inventory management of cement manufacturing companies in the country. The rapid demand for cement has augmented the inventory problem hence the need for effective and efficient inventory management. It is on this argument that this study aims to analyze the relationship between inventory management as a component of working capital and the profitability of cement manufacturing companies in Kenya.

Objectives of the Study:

The general objective of the study is to establish the effect of inventory management on profitability of manufacturing companies in Kenya. The specific objectives were as follows:

i. To establish the relationship between inventory turnover and profitability of cement manufacturing firms in Kenya.

ii. To establish the relationship between inventory conversion period and profitability of cement manufacturing firms in Kenya

2. LITERATURE REVIEW

Lwiki et al (2013) using a survey conducted on all the eight (8) sugar manufacturing firms in Kenya established that there is generally positive correlation between each of inventory management practices. Specific performance indicators were proved to depend on the level of inventory management practices. They established that Return on Equity had a strong correlation with lean inventory system and strategic supplier partnerships. As such, they concluded that the performance of sugar firms could therefore be stated as being a function of their inventory management practices.

Capkun, Hameri, and Weiss (2009) studied the relationship between inventory and financial performance in manufacturing companies. The researchers studied 52,254 businesses for a period of 25 years between 1980 and 2005;

they used multiple regressions to determine the correlation between financial performance and various inventory levels. They measured financial performance using gross profits and operating profit results and Inventory levels in regard to raw materials, partially manufactured products, and finished products. The results revealed a positive correlation between a company's inventory management and its financial performance. They also noted that Degrees of correlation vary depending on the type of inventory and the financial performance reference.

Sahari, Tinggi and Kadri (2012) empirically analyzed the relationship between inventory management and firm performance along with capital intensity. For the purpose they took a sample of 82 construction firms in Malaysia for the period 2006–2010. Using the regression and correlation analysis methods, they deduced that inventory management is positively correlated with firm performance. In addition, the results indicate that there is a positive link between inventory management and capital intensity.

Eneje et al (2012) investigated the effects of raw materials inventory management on the profitability of brewery firms in Nigeria using a cross sectional data from 1989 to 2008 which was gathered for the analysis from the annual reports of the sampled brewery firms. Measures of profitability were examined and related to proxies for raw materials inventory management by brewers. The Ordinary Least Squares (OLS) stated in the form of a multiple regression model was applied in the analysis. The study revealed that the local variable raw materials inventory management designed to capture the effect of efficient management of raw material inventory by a company on its profitability is significantly strong and positive and influences the profitability of the brewery firms in Nigeria. They concluded that efficient management of raw material inventory is a major factor to be contained with by Nigerian brewers in enhancing or boosting their profitability.

Anichebe and Agu (2013) examined the effect of inventory management on organizational effectiveness in selected organizations in Enugu Nigeria. Using a descriptive research and a sample size of two hundred and forty eight (248) respondents, they established that there is significant relationship between good inventory management and organizational effectiveness. Inventory management was found to have a significant effect on organizational productivity. There was a high positive correlation between good inventory management and organizational profitability. They concluded that Inventory Management is very vital to the success and growth of organizations. The entire profitability of an organization is tied to the volume of products sold which has a direct relationship with the quality of the product.

3. RESEARCH METHODOLOGY

To achieve the study objectives, a panel data design was used to carry out the study. Panel data design involves the pooling of cross-sectional units of observations over several time dimensions and produces estimates that are more robust than employing cross-sectional or time-series estimation technique alone (Baltagi, 2005). This advantage is eminent since the methodology allows several data points to be pooled on each variable, which increases the degrees of freedom necessary in realizing more robust economic estimates. The target population refers to the entire group of individuals or objects of which the researcher is interested in generalizing the conclusions (Kothari, 2004). The population of study will comprise of the six (6) cement-manufacturing firms in Kenya.

Variables:

The variables have been classified as dependent variables and independent variables. The dependent variables include profitability measure, that is, gross operating profit margin (GPM) and Return on asset (ROA) to study the impact of inventory management variables IT , ICP, on it.

$$GPM = \frac{Gross\ profit}{Sales} \qquad ROA = \frac{Net\ Income}{Total\ assets} \qquad T = \frac{Cost\ of\ sales}{Average\ inventory} \qquad CP = \frac{365}{Inventory\ Turnover}$$

$FS = Natural\ Log\ of\ sales \qquad (Sales_t - Sales_{t-1})/Sales_{t-1}$

Model specification:

The regression analysis was based on the linear equations expressed as follows:

ROA = β_0 + β_1(IT) + β_2 (ICP) + β_4(FS) + β_4(FG) + ε ……………….. Model 1

GPM = β_0 + β_1(IT) + β_2 (ICP) + β_4(FS) + β_4(FG) + ε ……………….. Model2

4.   RESULT AND DISCUSSIONS

This Section begins by analyzing the descriptive statistics of the variables, test the null hypotheses defined in Chapter one, test the correlation between the variables under study and to ascertain the effect of inventory management on profitability by regression.

Descriptive Statistics:

Descriptive statistics shows the mean value and standard deviation of the selected manufacturing companies. In addition, it also provides the maximum and minimum values of the variables.

Table 4.1 Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
IT	45	3.4510	17.4000	5.774	2.7399794
ICP	45	21.0	105.8	71.963	21.6356
FS	45	6.2150	7.5700	6.9717	.3670762
FG	45	-.0640	2.3410	.978713	.9795814
ROA	45	-.0580	.5190	.110833	.1197393
GPM	45	.1420	.4670	.302737	.0705413

The table 4.1 above presents the descriptive statistics and the distribution of the variables considered in this research: Inventory turnover (IT) Inventory Conversion periods (ICP) Firm size (FS) Firm Growth (FG) Return on Asset (ROA) and Gross profit margin (GPM). The descriptive statistics considered were minimum, maximum, mean and standard deviation. The study showed that Profitability which was a represented by return on assets (ROA) had a mean of 0.11083 and standard deviation of 0.119. The return on assets was on average, 11% of the Cement companies' (total assets – financial assets). However, the value went highs of 52% and lows of up to -5.8%, this therefore, indicated a significant returns from the total assets invested. Alternatively, GPM on average had a return rate of 30.3% of the total sales of the cement companies in Kenya, which is better off as compared with the Return on the Asset. On average the stock of the Cement manufacturing firms in Kenya was turned into sales at 5.774 times while on maximum Cement companies were able to convert inventory to sales 17.44 times. These figures indicates a fair efficiency of the management in production by unit of sales of cement companies in Kenya to convert their inventories. On average, the cement manufacturing companies are able to hold stock in the warehouse before being sold for 72 days, while other cement companies took as short as 22 days or as long as 105 days. The study also showed that the logarithm of sales at 6.9717 shows the average size of the companies under study. The firm growth predicted by sales indicates a turnover growth on average of 0.9787 with a standard deviation of 0.979 showing a high growth rate of the Cement manufacturing firms in Kenya.

Correlation Analysis:

	Variables	IT	ICP	FS	FG	GPM
IL	Pearson Correlation					
	Sig. (2-tailed)					
	N					
IT	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	45				
ICP	Pearson Correlation	-.865**	1			
	Sig. (2-tailed)	.000				
	N	45	45			
SC	Pearson Correlation	.546**	-.339			
	Sig. (2-tailed)	.002	.067			
	N	45	45			
FS	Pearson Correlation	.341	-.153	1		
	Sig. (2-tailed)	.065	.420			
	N	45	45	45		
FG	Pearson Correlation	-.054	.020	-.048	1	.
	Sig. (2-tailed)	.775	.918	.800		
	N	45	45	45	45	
GPM	Pearson Correlation	-.284	-.355	-.107	.024	1
	Sig. (2-tailed)	.129	.054	.574	.902	
	N	45	45	45	45	45
ROA	Pearson Correlation	-.431**	-.206	.403**	.139	1
	Sign. (2 -tailed)	0.002	0.176	0.001	0.25	1

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

The results on table 4.2 show that the ROA is negatively related to IT and ICP. The negative relation between ROA and ICP is consistent with the analysis that the lower the number of days the inventory is held in a firm before its turnover, the more the assets is utilized in the firm increasing profitability. The negative relationship between ROA and IT is consistent with the view that, if the net profit is low, a high volume of trading transactions is necessary to produce a satisfactory amount of total profits, (Marijan et.al 2013). However, both IT and ICP has insignificant effect on the profitability.

Further, the study established that firm size is positively related to ROA, which means that larger firms report higher returns on assets compared to smaller firms. This may be due to larger firm's ability to exploit the economies of scale. Firm growth has a positive relation to ROA meaning as the sales of the firms grow there is higher likelihood that the firm records more profits unlike in a case of declining sales

Inventory turnover on the other hand has a weak negative correlation coefficient with gross profit margin of -0.284. This implies that with increase in GPM, IT would fall and vice versa though the relationship between them is statistically insignificant.

The ICP and GPM have a weak negative relationship, as the coefficient of correlation is -0.355. This means that a decrease in the inventory conversion period leads to an increase in the in the gross profit margin and vice versa. This finding indicates that firms, which hold inventory for a longer period, are likely to reduce their profits. The results of the correlation analysis are consistent with earlier studies taken on this subject.

Regression Analysis:

Regression analysis evaluates the relationship between the dependent variable and the independent variables.

Model summary:

Table 4.4 Model summary 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.871[a]	.758	.720	.25622

a. Predictors: (Constant), FG, IL, IT, FS, ICP, SC

As per the results on table 4.4, model 1 has a R^2 value of 0.758 meaning that 76% of the variation in the dependent variable is explained by the independent variables while 24% is explained by other variables outside the model. This indicated that our model is a strong predictor. The R-value of 0.871, which indicates that there is a strong positive correlation between the dependent variable (ROA) and the set of independent variables.

Analysis of variance (ANOVA):

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	7.816	6	1.303	19.842	.000[b]
1	Residual	2.495	38	.066		
	Total	10.310	44			

a. Dependent Variable: ROA

b. Predictors: (Constant), FG, IT, FS, ICP,

Coefficients of Variation:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.371	.410		15.554	.000
	IT	.021	.043	.133	3.485	.031
1	ICP	.001	.003	.039	1.256	.007
	FS	.014	.460	.003	3.030	.002
	FG	-.759	.564	-.114	-1.347	.186

a. Dependent Variable: ROA

The resultant regression equation is as follows

$$Y = 6.371 + 0.021IT + 0.00ICP + 0.014FS - 0.759FG + \varepsilon$$

The regression equation shows that the Return on Asset will always depend on a constant factor of 6.371 regardless of the existence of other profit determinants. Every unit increase of inventory turnover will increase Return on Asset by a factor of 0.021. On the other hand, every unit increase of inventory conversion period has no effect on profitability. A unit increase in firm growth will decrease profitability by 0.759. The size of the firm, as given by the logarithm of sales, shows that every unit increase in sales increases profitability by 0.014. All the variables are significant as the p-value is less than the standard significance level of 0.05.

Model Summary:

Model summary 2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.646[a]	.417	.325	.18318

a. Predictors: (Constant), FG, IT, FS, ICP

Table 4.7 indicates that the R square value is 0.417, which indicates that 42% of the variation in the dependent variables is explained by the independent variables while 58% of the variation is explained by other factors outside the model and the error term. The R-value is 0.646, which indicates a strong positive correlation between the dependent and the independent variables.

ANOVA:

Table 4. 8 Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.914	6	.152	4.538	.001[b]
	Residual	1.275	38	.034		
	Total	2.189	44			

a. Dependent Variable: GPM

b. Predictors: (Constant), FG, IT, FS, ICP

From the ANOVA table 4.8 above, the regression source of variation of 0.914 is lower than the residual source of variation of 1.275. Thus, the regression model is unable to explain larger portion of the variations in the dependent variables (GPM) than the residual source of variation. The, p-value is 0.001 which is less than the 0.05 and 0.01, set as standard significance levels indicating that the model is significant and fit.

Coefficients of Variation:

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	1.235	.293		4.217	.000
	IT	-.134	.031	-1.870	4.386	.000
	ICP	-.006	.002	-.571	-2.442	.019
	FS	.345	.329	.159	1.049	.301
	FG	1.033	.403	.336	2.562	.015

a. Dependent Variable: GPM

The resultant regression equation is as follows

$$Y = 1.235 - 0.134IT - 0.006ICP + 0.345FS + 1.033FG + \varepsilon$$

The results on table 4.9 show that firm growth has a positive and significant relationship with gross profit margin. This indicates that there is a direct relationship firm growth and profitability of cement manufacturing companies in Kenya, which indicates that an increase in these variables increases profitability. Inventory turnover and inventory conversion period has a negative significant relationship with gross profit. However, firm size have a positive relationship with profitability with a coefficient of 0.345 which is statistically insignificant at 0.301 p-value.

Inventory turnover have a negative relationship with profitability meaning that every unit increase in inventory turnover will decrease profitability by 0.134. However, the relationship is statistically significant as the p-value (0.000) is below the standard significance level of 0.05.

From the co-efficient table above, IT, ICP, FS and FG have a p-value less than the standard significance level of 0.05 , we reject the null hypothesis and conclude that these variables have significant effect on profitability of cement manufacturing firms in Kenya.

Summary of the Findings:

This study sought to examine effect of inventory management on profitability of manufacturing companies in Kenya. The study used two measures of profitability, which included return on assets and gross profit margin.

The study findings established that inventory turnover has a negative insignificant relationship with both ROA and GPM. This is consistent with the view that, if the gross profit rate is low, a high volume of trading transactions is necessary to produce a satisfactory amount of total profits, (Marijan et.al 2013). This finding contradicts with those of Kolias, Dimeli and Vasiolis (2010) who reported that inventory turnover has a positive relation with profitability. Therefore, with this inference, firms that report high gross profit margins are believed to have higher inventory turnover though the relationship is statistically insignificant.

The study found a negative relation between ICP and ROA and GPM which is reliable with the analysis that the lower the number of days the inventory is held in a firm before its turnover, the more the cash sales available to replenish the inventory. Hence, leading to more sales, which result to an increase in profitability. This is consistent with the findings of Hyder et al. (2007); Raheman and Nasr (2007) have also reported a negative relationship between Inventory period and profitability. Panigrahi (2013) also undertook an in-depth study of inventory management on a sample of the top five cement companies of India over a period of 10 years from 2001 to 2010 and concluded a considerable inverse linear relationship existing between inventory conversion period and profitability. However, this finding Contradicts (Mathuva, 2010) who found a positive relationship between the ICP and profitability.

5.   SUMMARY OF FINDINGS, CONCLUSSIONS AND RECOMMENDATIONS

The study established that an increase in inventory conversion days leads to a decrease in gross profit margin and return on investment. This implies that firms that take shorter days to convert their inventories into finished goods earn more profits as compared with those that take longer periods. The findings were consistent with the findings of Ashok Kumar (2013) who analyzed Indian cement industry and Sanjiv, Mittal ,Singh and Gupta who analyzed Indian fertilizer industry and found an inverse relationship between ICP and profitability. Therefore, it can be deduced that reducing the time of holding inventory would augment the profitability of the Cement-manufacturing firms.

Inventory turnover was found to have a negative effect on both gross profit margin and Return on asset. This indicates that manager's trade-off profitability and inventory turnover in their decision-making; hence, if the gross profit rate is low, a high volume of trading transactions is necessary to produce a satisfactory amount of total profits, (Marijan et.al 2013). The findings concurred with those of Kolias, Dimeli and Vasiolis (2010) who reported that inventory turnover has a negative relation with profitability. Therefore, firms with smaller gross profit margins have to strive for higher inventory turnover.

The findings also concluded that the size of the firm and increase in sales' growth would also help in enriching inventory turnover. It is also noted that firm profitability and growth are not necessarily linked to each other. The results so derived are also consistent with prior studies on these relationships.

Conclusion:

The study of inventory management in cement industry for the respective period leads to the conclusion that inventory performance was satisfactory. Gross profit margin is negatively correlated with the inventory conversion period. This means that by shortening ICP, firms' profitability improves.

The study also concludes that increases in sales, which denotes the firm size enriches the firm's inventory levels, which pushes profits upwards due to optimal inventory levels. It is also noted that firms inventory systems must maintain an appropriate inventory levels to enhance profitability and reduce the inventory costs associated with holding excessive stock in the warehouses.

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