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Inventory Positioning and Firm Performance in Engineering Companies. Evidence from Nigeria

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Abstract: This paper examines the impact of inventory management practices on the financial performance of Engineering firms in Nigeria. Because of the huge inventories maintained by most firms, a considerable sum of an organization's fund is being committed to them. Thus it becomes absolutely imperative to manage inventories efficiently so as to avoid the costs of changing production rates, overtime, sub-contracting, unnecessary cost of sales and back order penalties during periods of peak demand.The research survey was conducted in all the five selected engineering firms from the period 2009-2014. Secondary data was obtained from Annual Reports of the companies under study. Correlation analysis was used to determine the nature and magnitude of the relationship among inventory management variables. The results indicate that there exists a positive correlation between inventory management and Return on Asset (r=0.740) and also with Return on Equity (r=0.653) which were found to be statistically significant at 5% level.The answer to the fundamental question of how best an organization handles inventory by using various optimization techniques was obtained, Consequently, recommendations on the right quantity, quality and timing of material, at the most favorable price to enhance profitability and return on equity conclude the research study.

Key words: Inventory Management · Financial Performance · Return on Assets · Return on Equity

INTRODUCTION

The aim of this study is to examine the relationship,between inventory management control and financial performance of firms in Nigeria. The effective and efficient functioning of a productive system requires the regular demand and supply of inventory at the input transformation and output phases of the production process [1]. Management is also seen as the effective and efficient utilization of resources for the achievement of organizational objectives. To ensure the achievement of the objective there must be free flow of materials, unencumbered at every stage of the production process. In Nigeria today, firms source their raw materials from the same market. With the present economic melt down, organizations are after these scare resources to produce their products. Therefore, the urgency for the effective and efficient management of inventory in form of raw materials, work-in-progress and finished goods constitute significant proportion of assets of most organization. Inventory items cost money to acquire, they cost money to store and to look after, which means storage facilities has to be provided so as to make sure that these materials or items do not get spoilt until they are turned into sellable goods, they do not produce money. When stocks are held, it means tying down capital that would have been used in other areas, so it all represent cost and should be managed properly to acquire efficiently. We must however, hold stocks to meet production needs and sales needs. This is because if we do not hold stocks in sufficient quantities waste and the risk of running out of stock may occur.Similarly, if there is short of finished good, we may disappoint our customers. Inventory shortage in both forms will likely lead to loss of customers and money [2]. For the organization not to have above problems they should strike a balance between too much stocks (over inventory) and carrying too little stock. (Under inventory). This is essentially the importance of inventory management, managing assets of all kinds is basically an inventory problem, the same

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method of analysis applies to cash and fixed assets as to inventories themselves. Inventory management is pivotal in effective and efficient organization. It is also vital in the control of materials and goods that have to be held (or stored) for later use in the case of production or later exchange activities in the case of services. The principal goal of inventory management involves having to balance the conflicting economics of not wanting to hold too much stock [3]. Inventory problems of too great or too small quantities on hand can cause business failures. If a manufacturer experiences stock-out of a critical inventory item, production halts could result. Moreover, a shopper expects the retailer to carry the item wanted. If an item is not stocked when the customer thinks it should be, the retailer loses a customer not only on that item but also on many other items in the future. The conclusion one might draw is that effective inventory management can make a significant contribution to company's profit as well as increase its return on total assets. It is thus the management of this economics of stockholding, that is appropriately being refers to as inventory management. The reason for greater attention to inventory management is that this figure, for many firms, is the largest item appearing on the asset side of the balance sheet.Yang *et al.* [4], has argued that supply chains have evolved from traditional forecast-driven push to demand-driven pull systems over time and that postponement is playing an increasingly important role in a supply chain. Wanke, [2000], states that inventory management approaches are a "function of product, operational and demand related variables such as delivery time, obsolescence, coefficient of variation of sales and inventory turnover" and that logistics managers are more likely to decentralise inventory in order to stock product close to the customer's facility if the customers demand a reduced delivery time. Graman, [5], argued that today, the cost of holding inventory, extensive product proliferation and the risk of obsolescence, especially in rapidly changing markets, make the expense of holding large inventories of finished goods excessive and that high demand items naturally have safety stock assigned to them but in many organisations there are so many very-low-demand items that keeping any stock of these items is unreasonably expensive, so they argue that companies must now provide good service while maintaining minimal inventories. Therefore, inventory management approaches are essential aspects of any organisation.

Statement of Problem: The life blood of any organization, whether private or public productive or service organization is inventory. Because of shortage of materials to meet sudden increase in customers demand, reduction in profit margin, low returns on equity, wastages of materials, pilferage arising due to excess stock and sleep in communication chains that exist in most industries, inventory management has become mandatory on each and every manager responsible for production in an organization.Inventory is one vital resource that any organization requires and just like any other resource that is very scarce and that requires effective management rather than neglect. The cost of acquiring these inventories is also important for the fact that too much of it will mean tying down capital and risk of becoming obsolete while having little could lead to shortage and production bottle neck. How then, to determine adequate quantity of raw material to buy, where to buy on a regular basis devoid of scarcity, the amount to invest on the inventory and projection towards maximizing profit is the concern of the study.

Objectives: The objectives of the study are as follows:

- To examine the relationship between Inventory ratio and profitability.
- To also examine the relationship between sales growth and Return on Equity and profitability.

Research Hypothesis: The following are hypotheses developed to guide this research work:

- There is no significance relationship between Inventory ratio and profitability
- There is no significant relationship between sales growth and profitability.

Review of Related Literature: In Malaysia, Angus and Noor, (2006) [6] examined the relationship between inventory management practices and financial performance. The study measured the manager's perceptions of inventory and supply chain management practices and the level of performance in the industry. They employed a structured questionnaire, which was designed to assess the companies in terms of the described dimensions. The sample were randomly chosen from manufacturing companies (non-food based manufacturing companies with medium to high technology) in Klang valley, Malaysia. The findings suggest that inventory management practices have significant correlations with profitability and return on sales (ROS),analysis variance was used for the data processing.

Sanghal, [7], studied the effect of excess inventory on

long term stock price performance. The study estimated the long-run price effects of excess inventory using 900 excess inventory announcements made by publicly traded firms during 2010-2012. These announcements are clear and unambiguous acknowledgement by affirming that it is suffering from excess inventory.with the help of chi-square technique, He found evidence suggesting that stock market partially anticipates excess inventory situations and that firms do not recover quickly from negative effects of excess inventory. He further noted that the negative effect of excess inventory is economically and statistically significant.

Roumiantsev and Netessine, [8], investigated the association between inventory management policies and the financial performance of affirm. The purpose of the study was to assess the impact of inventory management practices on financial performance across the period 1992-2002.They used conventional firm specific variables (inventory levels, margins and lead times) as explanatory variables. They found no evidence that smaller relative levels are associated with financial performance as measured by return on assets.

Eckert, [9], examined inventory management and role it plays in improving customer satisfaction. He found a positive relationship between customer satisfaction and supplier partnerships, education and training of employees and technology. Ectert favours likert-type scale of five levels and t-test of two-tailed was used to test the hypothesis. He recommends that a good rapport between the suppliers must be maintained in order to have goods demanded delivered in time for a smooth production operation.

[10], In Greece, studied the effect of inventory management on firm performance 1358 manufacturing firms operating in three industrial sectors in Greece, food textiles and chemicals were used in the study covering 2000-2002 period. The hypothesis that lean inventory management leads to an improvement in a firm's financial performance was tested. The findings suggest that the higher the level of inventories preserved (departing from lean operations) by a firm, the lower the rate of return.

[11], studied on the effect of inventory management on firm performance. The study found a significant correlation between the use of inventory control systems and operational performance and recommend proper inventory control for all tea processing firm to enhance their operations. They made use of primary data, analyzed and interpreted by the use of chi-square.

The study methods employed includes the variance analysis, Economic Order Quantity (EOQ) Model and the Chi-square method. The answer to the fundamental question of how best an organization handles inventory by using various optimization techniques. Consequently, recommendations on the right quantity, quality and timing of material, at the most favorable price conclude the research study [12].

The effect of raw materials inventory management on the profitability of brewery firms in Nigeria. A cross sectional data 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 focal variable raw materials inventory management designed to capture the effect of efficient management of raw material inventory by a company on it's profitabilityis significantly strong and positive and impacts on the profitability of the brewery firms in Nigeria. They recommend, efficient management of raw material inventory as a major factor to enhance their profitability [13].

The relationship between inventory control management system and organizational performance in 7up bottling company, Nile Mile Enugu. Data for examining the research hypothesis were obtained through questionnaires. They found that there is a significant relationship between effective inventory control management system and organizational performance [14].

Inventory Management in Small Business Finance either used a regression model to analyze secondary data collected from periodical publications.to explain the effect of inventory value on performance proxy by profit over a period of ten years, the study revealed that a Naira change in stock would cause almost a Naira (92 Kobo) change in profitability of selected businesses. This indicated a strong positive relationship between inventory and profitability of small businesses in Kwara State with a t-value of (6.409). it was concluded that small businesses are likely to generate higher profit if an effective inventory management is put in place [16].

Effect Of Inventory Control Systems On Operational Performance Of Tea Processing Firms, They used primary data collected through structured questionnaire. Quantitative data was analyzed using descriptive and inferential statistics and regression analysis to assess the association between the variables in the study. The study found a significant correlation between the use of inventory control systems and operational performance

and recommend proper inventory control for all tea processing firm, to enhance their operations [17]. The study employ secondary data obtained from Journal of social sciences vol.54, p 44-150, analysis of variance tools (ANOVA) was use to test the reliability of the inventory variables. He discovered that inventory management cost is correlated with the firms profit. He conclude by asserting that firm must keep eye tab to minimize the cost of inventory so as to increase profit margin [18]. The role of vertical integration in the inventory management of a supply chain. Taking Chinese listed companies from 2001 to 2010 as our scope, Secondary data from Chinese Social Sciences journal publications, analyzes using a multiple regression technique, they find that vertically integrated firms have lower inventory holdings and volatility, indicating that vertical integration improves firms' inventory management efficiency. Further analyses show that this effect is more pronounced for firms located in regions with a lower level of market and for firms facing higher demand volatility and business growth. They recommended and concludes that, the more thoroughly firms have accomplished vertical integration, the more greatly vertical integration increases inventory management efficiency and that the positive impact of vertical integration on inventory management is more significant in industries with no overcapacity, for diversified firms and during non-crisis periods [19]. The study examine the relationship between information sharing, inventory management and customer satisfaction in the downstream chain of manufacturing firms in Uganda.The research was based on registered distributors and retailers who sell products of manufacturing firms in Uganda. A Sample of 523 was taken composed of registered retailers and distributors. Primary data collected through survey questionnaire was used. Analyzed with chi- square and tested using student t-test.The it was found that, 47.1% of the variation in customer satisfaction and inventory management explained 39.4% of the variation in customer satisfaction. From the results they infer that firm's ability to share information and ensure proper inventory management has implications on customer satisfaction, indicating a positive relationship between inventory management and customers' satisfaction.

Wen, Yi. [20] wrote on Input and Output Inventory Dynamics. The study investigates the relationship that exist among inventory variables (input and Output) secondary data from international journal of Economics and management sciences publication was used.(ANOVA) as a statistical tool was used to analyze the data and interpretations was made for the following findings; The model's predictions are broadly consistent with the US business cycle and key features of inventory behavior. It is also shown that technological improvement of inventory management can increase, rather than decrease, the volatility of aggregate output. It recommend that stockout-avoidance motive leads to a procyclical shadow value of inventories, which acts as an automatic stabilizer that discourages sales in booms and encourages demand in recessions, thereby reducing the variability of GDP [21].

We compareD the empirical performance of different financial variables (coverage ratio, cash stocks and cash flow) used in previous research to test for the presence of financing constraints. The comparison is undertaken in a common framework with an identical sample and high-frequency (quarterly) firm panel data. Cash flow is much more successful than cash stocks or coverage in explaining the facts about inventory investment across firm size, different inventory cycles and different manufacturing sectors.

In conclusion, most of the studies reviewed concentrated on conventional firm level variables such as inventory levels, demand and lead time. Little attempt was made to capture the perceptions of managers about the impact of inventory management practices on firm financial performance. Angus and Noor [6] did measure the perception of managers about the impact of inventory management practices on financial performance of manufacturing firms in Malaysia. However, circumstances in Malaysia could be different from those in Nigeria. This study seeks to investigate the effect of inventory management on firm financial performance in Nigeria.

MATERIALS AND METHODS

Research Design: This study adopted an ex-post factor research design.This is because it deals with events that have taken place in past.

Population and Sample Size: The population of this study consists of all the Manufacturing companies quoted on the Nigerian Stock Exchange (NSE) as at 31st December, 2013.The sample size is the Engineering companies quoted in NSE, which are dependent on data availability The data so collected were analyzed using Pearson correlation technique to determine the effect of inventory management practices on financial performance of firms under study. The companies are Huawei Technology Nig. Limited, Jubaili Technology, Mikano and 3tech Corporate

Nig. Limited. These companies are into power production of both mechanical and electrical energy. They are also the contractors to the major leading telecommunication companies in Nigeria (MTN, AIRTEL, GLO and ETISALAT) for their network maintenance.

Model Specification: The model that aided the analysis of the research work is stated as follows:

$Y = \beta 0+\beta 1\ (ROA) +B2[INV]\ldots\ldots\ldots\ldots..\ ei$

where
Y = Total Income (cash)
ROA = Return on Asset
INV Inventory
$\beta 0$ = Constant of the model
$\beta 1$ = Coefficients of the independent variable
ei = Random error term representing factors other than those specified in the model.

Data Analysis and Presentation: The data values for all the study variables in respect to each of the sampled engineering companies were computed using the extracted data, from the Annual financial statements of these sampled companies listed on the NSE. The financial performance Table 1 and 2 are derived from financial performance of selected Engineering companies in Nigeria 2009 –2014 earlier stated in methodology.The return on asset for a particular year is the ratio of profit after tax to net turnover. Return on equity for a particular year is ratio of profit after tax to equity capital plus reserves.

Calculation Key:

$$ROA = \frac{\text{Net profit after tax}}{\text{Net sales}}$$

Table 1: shows that ROA vary in all the firms, though the firms apply similar inventory management practices.This imply that firms profitability depend on other specific characteristics of each firm. Firm 1 and Firm 4 have registered impressive average return on assets over the six year period.However, other two firms have recorded negative average return on assets over the six–year period. This is expected because the two firms have been making losses over a six year period.

Calculation Key

$$ROE = \frac{\text{Net profit after tax}}{\text{Asset - Liability}}$$

From the observations of Table: 2, Return on equity varies in all the firms even though they apply similar inventory management practices. Therefore ROEs appear to depend on each firm's internal factors.Firms such as firm 1 and firm 4 have recorded higher average ROEs over the six year period. Firm 2 and 3 have recorded yet again negative average ROEs over the six year period. There is a positive correlation between ROE and ROA

From the above table, Inventory Management-Financial performance Causation shows the relationship between inventory management practices and financial performance. It also displays the association among

Table 1: Return on Asset (ROA)

Year	Huawei Technology Nig. Ltd	3tech corporate Nig. Ltd	Mikano	Jubaili Technology
2009	0.813	- 7.1	-4.21	-29.94
2010	- 0.26	-14.13	-30.7	-11.56
2011	8.03	-1.03	2	17.61
2012	12.71	1.58	9.37	19.14
2013	12.1	-4.43	-8.89	24.45
2014	13.534	3.53	3.51	10.11
Mean	7.82	-3.596	-4.82	4.97

Table 2: Return on Equity (ROE)

Year	Huawei Technology Nig. Ltd	3tech corporate Nig. Ltd	Mikano	Jubaili Technology
2009	1	- 8	7	- 5
2010	- 4	- 2	- 60	- 2
2011	14	- 3	1.8	18
2012	21	3	11	7
2013	19	-10	-8.9	7
2014	17	8	10	3
Mean	11.33	-2	-6.652	4.67

Table 3: Relationship between Inventory and profitability

		Linv	SSP.	Tech	Industry	(ROE)	(ROA)
Linv	Pearson correlation sig.(2-tailed)	1					
	N	6					
SSP	Pearson correlation sig.(2-tailed)	0.463					
	N	0.355					
		6					
Tech	Pearson correlation sig.(2-tailed)	0.578	0.396	1			
	N	0.230	0.319				
		6	6	6			
Industry	Pearson correlation sig.(2-tailed)	0.846	0.494	0.915			
	N	0.34	0.319	0.011			
		6	6	6			
(ROE)	Pearson correlation sig.(2-tailed)	0.813	0.852	0.391	0.653		
	N	0.49	0.31	0.443	0.159		
		6	6	6	6		
(ROA)	Pearson correlation sig.(2-tailed)	0.641	0.889	0.613	0.740	1	
	N	0.170	0.018	0.196	0.092		
		6	6	6	6	6	

Source: Cell contents of SPSS Package (Pearson Correlation)

inventory management practices. The Pearson correlation coefficients were generated at a significant level of P=0.05 (2-tailed). The output indicates a more than positive average positive correlation between inventory management practices and financial performance. The strongest relationship is observed between inventory management practices and ROA (r=0.740) the correlation between inventory management practices and ROE is also positive.

CONCLUSION

The study sought to find out the effect of inventory management on firm performance in Nigeria. Financial performance of two firms has recorded negative average return on assets and return on equity over the six year period. The rest have recorded positive average ROE and ROA.The findings suggest that there is generally an average positive correlation between inventory management practices and financial performance of technical companies. This is reflected in the calculated correlation coefficient between inventory management practices and ROA (r= 0.740) and that between inventory management practices and ROE is 0.653. It has also been observed that predictor variables of the inventory management practices are correlated. From financial performance tables, there are varied growth pattern for every firm. This implies that whereas the companies apply the same inventory management practices as determinants of their performance levels, the implementation of the practices respond to different specifically unique environments of each firm. There is generally positive correlation between each of inventory management practices. Specific performance indicators have been proved to depend on the level of inventory management practices.The performance of engineering firms can therefore be stated as being a function of their inventory management practices.

RECOMMENDATIONS

It is recommended that technology firms develop a policy framework to facilitate implementation of the best inventory management practices such as JIT and MRP. It is also recommended that technical firms should consider investing in modern technology and implement EDI. This will reduce inventory costs and improve returns.

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