

Inventory Management and Operational Performance of Manufacturing Firms in South-East Nigeria

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Abstract

This study aims to ascertain the relationship between inventory management and operational performance of quoted manufacturing firms in the south-east; one of the geographic regions with high industrialization prospects in Nigeria. To achieve this, operational performance of manufacturing firms and their association with components of inventory management; inventory cost, just-in-time approach, materials requirement planning and strategic supplier partnership, was examined through a questionnaire. Three hundred and seventy-one copies of a questionnaire issued to five hundred and thirty-eight sampled respondents of four quoted manufacturing firms in the south-east region of Nigeria were properly filled and found relevant to the study. The study used SPSS and Excel-based descriptive statistics to analyze the data collected. Regression analysis was used to test the hypotheses of the study. Study results conclude that there is a positive significant relationship between; inventory cost, just in time approach, materials requirement planning and strategic supplier partnership and operational performance of quoted manufacturing firms in the south-east region, Nigeria. The study recommends among others that, manufacturing firms in south-east Nigeria should adopt inventory practices such as strategic supplier partnership, just-in-time approach, materials requirement planning and inventory cost control due to the significant effect these practices have on operational performance.

Keywords: inventory, management, operational performance, manufacturing, firms, Nigeria

1. Introduction

1.1 Introduction to the Study

The success of companies in this contemporary competitive business environment requires them to improve production considerably, minimize cost in their supply chains and provide efficient customer service to ensure customer satisfaction. This could be achieved through efficient inventory management. As such, efficient inventory management ensures large profit and retention of the available customer base. The achievement of better customer service drives companies to structure their inventory management. At every stage of production in manufacturing firms, there ought to be a balance in the level of inventory; not too high and not too low, so as to reduce the cost of operating the firm and losses. (Hugo, Fettermann, Tortorella, & Testoni, 2016).

Providing the right quantity and quality of raw materials is one of the major goals of managing inventory efficiently. However, one mitigation to achieving this goal is knowing when to order, the quantity to order and frequency of ordering so that the organization always maintains the right level of raw material and finished product at minimum inventory total costs (Wangari & Kagiri, 2015) without also having shortage or excess of materials.

The process of quantifying the efficiency and effectiveness of inventory management could be mirrored by the operational performance of firms. While a manufacturing firm's ability to meet customer demands by adequately supplying quality finished goods, eliminating waste and reducing lead time reflects a good operational performance. Based on the foregoing, this research explored on inventory management and operational performance of quoted manufacturing firms in the south-east geopolitical zone of Nigeria.

1.2 The Study Problem

The application of taking inventory in real-life business scenarios, ought to influence the company's operational performance, despite the shortcomings of the techniques used; periodic review, continuous review, materials requirements planning systems (MRP), Just-In-Time (JIT) and enterprise resource planning (ERP). It is for this reason that this study examines to ascertain how significant the relationship between inventory management and operational performance of selected manufacturing firms in the south-east geographic region of Nigeria is. The south-east region of Nigeria is chosen for this study because of the industrialization prospects of this region through manufacturing firms and entrepreneurial ventures. The region also boasts of a conducive environment for business and investment. In this study, profound and clearer variables and analysis on the relationship between inventory management and operational performance of quoted companies in Nigeria are presented.

This research work will be significant to manufacturing companies in developing policy frameworks that will facilitate faster implementation of the best inventory management practices.

The elements of the study problem are illustrated by answering the following questions:

1. How significant is the relationship between inventory cost and the operational performance of quoted manufacturing firms?
2. To what degree is the relationship between just-in-time approach and the operational performance of quoted manufacturing firms significant?
3. To what extent is the relationship between material requirement planning and the operational performance of quoted manufacturing firms significant?
4. How significant is the relationship between strategic supplier partnership and the operational performance of quoted manufacturing firms?

1.3 Objectives of the Study

The study aims at examining the relationship between inventory management and the operational performance of quoted manufacturing firms in the south-east geo-political zone of Nigeria. The specific objectives include:

1. Determine the extent of the relationship between inventory cost and the operational performance of quoted manufacturing firms.
2. Ascertain the degree of the relationship between the just-in-time approach and the operational performance of quoted manufacturing firms.
3. Investigate the degree of the relationship between materials requirement planning and the operational performance of quoted manufacturing firms.
4. Determine the extent of the relationship between strategic supplier partnership and the operational performance of quoted manufacturing firms.

1.4 Hypotheses

The study consists of the following hypotheses stated in null form:

Ho₁: Inventory cost has no significant relationship with the operational performance of quoted manufacturing firms.

Ho₂: Just-in-time approach has no significant relationship with the operational performance of quoted manufacturing firms.

Ho₃: Materials requirement planning has no significant relationship with the operational performance of quoted manufacturing firms.

Ho₄: Strategic supplier partnership has no significant relationship with the operational performance of quoted manufacturing firms.

1.5 Limitations and Originality

In course of the study, there were limited existing research conducted in the present study area available for review. Thus, this study adds to existing research by ascertaining the effect of inventory management on the operational performance of manufacturing firms in the south-east, Nigeria.

2. Literature Review

Inventory management and performance have attracted much attention in academic research. For instance, (Shin, Ennis, & Spurlin, 2015) examined the effect of inventory management efficiency on the profitability of

manufacturing firms in the US. The manufacturing firms in the US studied were established from the *Compustat* database using North America industry classification system (NAICS) code. 1280 manufacturing firms were sampled for a 3 years interval from 2005-2008 in what made up the first of the two datasets used for this study, while 959 firms were sampled in an 8 years interval from 2005-2012 in what made up the second dataset. The study used a profit margin as evaluation metrics to measure firms' profitability while inventory selection ratio was used as evaluation metrics for inventory management efficiency. Evaluation of profitability and inventory management efficiency was done in two different analytical domains in this study. In the first domain, the dataset was classified based on the size of the firm into three groups while in the second domain, the dataset used was classified based on firms' level of assets. Result of the study shows that a positive relationship between profitability and inventory management exists, with a higher significant impact of inventory efficiency on profitability based on the firm size as compared to the impact of inventory efficiency on profitability based on assets size.

In (Naliaka & Namusonge, 2015), the role of inventory management on the competitive advantage of Unga group limited, Kenya, was investigated. To do justice to this, the effect of inventory lead time, inventory control/practices on the competitive advantage of the quoted manufacturing was determined. Furthermore, the extent of adoption of information technology in inventory management of Unga limited was assessed. Based on stratified and simple random sampling technique, 30 respondents issued a questionnaire instrument for the study were selected from all 289 employees of the quoted manufacturing firm. A statistical package for analysis (SPSS) based descriptive statistics were used to analyze the collected data. From the study, it could be deduced that the competitive advantage of manufacturing firms in Kenya is dependent on information technology, inventory control systems/practices and inventory lead time.

The study by (Munyao, Omulo, Mwithiga, & Chepkulei, 2015) was most specifically objective in finding out the inventory management techniques used by textile, rolling mills and food beverage manufacturing firms in Mombasa county, Kenya. A sample size of 45 manufacturing firms from 150 was adopted based on the stratified random sampling technique. Copies of the questionnaire were used as the major instrument for data collection. Result of the study showed that action level methods, just-in-time, periodic review technique, material requirement planning 1 and economic order quantity are the most frequently adopted inventory management technique with action level being the most adopted method notwithstanding the efficiency of material requirement planning 1 in production performance.

(Mukopi & Iravo, 2015) examined effect of four inventory management components; lean inventory system, strategic supplier partnerships, information technology in inventory management, and legal policies on the performance of the procurement function of sugar manufacturing companies in the Western Kenya Sugar Belt. This examination was carried out through copies of a questionnaire issued to 30 procurement personnel selected from 100 personnel of the four quoted sugar manufacturing companies in Kenya. In this study, the four inventory management components were employed as the independent variables while the performance of the procurement function was employed as the dependent variable. Result of the study based on descriptive statistics and regression analysis showed a very significant relationship between the independent variables and the effect of inventory management on the performance of the procurement function of sugar manufacturing companies in the western sugar belt.

(Otundo & Bichanga, 2015) in their study sought to objectively evaluate the effects of different inventory management practices; forecasting practices, inventory categorization practices and vendor managed inventory on the operational performance of Kisii County Government, Kenya. A sample of 38 respondents was selected for the study. Descriptive statistics were employed in analyzing the data. The study established that the effect of forecasting practice on operational performance is dependent on the level of supply and supply request of the various units responsible for quality services to customers. The study also revealed that the positive effect of forecasting practice on operational performance would be very much enabled by efficient inventory policies. Furthermore, it was noted that the quality of services to customers is the most effective of inventory categorization on operational performance.

(Oballah, Waiganjo, & Wachiuri, 2015) investigated the effect of four variables of inventory management practices; inventory shrinkage, inventory investment, inventory turnover, and inventory records accuracy on organizational performance of Kenyatta National Hospital, Kenya. 74 respondents from the category of pharmacists; stores and supply officers; store managers, assistants and clerk; and stock controllers were issued copies of the questionnaire from which data for the study was generated. From a descriptive study design perspective adopted by the study, the study revealed a negative effect of inventory shrinkage on organizational performance and a positive effect of inventory investment and inventory records accuracy on organizational

performance of the quoted national hospital.

Studies on the inventory management and performance relationship of firms have produced mixed results. In (Panigrahi, 2013), a significant negative linear relationship between inventory conversion period and profitability was obtained. (Folinas & Shen, 2014) found no link between inventory turnover and financial performance. (Onchoke & Wanyoike, 2016) found a significant positive influence of internal inventory security procedural practices, inventory auditing and computerized inventory control, on procurement performance. In (Lwiki et al., 2013), the study result revealed that there a positive correlation between inventory management and return on sales exists. These varying results show the different relationships that exist between inventory management and performance of different firms. Thus, this study is based on the reality of inventory management and performance of firms, which contribute greatly to the growth of Nigeria's economy. In today's competitive market place where companies face a dilemma of whether to hold or not to hold inventory due to; perceived high inventory cost, excess materials and products and incompetent information technology infrastructure, it is important to look at the affinity between inventory management and operational performance of manufacturing firms so as to come up with policy frameworks that would enhance implementation of balanced inventory management practices for greater productivity.

3. Study Methods

3.1 Population and Sample

The survey research design was employed in this study. The study location is South-east region of Nigeria. Four quoted manufacturing firms; Nigeria Breweries Plc. Enugu, PZ Cusson, Aba, Seven-up Bottling Company, Aba and Cutix Cable Industry, Nnewi was studied. The target population of the study consisted of staff from human resource, procurement, marketing, production and finance departments of the companies. A sample size of 538 was mathematically determined from 5223 target population using Godden's (2004) formula. Simple random sampling technique was employed to select the staff from the various departments for the study. The reason for using simple random sampling technique was to give every individual equal opportunity of being selected for the study.

The study used copies of a structured questionnaire to elicit information from the sampled respondents. The copies of the questionnaire contained questions that utilize the 5-points Likert rating scale (Strongly agree, agree, undecided, strongly disagreed and disagreed).

A total of five hundred and thirty-eight copies (538) of questionnaires were distributed to the respondents, out of which three hundred and seventy-one were properly filled and found relevant to the study. Descriptive statistics, correlation analysis and multiple regression analysis were employed in analyzing the data.

Table 1. Characteristics of the study sample

	Frequency	Percentage
GENDER		
Male	224	60.4
Female	147	39.6
Total	371	100.0
AGE		
18-30 years	178	48.0
31-40 years	94	25.3
41-50 years	63	17.0
51years and above	36	9.7
Total	371	100.0
MARITAL STATUS		
Married	176	47.4
Single	290	44.5
Separated/divorced	30	8.1
Total	371	100.0
EDUCATIONAL QUALIFICATION		
O'LEVEL	160	43.1
OND/NCE	154	41.5
B.Sc./HND	41	11.1
M.Sc./MBA	6	1.6
PhD/Others	10	2.7
Total	371	100.0

3.2 Sources of Data Collection

Data for the survey conducted was sourced from primary sources. Primary data was obtained from the study sample of selected staff of the quoted manufacturing firms in the south-east region of Nigeria, using questionnaire

3.3 Measure of Variables of the Study

The study variables consist of one dependent variable and four independent variables:

(1) Independent variables:

The independent variables are components of inventory management, which include: Inventory Cost, Just-in-Time Approach (JITA), Material Requirement Planning (MRP) and Strategic Supply Partnership (SSP).

(2) Dependent variable: operational performance of manufacturing firms (OPMF)

Relationship between inventory management and operational performance of manufacturing firms was evaluated using multiple regression analysis. The regression model used is represented as;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_n X_n + \epsilon \quad (1)$$

Where:

Y = Operational performance of manufacturing firms (OPMF)

α = Constant Term

β = Beta coefficients

X_1 = Inventory Cost

X_2 = Just-in-Time Approach (JITA)

X_3 = Material Requirement Planning (MRP)

X_4 = Strategic Supply Partnership (SSP).

ϵ = Error Term

3.4 Statistical Methods

The researchers used the SPSS program to analyze the study data collected from the questionnaire to test hypotheses and achieve the objectives of the study. It gave means, standard deviations and correlations of each independent and dependent variable. The statistical methods include frequencies, the mean, standard deviations and simple regression.

3.5 Reliability of the Instrument

The questionnaire was pre-tested through a pilot study to ascertain their effectiveness in getting the information needed. The research instruments were test-retested on a sample of ten respondents drawn from other manufacturing firms not used in the study. Cronbach-Alpha test was used to verify the stability and internal consistency in the questions in the questionnaire. The result of the alpha coefficient value was 0.751, which shows that there is a high degree of consistency for all questions.

4. The Results

SPSS and EXCEL were used to analyze the study data and to identify the descriptive characteristics of the dependent and independent study variables and the results of the hypothesis test. Table (2) presents the descriptive statistics of the variables of the study. Each hypothesis and descriptive statistics of their variables are shown in table 2 and table 3:

4.1 Statistics of the Variables of the Study

Table 2. Descriptive statistics of the variables of the study

	N	Min	Max	Mean	Std. dev.
Inventory cost	371	9	30	21.20	4.301
JITA	371	11	30	20.22	4.086
MRP	371	10	30	20.14	4.275
SSP	371	8	29	19.26	4.002
OP	371	11	30	22.54	3.208
Valid N	371				

Table 2 provides information about the mean and standard deviation of the variables used in the study. Low values of standard deviation for each of the variables indicate a consensus on statements associated with each of

the variables.

4.2 Hypotheses Testing and Result in Discussion

Table 3. Regression analysis of study hypotheses

Hypotheses	T	T.Sig.	Result of Ho	Result of H1
HO1	2.614	.040	rejected	accepted
HO2	2.191	.005	rejected	accepted
HO3	2.484	.013	rejected	accepted
HO4	2.288	.023	rejected	accepted

HO1: Inventory cost has no significant relationship with the operational performance of quoted manufacturing firms.

The operational performance of firms was measured using the MRA method, where the relationship between inventory cost and OPMF was measured by questions 1 to 5 in the questionnaire. Table 3 shows the result of the relationship between inventory cost and OP, where the value of P-value sig. = 0.040, which is less than the significant level $\alpha = 0.05$, thus rejecting the null hypothesis and accepting the alternative hypothesis, that is, Inventory cost has a significant relationship with the operational performance of quoted manufacturing firms.

HO2: Just-in-time approach has no significant relationship with the operational performance of quoted manufacturing firms. The operational performance of firms was measured using the MRA method, where the relationship between JITA and OP was measured by questions 6 to 10 in the questionnaire. Table 3 shows the result of the relationship between JITA and OP, where the value of P-value sig. = 0.005, which is less than the significant level $\alpha = 0.05$, thus rejecting the null hypothesis and accepting the alternative hypothesis, that is, Just-in-time approach has a significant relationship with the operational performance of quoted manufacturing firms.

HO3: Materials requirement planning has no significant relationship with the operational performance of quoted manufacturing firms. The operational performance of firms was measured using the MRA method, where the relationship between MRP and OP was measured by questions 11 to 15 in the questionnaire. Table 3 shows the result of the relationship between MRP and OP, where the value of P-value sig. = 0.013, which is less than the significant level $\alpha = 0.05$, thus rejecting the null hypothesis and accepting the alternative hypothesis, that is, Materials requirement planning has no significant relationship with the operational performance of quoted manufacturing firms.

HO4: Strategic supplier partnership has no significant relationship with the operational performance of quoted manufacturing firms. The operational performance of firms was measured using the MRA method, where the relationship between SSP and OP was measured by questions 16 to 20 in the questionnaire. Table 3 shows the result of the relationship between SSP and OP, where the value of P-value sig. = 0.023, which is less than the significant level $\alpha = 0.05$, thus rejecting the null hypothesis and accepting the alternative hypothesis, that is, Strategic supplier partnership has no significant relationship with the operational performance of quoted manufacturing firms.

5. Conclusions and Recommendations

5.1 Conclusions

This work examined inventory management and operational performance of quoted manufacturing firms in South-East Nigeria. Data were sourced from the employees and management of four quoted manufacturing companies. The data generated were analyzed and the following was discovered. The study found that inventory cost, just in time approach, materials requirement planning, and strategic supplier partnership have a significant relationship with operational performance. The study, therefore, concludes that inventory management has a significant positive relationship with the operational performance of the sampled quoted companies in South East Nigeria.

5.2 Recommendations

The study recommends that manufacturing firms in Nigeria should adopt inventory management practices such as strategic supplier partnership, just-in-time approach, materials requirement planning and inventory cost control as they were found to have a significant effect on operational performance. Also, manufacturing firms should adopt long-term relationships with suppliers and customers. This can be done by strategic supplier/customer partnership to improve the overall operational performance of the firm.

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