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Influence of Inventory Management on Performance of Coca-Cola Bottling Company, Ibadan Plant, Nigeria

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Abstract:

Some captains of industries are of the opinion that inventory management is just a routine function in an organization. Arising from this backdrop, this study aims at beaming its searchlight to inventory management as it affects the performance of Coca-Cola Bottling Company, Ibadan plant, Nigeria. A total of eighty-three respondent constitute the sample for the study. Four research questions and four hypotheses were generated and tested at 5% (that is 0.05) significant level using descriptive statistics and non-parametric test (chi-square that is, χ^2). The result of the analysis showed that flexibility in inventory control management is an important approach to achieving organizational performance. It was found that organizations benefit from inventory control management by way of easy storage and retrieval of material, improved sales effectiveness and reduced operational cost. The study also found that there is a relationship between operational feasibility, utility of inventory control management in the customer related issues of the organization and cost effectiveness technique are implemented to enhance the return on investment in the organization. Effective inventory control management is recognized as one of the areas management of any organization should acquire capability. It is recommended that organizations should adopt the inventory keeping method that best suit their operations.

Keywords: Inventory management, performance, lead-time, vendor managed inventory, economic order quantity

1. Introduction

Inventory or materials are needed by all manufacturing organizations big or small. But inventories tend to become big without proper management. Inventories serve some social purpose in industries which stems from some economic motives. (Datta, 2010). Inventory management is a serious management issue for manufacturing companies. Inventories are vital to the successful functioning of manufacturing organizations.

Buffa and Sarin (2007), posits that there are several reasons for keeping inventory. Holding too much stock could result in capital tied down, increase in carrying cost, deterioration of materials obsolescence and theft. On the other hand, shortage of materials can lead to production delay or stoppage; poor customer services as well as underutilization of man, machines and equipment. Inventories can be categorized into: raw materials, work-in-progress, spare parts, consumable, and finished goods. It may not be necessary for a company to have all these inventory classes. But whatever inventory the organization carries, a substantial share of an organization's funds is invested in them. Different departments within the same organization adopt different attitude towards inventory for examples, the sales department might desire large stock in reserve to meet virtually every demand that comes. The production department similarly would ask for stocks of materials so that the department runs uninterrupted. Inventory often represents as much as 75% of total capital of industrial organizations (Moore, Lee and Taylor, 2003:321). It may represent 33% of company assets and as much as 90% of working capital, (Sawaya Jr. and Giauque, 2006:121). Since inventory constitutes a major segment of total investment, therefore it is important that effective inventory management be practiced to ensure organizational growth and profitability. Inventory management is pivotal in effective and efficient organization. It is also vital in the management 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 service. The principal goal of inventory management involves having to balance the conflicting economics of not wanting to hold too much stock. Thereby having to tie up capital so as to guide against the incurring of costs such as

storage, spoilage, pilferage and obsolescence and, the desire to make items or goods available when and where required (quality and quantity wise) so as to avert the cost of not meeting such requirement.

Essentially, inventories exist for many purposes, including:

- To provide and maintain good customer service
- To smooth the flow of goods through the productive process
- To provide protection against the uncertainties of supply and demand and
- To obtain a reasonable utilization of people and equipment. Leenders et al (2006)

1.1. Statement of the Problem

Inventories are vital part of current assets mainly in every organization, huge funds are committed to inventories as to ensure smooth flows of production and to meet customers demand. However, maintaining/managing inventories also involves holding or carrying cost along with opportunity cost. Inventory management and control therefore play a crucial role in balancing the benefits and disadvantages associated with holding inventories. Moreover, several authors have worked on inventory control, but much has not been done on how effective inventory management can enhance performance.

1.2. Objectives of the Study

The aim of this paper is to investigate the impact of inventory management on performance of Coca-Cola Bottling Company, Ibadan plant, Nigeria.

The specific objectives of the study are as follows:

- To determine the effect of inventory management on organizational productivity
- To evaluate the nature of correlation between effective inventory management and organizational performance.

1.3. Research Questions

The following questions will guide the study:

- What has been the impact of inventory management on organizational productivity?
- What is the correlation between inventory management and organizational performance?
- What is the nature of relationship between inventory management and organization effectiveness?
- To what extent does inventory management help in service delivery?

1.4. Research Hypotheses

The following hypotheses were formulated for the study;

- H_0 : There is no significant effect of inventory management on organizational performance
- H_1 : There is significant effect of inventory management on organizational performance
- H_0 : There is no positive correlation between effective inventory management and organizational profitability
- H_1 : There is positive correlation between effective inventory management and organizational profitability
- H_0 : There is no significant relationship between effective inventory management and organizational effectiveness
- H_1 : There is significant relationship between effective inventory management and organizational effectiveness.
- H_0 : Inventory management does not help in service delivery
- H_1 : Inventory management help in service delivery

2. Literature Review

2.1. Economic Order Quantity

Economic Order Quantity is the measurement used in the field of Operations, Logistics, and Supply Management (Camp 1992), . In essence, EOQ is a tool used to determine the volume and frequency of orders required to satisfy a given level of demand while minimizing the cost per order.

The Economic Order Quantity is a set point designed to help companies minimize the cost of ordering and holding inventory. The cost of ordering an inventory falls with the increase in ordering volume due to purchasing on economies of scale. However, as the size of inventory grows, the cost of holding the inventory rises. EOQ is the exact point that minimizes both these inversely related costs. The Economic Order Quantity (EOQ) is the number of units that a company should add to inventory with each order to minimize the total costs of inventory—such as holding costs, order costs, and shortage costs (Tsan-Ming 2014). The EOQ provides a model for calculating the appropriate reorder point and the optimal reorder quantity to ensure the instantaneous replenishment of inventory with no shortages. It can be a valuable tool for small business owners who need to make decisions about how much inventory to keep on hand, how many items to order each time, and how often to reorder to incur the lowest possible costs.

Since the model assumes instantaneous replenishment, there are no inventory shortages or associated costs. Therefore, the cost of inventory under the EOQ model involves a tradeoff between inventory holding costs (the cost of storage, as well as the cost of tying up capital in inventory rather than investing it or using it for other purposes) and order costs (any fees associated with placing orders, such as delivery charges). Ordering a large amount at one time will increase a small business's holding costs, while making more frequent orders of fewer items will reduce holding costs but increase order costs (Perera; Sandan; Janakiraman; Ganesh; Niu & Shun-Chen, 2017).

2.2. Vendor Managed Inventory (VMI)

In a VMI partnership, the supplier, usually the manufacturer but sometimes a reseller or distributor, makes the main inventory replenishment decisions for the consuming organization. This means that the vendor monitors the buyer's inventory levels (physically or via electronic messaging) and makes periodic resupply decisions regarding order quantities, shipping, and timing. Transactions customarily initiated by the buyer (such as purchase orders) are initiated by the supplier. Indeed, the purchase order acknowledgement from the vendor may be the first indication that a transaction is taking place: an advance shipping notice informs the buyer of materials in transit (Matt, Johnson & Tom 2013).

The arrangement transfers the burden of asset management from the consuming organization to the vendor, who may be obliged to meet a specific customer service goal (usually some kind of stock target).

2.3. Concept of Inventory Management

Inventory is the stock of any item or resource used in an organization. An inventory management is referred to as set of controls that monitors levels of inventory and determines what levels should be maintained, when stock should be replenished, and how large orders should be, (Chase and Aquilano, 1995:546). On the other hand, management is an act of organizational design. The basic function of management is to identify for a focal business organization area of crucial contingencies and constraints so that the business organization can make structural responses to include these constraints and contingencies within its boundary. (Onwuchekwa, 1993: 193).

Inventory management therefore has been defined in many ways by many authors. As expected, these authors defined inventory management based on their perception of the subject matter. Nwandu, (2006:171) defines inventory management as a form of administration control that is particularly essential in all manufacturing, wholesale and retail organizations. The essence of inventory according to Nwandu is, 'to have the right goods quality and quantity, at the right place and time', the essence of inventory management for a contemporary organization. Orga (2006:66), defines inventory control as a process of ensuring that the right quality of the relevant stock is available at the right time and in the right place. Nweze (2004:423), on his own part defines, inventory control as the means of ensuring that actual flow of inventory in an organization conforms to plan. Ghosh and Kumar (2007) defined inventory management as a stock of goods that is maintained by a business in anticipation of some future demand. The definition is corroborated by Brag (2005) who stresses that inventory management has an impact on all business functions, particularly operations, marketing, accounting and finance. From the foregoing therefore, one infers that inventory management is the act of ensuring that balanced items of stock are maintained at the right quantity, quality place and time in an organization, to ensure organizational business continuum.

2.4. Inventory Ordering System

The cardinal objective of inventory management is the maintenance of an optimum level of inventory necessary to support the production at any time and at the least cost possible. The attainment of this objective entails taking decisions with respect to the determination of an appropriate order quantity, when to place the order and how much inventory to carry per unit of time. These various decision variables will, at any time, dictate the behavior of any inventory system. Inventory ordering systems reflect part of the strategies available to an organization in meeting its inventory management objectives (Temeng et al 2010). Basically, there are three major inventory ordering systems, the fixed- order quantity system, the fixed-order interval system and the ABC inventory analysis system. The purpose of the ABC inventory classification is to be able to assess the status of every item kept in inventory in addition to determining what specific attention is required by each group of inventories (Banjoko, 2004:198).

2.5. Inventory Management Techniques

Lawal (2006: 26), stresses that stock levels refer to certain points or positions (in the consumption pattern) of the materials held in store at which some strategic decisions or steps has to be taken in order to forestall stock out situation or to prevent stock redundancy emanating from overstocking. The most common points of strategic decisions in inventory management are; maximum level; minimum level; and re-order level.

2.6. Lead Time Influences on Inventories

There is a direct relationship between lead time and inventories. During the lead time there will be no delivery of materials by the suppliers and the consuming departments will have to be served from the inventories held. Both lead time and consumption rate could increase without notice and the inventories held. Both lead time and consumption rate could increase without notice and the inventories need to be capable of meeting this contingency (Sexena, 2003). Inventories have to be stocked to take care of normal consumption during both average lead time and abnormal lead time. Therefore, as the lead time increases, the inventories have to be increased correspondingly.

The various types of lead time that influence inventory decisions are:

- Administrative lead time
- Manufacturing lead time
- Transporting lead time
- Inspection lead time
- *Administrative lead time* arises on account of the activities like identification of needs and follow-up of orders. In the identification stage the planning section as to compute the requirements of various materials over a time horizon. The actual computing time may be only around half an hour, but the planning department may take two

to three weeks to raise an indent. This much time taken maybe due to waiting time for discussions, meetings, approvals and signature, especially so in the case of new materials (Ramappa 2003). The average time required in the industrial undertakings to convert intent to an order is about two and half months for new items. First of all, the source has to be located and then the terms and conditions of supply have to be negotiated. Once the negotiations are complete, the order can be placed. For imported items, formalities such as FE clearance, import license and raising a letter of credit need also be undertaken, thus, leading to an increase in the lead time.

- *The manufacturing lead time* depends entirely on the supplier. Once the order is placed, the purchase has to wait till the supplier delivers the goods.
- *The transporting lead time* depends on the mode of transport. The time-consuming formalities such as insurance, sales tax forms and retiring of documents are involved in it. Customs formalities add to the lead time requirements for imported items as the transshipment is made at the port itself.
- *Inspection lead time* arises on account of the non-availability of the standard to compare the quality of the received item. In the case of special equipment, the indenter may depute its own inspection personnel, which naturally increases the lead time. A pertinent factor which has to be taken note of is that, if an item is rejected during inspection, the lead time will be increased by the time taken to supply the replacement.
- Of the various components of lead time, the procurement or manufacturing lead time is the toughest nut to crack. This should be taken care of while negotiating the order and supply details. The administrative and inspection lead time are under the control of the purchaser. The transportation lead time can be reduced by a cost trade off but not below the threshold (Sandilya & Gopalakrishnan 2002).

3. Methodology

The researcher made use of survey design. In carrying out this study, the researcher used two sources of data collection methods, i.e. primary and secondary data. Primary data was collected through structured questionnaire and interview from the sample of a study of Coca-Cola plant, Ibadan. Secondary data was obtained through books, journals and internet. This study employed judgmental sampling, and the purchasing, production, quality control and warehouse/store departments were selected as they deal directly with materials. A total of eighty-three respondent constitute the sample for the study. Four research questions and four hypotheses were generated and tested at 5% (that is 0.05) significant level using descriptive statistics and non-parametric test (chi-square that is, χ^2).

The research questions were analyzed using simple percentage, while the hypothesis of the study was tested using Chi-square test statistic:

$$\chi^2_c = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where:

f_o = Observed Frequency,

f_e = Expected Frequency and

χ^2_c = Chi-square test.

χ^2_c = Chi-Square calculated and χ^2_t = Chi-Square tabulated.

Here, Null hypothesis is accepted where $\chi^2_c < \chi^2_t$ and rejected where $\chi^2_c > \chi^2_t$

4. Data Analysis and Discussion

As stated under methodology, a total of eighty-three (83) copies of questionnaires were distributed, out of which sixty (60) copies retrieved as correctly filled. The data obtained from the field were hereby presented and analyzed with descriptive statistics to provide answers for the research questions while the corresponding hypotheses were also tested.

4.1. Answering the Research Questions

S/No	Variables	SA	A	D	SD
1.	The significant relationship between inventory management and organization effectiveness	21 35%	18 30%	11 18%	10 17%
2.	The positive effect of inventory management on organization productivity	24 40%	15 25%	14 23%	7 12%
3.	The positive correlation between inventory management and organizational performance	23 38%	20 33%	9 15%	8 14%
4.	The positive effect of inventory management on customer service delivery	26 43%	13 22%	8 13%	13 22%

Table 1

Source: Field Survey (2020)

Key: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

Result in table 1. Question 1 shows that 21 (35%) of the respondents indicated strongly agree, 18 (30%) indicated agree, 11(18%) indicated disagree while 10(17%) indicated strongly disagree. This implies that there is a significant relationship between inventory management and organization effectiveness. Result in table 1. Question 2 shows that 24(40%) of respondents indicated strongly agree, 15(25%) indicated agree, 14(23%) indicated disagree while 7(12%)

indicated strongly disagree. This implies that there is positive effect of inventory management on organization productivity.

Result in table 1. Question 3 shows that 23(38%) of the respondents indicated strongly agree, 20(33%) indicated agree, 9(15%) indicated disagree while 8(14%) indicated strongly disagree. This implies that there is positive correlation between inventory management and organizational performance. Result in table 1. Question 4 shows that 26(43%) of the respondents indicated strongly agree, 13(22%) indicated agree, 8(13%) indicated disagree while 13(22%) indicated strongly disagree.

This implies that there is positive effect of inventory management on customer service delivery.

4.2. Test of Research Hypotheses

4.2.1. Hypothesis One

- H_0 : There is no significant effect of inventory management on organizational productivity
- H_1 : There is significant effect of inventory management on organizational productivity

Options	Observed(O)	Expected(E)	O-E	(O-E) ²	(O-E) ² E
SA	23	15	8	64	4.27
A	18	15	3	9	0.6
D	11	15	-4	16	1.07
SD	8	15	-7	49	3.27
Total	60	60			9.21

Table 2

Source: Field Survey (2020)

The calculated chi-square (X^2c) = 9.21. To get the tabulated chi-square (X^2t), the degree of freedom is obtained by $V = (R-1)(C-1)$ and with this unit statement. $V = (4-1)(1) = 3$. The value of chi-square tabulated at degree of freedom 3 with 5% level of significance is 7.815.

Since the calculated chi-square (X^2c) is greater than the tabulated chi-square (X^2t), that is 9.21 is greater than 7.815, therefore the null hypothesis is rejected, and conclude that there is significant positive effect of inventory management on organizational productivity

4.2.2. Hypothesis Two

- H_0 : There is no positive correlation between effective inventory management and organizational profitability
- H_1 : There is positive correlation between effective inventory management and organizational profitability.

Options	Observed(O)	Expected(E)	O-E	(O-E) ²	(O-E) ² E
SA	24	15	9	81	5.4
A	15	15	0	0	-
D	14	15	-1	1	0.07
SD	7	15	-8	64	4.27
Total	60	60			9.74

Table 3

Source: Field Survey (2020)

From the table above, chi-square calculated (x^2c) is 9.74. The chi-square tabulated (x^2t) is 7.815. at 5% level of significant. Since the calculated chi-square (X^2c) 9.74 is greater than the tabulated chi-square (X^2t) 7.815, therefore the null hypothesis is rejected, and conclude that there is positive correlation between effective inventory management and organizational profitability

4.2.3. Hypothesis Three

- H_0 : There is no significant relationship between effective inventory management and organizational effectiveness
- H_1 : There is significant relationship between effective inventory management and organizational effectiveness.

Options	Observed(O)	Expected(E)	O-E	(O-E) ²	(O-E) ² E
SA	23	15	8	64	4.27
A	20	15	5	25	1.67
D	9	15	-6	36	2.4
SD	8	15	-7	49	3.27
Total	60	60			11.61

Table 4

Source: Field Survey (2020)

From the table above, chi-square calculated (χ^2_c) is 11.61. The chi-square tabulated (χ^2_t) is 7.815. at 5% level of significant. Since the calculated chi-square (χ^2_c) 11.61 is greater than the tabulated chi-square (χ^2_t) 7.815, therefore the null hypothesis is rejected, and conclude that there is significant relationship between inventory management and organizational effectiveness.

4.2.4. Hypothesis Four

- H_0 : Inventory management does not help in service delivery
- H_1 : Inventory management helps in service delivery

Options	Observed(O)	Expected(E)	O-E	(O-E) ²	(O-E) ² E
SA	26	15	11	121	8.07
A	13	15	-2	4	0.27
D	8	15	-7	47	3.13
SD	13	15	-2	4	0.27
Total	60	60			11.74

Table 5

Source: Field Survey (2020)

From the table above, chi-square calculated (χ^2_c) is 11.74. The chi-square tabulated (χ^2_t) is 7.815. at 5% level of significant. Since the calculated chi-square (χ^2_c) 11.74 is greater than the tabulated chi-square (χ^2_t) 7.815, therefore the null hypothesis is rejected, and conclude that inventory management helps in service delivery.

5. Conclusion

The researchers discovered that inventory management affects the overall performance of the organization in terms of productivity and profitability, also profitability can be achieved through effective inventory management. There is also a significant positive effect of inventory management on organizational productivity; there is positive correlation between inventory management and organizational profitability; there is a significant relationship between inventory management and organizational effectiveness and that inventory management helps in service delivery.

6. Recommendations

Based on the findings, it is important to provide recommendations to the management of the organization under study:

- To successfully reduce the time, it takes to perform activities in a process i.e. reduce set up and cycle time.
- To coordinate the flow of resources to eliminate waste in the system and ensure that materials and equipment arrive on time.
- Management should monitor closely their inventory management techniques so as to maintain production consistency.
- To ensure timely delivery of raw materials to the factory and distribution of finished goods to their customers.

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