INVENTORY MANAGEMENT SYSTEM AND PERFORMANCE OF SELECTED CONSUMER GOODS' MANUFACTURING COMPANIES IN NIGERIA

BY
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Abstract

This study was designed to examine the inventory management system and performance of select listed consumer goods' manufacturing companies in Nigeria. Specifically, the objectives were to evaluate the level of influence of inventory cost control, inventory efficient/accountability and inventory speed on the profitability of the select listed companies. Longitudinal research design using time series panel data of six years period, 2010 – 2015 was adopted. The population for this study consisted of the 24 listed consumer goods' manufacturing companies on the Nigerian Stock Exchange (NSE). Taro Yamane's sample size statistical formula was used to determine the sample size of ten (10) at an error term of 0.05 while purposive sampling technique was used to select the sampled companies. The data obtained were from secondary sources and analysed using descriptive and inferential statistics. The finding reveals that there is significant positive influence of inventory cost control (inventory management system) on net profit margin (profitability) and insignificant and fair inventory management practices on inventory turnover and inventory speed. Based on this finding, it was concluded that inventory management system significantly influences performance of select listed consumer goods' manufacturing companies in Nigeria. Thus, the companies should ensure that efficient inventory management system is maintained for appropriate inventory investments, enhanced profitability and to reduce the inventory costs associated with holding excessive inventories in the warehouses as well as shortening inventory holding periods and increasing inventory turnover.

Keywords: *inventory management system, inventory cost control, inventory efficiency/accountability, inventory speed*.

1.   Introduction

The management of working capital components such as inventory, trade receivables, cash-flows as well as trade payables cannot be over-emphasized. This is due to the fact that, for every good successful performance, the working capitals must be properly managed. Mohamad, Suraid, Rahman and Suhaimi (2016) opined that company performance depends on key variables - either on sales, marketing, good human resources, less of operational costs and/or efficient inventory management system.

Inventory management refers to a planned method of purchasing and storing the material to prevent stock out. Adeniji (2008) defined inventory management as an organization's practice for efficient and effective inventories in order to eliminate unnecessary investment. Organization inventory management is a crucial part of a business entity as its mismanagement may threatens a firm's viability, and such too much inventory become addition costs burden, increases the possibility of damage, spoilage and loss (Lwiki, Ojera & Wachira, 2013) while inventory management system is a whole system of inventory cost control, inventory efficiency, inventory accountability and inventory speed. Inventory occupies an important part of current assets, particularly in manufacturing concerns. Huge funds are always committed to inventories so 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. Efficient inventory management system, therefore, plays a crucial role in balancing the benefits and disadvantages associated with holding inventory. It goes a long way in successful running and survival of a business firm. Many studies have been carried-out on inventory management but very little on inventory management system - inventory cost control, inventory efficiency, inventory accountability and inventory speed as integrated inventory management practice for good profitability. Against this framework, the study is set out to examine inventory management system and the performance of select listed consumer goods' manufacturing companies in Nigeria by taking a sample of 10 companies for a period of six (6) years from 2010 – 2015. Specifically, to:

i. Evaluate the influence of inventory cost control and inventory accountability on profitability on select listed consumer goods manufacturing companies in Nigeria.
ii. Examine the influence of inventory efficiency and accountability on the profitability of the select listed companies in Nigeria.
iii. Assess the influence of inventory speed on the profitability of the select listed companies in Nigeria.

Research Questions.
 To achieve the objective of this study, these research questions were raised.
i. How does inventory cost control (as proxied by $\log_{10}$ cost of sales) influence the profitability of selected listed consumer goods manufacturing companies in Nigeria?
ii. What is the impact of inventory management efficiency and inventory accountability (as proxied by inventory turnover ratio) on the profitability (as proxied by Net profit margin for the year ratio) of selected listed consumer goods manufacturing in Nigeria?
iii. How does inventory speed (as proxied by 365 days to inventory turnover) influence the profitability of selected listed consumer goods manufacturing companies in Nigeria?

Research Hypotheses
Ho$_1$: There is no significant influence of inventory cost control (as proxied by $\log_{10}$ cost of sales, IC) on the profitability of select listed consumer goods manufacturing companies in Nigeria.
Ho$_2$: There is no significant influence of inventory efficiency/inventory accountability (as proxied by inventory turnover, IT) on the profitability of select listed consumer goods manufacturing companies in Nigeria.
Ho$_3$: There is no significant influence of inventory speed (as proxied by inventory holding period, IS) on the profitability of select listed consumer goods manufacturing companies in Nigeria.
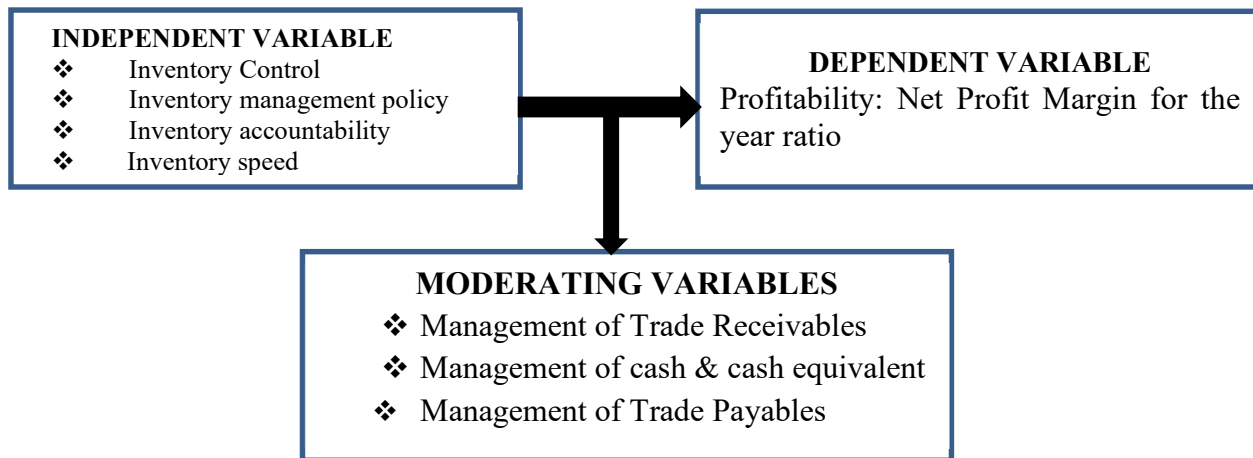
2. Review of Related Literature
2.1 Conceptual Framework
Inventory Management System (IMS) encompasses the organized processes, procedures, models, decisions, strategic operations, costs and information flows of inventories and a set of integrated software and hardware tools by which an organization can obtain the optimum benefits in its inventory investments. Every efficient and effective IMS must possess the following attributes namely; inventory control, inventory efficiency, inventory accountability and inventory speed (Mathias & Owuor, 2015). The ultimate purpose of efficient IMS is to maintain a large size of inventory for efficient and smooth production and sales operations as well as to maintain a minimum investment in inventories to maximum investments in inventories to maximum profitability (Adeniji, 2008).
Inventory cost control is the practice of ensuring that the right quantity and quality of the relevant inventory is available at the right times and is of the right price as well at the right place.
The inventory control systems aim at ensuring that raw materials are available for production purposes; that finished goods are available for dispatch to customers, that work-in-progress are valued and helping to control wastage and pilferage of materials. Thus, an inventory control system objective is to minimize total inventory related cost. This is done by establishing when to order? (Re-order level) and how many to order? (Economic order quality, EOQ). Therefore, inventory control managers will have to define and review in often what inventory levels should be maintained - to determine when and how much to order and whether it is performed on perpetual or periodic basis (Mathias & Owuor, 2015). Inventory management efficiency involves policy decisions, plans, strategies and models to ensure inventories are efficiently and effectively manage in order to eliminate inadequate and unnecessary investments as well as tiding-up of working capitals. The main objective of inventory management efficiency should be to determine and maintain optimum level of inventory investment policy to achieve the best values in inventory investments. The use of customer demands to pull products through tie distribution channel and an alternative philosophy used in the organization which allocates inventory on the basis of forecasted demand of product availability should be used (Mathias & Owuor, 2015), and the strategies set must be effective and efficient in cutting

cost of running inventory management. Magad and Amos (1989) and Lwiki, Ojera Mugenda and Wachira (2013) opined that the key aim of inventory management efficiency is to minimize cost and improve managerial efficiency. Inventory accountability entails the verification and confirmation of documents in receiving (purchasing) and issuing of inventory counter checking of inventory at entry and exit of products till change of titles take place by security (Mathias & Owuor, 2015). It is an inventory internal control, check and audit. The ultimate purpose of inventory accountability is to ensure that all parts/components of inventory are properly accounted for by the business entity for efficiency. In summary, inventory management efficiency and inventory accountability will be measured by inventory turnover ratio. Inventory speed measures the rate of inventory turnover and the strategies put in place to determine how fast inventory is selling or consumed in production, and the average volume held on hand.

INDEPENDENT VARIABLE
- ❖ Inventory Control
- ❖ Inventory management policy
- ❖ Inventory accountability
- ❖ Inventory speed

DEPENDENT VARIABLE
Profitability: Net Profit Margin for the year ratio

MODERATING VARIABLES
- ❖ Management of Trade Receivables
- ❖ Management of cash & cash equivalent
- ❖ Management of Trade Payables

Figure 1: Conceptual Framework

Developed by the Researcher (2017)

2.2 Theoretical Framework

Economic Order Quantity (EOQ) Theory: The most widely used model to determine the optimal inventory level is the EOQ. This model was developed by F.W.Haris in 1913. But R.H. Wilson is given credit for his early in- depth analysis of the model (Lwiki, Ojera Mugenda &Wachira, 2013)). The model is also known as the Wilson EOQ model. According to this model, some costs (ordering costs) decline with inventory holdings, while others (holding costs) rise and that the total inventory-associated cost curve has a minimum point. This is the point where total inventory costs are minimized. The economic order quantity is the level of inventory that minimizes the total of the inventory holding cost and ordering cost.

Lean Management Theory: Lean production principle was pioneered by Womack et al (1990). This principle was linked with reduced inventories. The argument is that as inventory cost is reduced, there will be profit improvement due to interest savings as well as a reduction in storage fees, handling and waste. These savings have been estimated by literature to be in the range of 20 -30 percent (Brigham & Gapenski, 1993). Lean Management is getting more and more attention in today's highly competitive environment. The proponents of Lean Inventory system argue that excess inventory will adversely affect the net cash flows of a firm. On the cost side, most obvious are the costs of holding inventory, which include the capital costs (interest or opportunity) and the physical cost (storage, insurance and spoilage). In recent years, a number of systems have been developed in the field of operations management to deal with excess inventory problem. Management– oriented systems include the Just-In-Time (JIT), the materials Requirements Planning systems (MRP) and Enterprise resource planning, ERP. Just-In-Time refers to a collection of practices that eliminate waste. These organization wide practices encompass the entire supply chain.

2.3 Empirical Review

Mohamad, Suraidi, Rachman and Suhaimi (2016) studied the relationship between inventory management and company's performance of Textile Chain Stores in Malaysia. Survey design was adopted in the study where the companies staff were interviewed and data also obtained from the sampled companies' annual reports from 2008 – 2012. Both Descriptive and inferential statistics were deployed. Finding reveals that there is significant relationship between inventory management (as proxied by inventory days) and company's performance (as proxied by return on assets). It was concluded that improved inventory management practice will lead to better performance in terms of profit, reducing inventory cost and maximize utilization of resources.

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. Ogbo, Onekanma and Ukpere (2014) examined the relationship between effective inventory management and organization's performance in Nigeria. This case study of a bottling company using descriptive statistics and Chi-Square non-parametric test found that inventory management enhanced the return on investment.

Sitienei and Memba (2015) investigated effect of Inventory Management on Profitability of listed Cement Manufacturing Companies 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.

Panigrahi (2013) examined the relationship between inventory conversion period and the profitability of cement companies in India for the period 2001 to 2010. The study adopted gross operating profit as the dependent variable and proxy for profitability and inventory conversion period as the independent variable. In addition, current ratio, size of the firm and financial debt ratio were used as control variables. The study found significant negative linear relationship between inventory management and profitability.

Prempeh (2015) studied the impact of efficient inventory management on the profitability of manufacturing firms in Ghana, using raw material inventory management and profit as variables. Cross sectional data from the annual reports of four manufacturing firms listed on the Ghana Stock Exchange were analysed using Ordinary Least Squares (OLS) and multiple regression techniques. The study found a significantly strong and positive relationship between raw material inventory management and profitability.

Mathias and Owuor (2015) analysed inventory management system as a determinant for performance of Grain Bulk Handlers Limited. It sought to establish effects of inventory management system on organizational performance. Specifically, the effect of inventory management attributes; inventory control, inventory speed, inventory cost and inventory accountability on organization performance was examined. Having not yet adopted inventory management systems, organizations face stock out cost, which results into great loss. This study developed research questions such as what are the effects of inventory; control, speed, cost and accountability on organization performance. The study adopted a descriptive research design which ascertained and described characteristics of the variable of interest in a situation. The target population for this study was 672 workers with a size sample of 100. Sekeroglu and Altan (2014)

investigated the effect of inventory management on the profitability of firms in the weaving, food, wholesale and retail industries in Turkey from 2003 to 2012. The study employed regression and correlation techniques using the computer software SPSS 20 version to analyse data collected from the income statements of the selected firms. The results showed positive relationship between inventory management and profitability in the food industry, but no relationship in the weaving, wholesale and retail industries.

3. Methodology

In this study, longitudinal research design using time series panel data of for six years period was adopted. The population for this study consisted of the 24 listed consumer goods' manufacturing on the Nigerian Stock Exchange (NSE). Taro Yamane's sample size statistical formula was used to determine the sample size of ten (10) companies. Purposive sampling technique was used to select the sampled companies. There are Nestle Plc, Guiness, Nigerian Breweries, Dangote Sugar, Unilever Nigeria, Flourmill, PZ Cussons Nigeria, Dangote Flour, Seven Up Bottling and Honeywell.

Secondary data, specifically, the annual report and accounts of the select sampled companies were deployed. The study used step-wise multiple linear regression analysis technique of the computer software SPSS-20 version to examine the influence of inventory management system on profitability on the selected companies.

Model Specification: A Step-wise multiple linear regression models was fitted to test how dependent variable is explained by independent variables. The functional form, econometric and residual forms are as stated thus:

Prof= f(IMS) …………………………………………………………….. eqn. (i)

$Y= \beta_0 + \beta_1 X_{it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it}$ ……………………………………….eqn. (ii)

$NPM = \beta_0 + \beta_1 IT_{it} + \beta_2 IS_{it} + \beta_3 IC_{it} + \varepsilon_{it}$ ………………………………….eqn. (iii)

$NPM = \beta_x IC_{it}$ ……………………………………………………… eqn. (iv)

Where: Inventory Management System (IMS); Performance. = profitability= net profit margin (NPM); IT inventory turnover; IS= inventory speed; IC = inventory control; β_0 = constant term, $\beta_1 – \beta_3$ = coefficients of independent variables

Measurement and Explanations of Variables

Variables	Types	Measurement/Definition	Expected sign	Source
Profitability, NPM	Dependent	$\dfrac{net\ profit\ for\ the\ year}{sales\ revenue}$ It measures the overall operational performance.		Annual accounts
Inventory Turnover, IT	Independent	$\dfrac{cost\ of\ sales}{average\ inventory}$ Measures the rapid rate which a company is able to turn its inventory into sales. The higher number of times, the more efficient the inventory managements of the business for profitability.	+	Annual accounts
Inventory Speed, IS (Inventory holding period)	Independent	$\dfrac{365}{inventory\ turnover}$ The average period of time in which inventory are being held before being sold to customers. The shorter the period, the better, the better the profitability.	-	Annual accounts
Inventory Control, IC (cost of sales)	Independent	$\log_{10} Cost\ of\ Sales$ Cost of purchase of inventory [purchase price + import duties and other taxes + transport, handling and any other cost		Annual accounts

		directly attributed to the acquisition of finished goods, services and materials + trade discounts, rebates and other similar amount (IFRS 2)]. The lower the cost, the better the profitability.	-	

Source: Compiled by Researcher (2017)

4.   Results and Discussions

This Section is the analysing of the descriptive and inferential statistics of the variables, testing of the null hypotheses and discussion of major findings of the study.

Table 4.1: Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
IC	60	4.4495	5.3353	4.8924	1.3242
IT	60	3.03	10.90	5.2673	1.403
IS	60	33.49	120.47	73.4598	16.9233
NPM	60	0.0015	0.01942	9.4487	4.8836
Valid N	60				

From Table 4.1, the mean value and standard deviation for NPM which is the dependent variable of the study is 9.4487 and 4.88360 respectively. Inventory Turnover, IT calculated, the results can be summarized as it will take minimum 3.03 times and maximum 10.90 times for the companies to turnover their inventories. The result also stated that the minimum cost of sales is 4.4495 ($\log_{10}$) and maximum is 5.3353 ($\log_{10}$). Also, that inventory speed (number of days to inventories are held in the warehouse before being sold to customers minimum and maximum are 34 days and 121 days respectively; and that as the companies maintaining this inventory management system can only can gain an average maximum profit of 1.942% and not more than that. If companies want to achieve more than 1.942% profitability; they must increase their inventory turnover rates higher than 10.90 times, reduce the inventory conversion speed and inventory costs to the minimum.

Table 4.5: Excluded Variables[a,b]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics Tolerance
1	IT	.247[c]	1.094	0.279	0.142	0.067
	IS	-.218[c]	-0.868	0.389	-0.113	0.055

a. Dependent Variable: NPM

b. Linear Regression through the Origin

c. Predictors in the Model: IC

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5384.791	1	5384.791	230.391	.000[c]
Residual	1378.972	59	23.372		
Total	6763.763[d]	60			

In Table 4.2, the result of influence of inventory cost control (IC) was considered on profitability. The F-calculated of 230.391 was obtained and the p-value less than 0.05. Therefore, there is a strong positive significant influence of inventory management system on profitability although IT and IS were excluded from the computation due to poor profitability made by Nigerian consumer goods' manufacturing companies. This means that the companies pay less attention to the management of inventory in respect to IT and IS while more of IC over the study period, of which IMS is a whole system (Table 4.5).

Table 4.3: Coefficients[a,b] of the Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
IC	1.983	.131	.892	15.179	.000

Table 4.4: Model Summary[c,d] using Step- wise Regression

Model	R	R Square [b]	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.892[a]	0.796	0.793	4.8345	1.486

From Table 4.4, a step- wise multiple linear regression was deployed so as toaccommodate only variable that has significant value while insignificant variables were excluded from the model. An adjusted R Square of 0.793 was obtained which shows that IC accounted for 79.3% of the variation in profitability while 20.7% are accounted by other variables.

Results in Table 4.3 shows that IC has significant positive influence on NPM (β = 1.983, t-cal. = 15.179, p-value = 0.000, p< 0.05). This means that the more efficient and effective inventory cost controls, the more the level of profitability increases significantly in constraint of inventory turnover (IT) and inventory speed (IS) in place.
 The finding is consistent with the findings of Mohamad, Suraidi, Rachman and Suhaimi (2016) that analysed Indian cement industry and found that improved inventory management practice will lead to better performance in terms of profit, reducing inventory cost and maximize utilization of resources. This is in line with the study of Prempeh (2015), who found a significantly strong and positive relationship between raw material inventory management and profitability.

5. Conclusions and Recommendations

Based on the findings of this study, it is established that an efficient and effective inventory management system – inventory management efficiency and accountability (inventory turnover, IT); inventory speed (inventory holding period) and inventory cost control ($\log_{10}$ cost of sales) leads to an increase in profitability (net profit margin, NPM). This implies that companies that control costs, take shorter days to warehoused

their inventories before sales while increasing the rate of turning the finished goods to sales will earn more profits as compared with those that not practicing.

Thus, it is recommended in this study that companies in consumer goods manufacturing industry that they must ensure efficient inventory management system inventory by maintaining an appropriate inventory investments to enhance profitability and reduce the inventory costs associated with holding excessive stock in the warehouses. It is also recommended that manufacturing firms should develop a policy framework to facilitate faster implementation of the best inventory management practices such as JIT and MRP so as to improve inventory turnover and inventory speed.

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