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Abstract- This study examines the effect of inventory management on organizational operations, productivity, as a means of causing the profitability of companies. The study was, therefore designed to study how the manufacturing firms managed their inventory materials. We used questionnaire in collecting our data. The data collected was analysed using spearman's rank-order correlation coefficient and the Pearson product-moment correlation coefficient. The findings indicated that the method used by 7Up Bottling Company to manage their inventories in both raw materials and the finished product was efficient as the amount of naira saved in the course of purchase have more effect on the profitability of the company during production/ selling of the finished goods. Controlled purchasing is found to be cost- effective. The study recommends the following: an adoption and application of the economic order quantity (EOQ) model to save cost and make the operations more efficient. It also recommended that the EOQ model should adopt a fixed order for continuous productivity, which will lead to effective market operations and profitability, which will make organizations' gain product a competitive advantage. The study suggested that the EOQ model, which is cost-saving and total inventory material, be persistently used in the production process, and effective management and control of inventory shall lead to efficient operations, which in turn will guarantee profitability.

Keywords: inventory management, inventory materials, operations management, organizational operations, profitability, controlled purchasing, controlled inventory, economic order quantity (EOQ) model, market operations.

I. Introduction

a) Background to the Study

In the literature of Production economics, the existence of any business outfit, demands the regular use for inventory management cannot be exaggerated as it is a means for improving the performance of manufacturing industries that will ultimately contribute positively to the growth of any economy. Production Economics according to Abomaye-Nimenibo (2019) is a process in which engaged workers combine various material inputs and immaterial inputs (plans, technical know-how, etc.) to make something out of it for consumption (the output). It is the act of creating production (an aspect of economics), i.e., goods and services which have economic value (economics) and contribute to the utility (economics) of individuals. Production Economics is concerned with the use of a combination of various inputs (including plans and executions) into finished goods and services (output). It is the act of synthesizing goods and services using combined efforts of factors of production with the view of minimizing wastages and losses in-order to bring about profit maximization and high mindfulness of business consciousness. The subject is, therefore, the study of how human beings satisfy their unlimited wants by using the limited resources they have to create or produce the goods and services demanded by individuals; or any activity that is carried out to satisfy human wants (goods and services). It is the means of converting raw materials into finished merchandise suitable for human consumption with the use of labour to create them. Taking an inventory of such materials in their original form or processed state known as inventory management is very crucial. This inventory is taken by measurement in numbers and quantities. For example, a factory may be able to produce 100 million Kia cars in a month with a minimum cost. The number of manufactured cars need to be known as well as quantity demanded within the same period, to ascertain and plan for the production of any shortfall or determine the physical stock level to avoid an unnecessary stockpiling of goods.

The term inventory came into literature in 1601, which is defined as the record taking of current assets of a business that is, the properties owned, commodities on hand, the value of all on-going and completed works still in the company's premises that is yet to be sold, which are capable of easy conversion into liquid cash within a short time. Proper inventory has accounted for continues profitability of a manufacturing firm which calls for thorough research at all times; as it plays a vital role in the management of business operations of manufacturing companies. Having an up-to-date inventory of raw materials in stock gives leverage to companies to operate independently of their suppliers, irrespective of their day-to- day operations, which are

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not dependent on deliveries from supplies since stocks of the necessary materials are maintained. Accurate inventory control has prevented the loss of billions of Naira annually, had there been the non-accountability of stocks and inaccurate checks and balances.

Inventories, according to Pandey (2004), are stocks of a product which a company manufactures for sale, and components that are of various forms in which inventory exists in a manufacturing firm known to be raw materials, work in progress, and finished goods. Inventory management is therefore, the art and science of maintaining stock levels of a given group of items incurring the least cost consistent with other relevant targets and objectives set by management (Jessop 1999).

The success or failure of any business depends on how it effectively practiced inventory management, to ensure that adequate stock of used or unused materials are in store to avoid stock-out so that production is not disrupted and distribution cycle that is crucial to the survival of all manufacturing companies e maintained, while too much stock is not piled up, so as not to tie down the scarce resources of the company. On the other hand where the resources are poorly handled for lack of proper inventory management can result into scarcity of materials in stock and lead to loss of customers and profit. Inventory management extends not only to raw and finished goods, but also to fixed and current assets, properties, work in progress, office equipment and supplies, business customers, trading partners; and overall operational supplies.

Inventories are important part of, the current asset of large companies; which are approximately 60% of the current asset of large companies. Considering the large sum of money that is committed to the stocking of raw materials, work in progress, and finished goods, it is therefore of paramount necessity that these stocks be managed efficiently and effectively to avoid jeopardizing the profit position of the firm.

Most companies set profit goals, but few set productivity goals. In a growing economy, everyone, including labour, the management or consumer, wins when productivity expands. Growth in productivity can bring immense benefits to the economy. The usefulness of inventory management is often overlooked in most of the industrial undertakings. This aspect of inventory is particularly rewarding in big outfits, being the largest co-partner in the total cost partnership of a business.

Maintenance is a means for improvement of productivity and profitability. As the equipment cost and recurring operating expenditures are generally on the higher side, the formulation of careful maintenance and replacement policy is significant for accomplishing maximum productivity and profitability. Productivity is a crucial area in business and is the primary concern of any nation. Maintenance and replacement policy help the employees to earn more money, and at the same time, helps the management to get additional capital, the shareholder to receive a higher dividend, the government to collect more tax revenue, and improving the living standard of society.

Improved productivity means cost-effectiveness. Thus productivity and cost are inversely related. A rise in productivity implies a fall in the prices of products or services, which culminates into increased profitability. Increase in productivity or productivity growth depends on several factors such as the growth of inputs available for use in a production process, the scale and level of technology used in production, the management techniques, the research and development, and the skill and attitude of the people are of prime importance. Therefore, productivity and profitability are not the same thing, although they have a close relationship. Usually, when productivity increases, the profit should also increase. However, a rise in the product price combined with a fall in factor costs may increase the profitability even if productivity has dropped at the same time. Again, a rise in factor cost coupled with a fall in output may lower profitability although there is an increase in productivity. Thus productivity results in higher profitability, but profitability is not the measure of productivity.

In inventory, there is an optimum level, and inadequate inventory causes loss of sale and disrupts the production process. Still excessive stock level leads to unnecessary carrying cost and obsolescence or spoilage risks. Horngren (2000) defines inventory management as the planning, coordinating, and controlling activities related to the flow of inventory in and out of the organization. So, the profit-making of any manufacturing firm is mostly dependent on the efficient management of its inventory which is the reason for this study by ascertaining that a better stock taking will lead to an excellent performance of a company, that is expected to yield profitable returns.

b) Statement of the Problem

The main goal of inventory management is all about balancing the economics of not wanting to hold less stock or too much stock at any point in time. Return maximization on investment calls for an appropriate inventory present a considerable proportion of a firm's working capital, which is a significant function of the firm's financial manager. However, most managers ignore the saving potential that arises from proper management of inventories, which will save costs and reduce tying down of capital instead, while trying to treat stock as a necessary evil and not as an asset that requires management. Some firms do not or ignore to control inventory holding, and this leads to understocking and causing the firm to stop or slow its operations, and production. To this end, many organizations usually fail to examine its investment in inventory; and instead focus on maximization of returns.

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In Nigeria, small and medium firms are increasingly adopting inventory management systems for competitive advantage and improving their operations and productivity. However, the main challenge today among firms in Nigeria is how to obtain their efficiency and improve effectiveness. Firms are known to have a poor inventory management technique, which has negatively affected the firm's ability to service and satisfy its customers. Most firms are in a dilemma as regards how much and when to order and reorder for inventory. The decision as regards the quantity and time of order is also a matter of concern.

The high cost of storage/holding cost of inventory is an issue that affects organizational profit in Nigeria. For lack of proper inventory, a lot of business firms do not declare profits; others operate below capacity; some in the liquidation process and others having poor productivity. There is also a delay in the replenishment of inventories. This study seeks to address these problems enumerated above, to proffer solutions that will go a long way in improving the profit performance, operations, and productivity of an organization.

c) Objective of the Study

The main objective of this study is to find out the effect of inventory management in an organisation, using seven (7up) bottling company as a case study.

The specific objectives include:

1. To observe the effect of inventory management on organizational productivity.
2. To determine the extent to which poor inventory management could affect organizations operations.
3. To assess the extent to which inventory management contributes to the profitability of an organization.

d) Research Questions

For this research study, the following research questions were our guided:

1. How does inventory management affect organizational productivity?
2. How does poor inventory management affect you organization's operations?
3. To what extent does effective inventory management contribute to the profitability of an organization?

e) Research Hypotheses

The following hypotheses were formulated in the null (H_0) form.

1. There is no significant relationship between inventory management and organizational productivity.
2. There is no significant relationship between poor inventory management and the organization's operations.
3. There is no significant relationship between effective inventory management and profitability.

f) Significance of the Study

This research work is useful and relevant to manufacturing firms and the entire society in the following ways:

1. It will help to improve inventory control and management in manufacturing companies as it will enable them to keep an adequate inventory control and ensure that they do not run out of stock or have excess of it, which endangers their liquidity.
2. It will enrich organizations and other sectors of the economy in knowing and appreciating the effects of inventory management in the enhancement of organizational efficiency, which aids increase in profitability and productivity.
3. It will reveal the methods that should be used in preventing mismanagement in companies and business outfits.

g) Scope of the Study

This research study centred on inventory management and organisational profitability covered such areas as storage, transportation procurement, inventory handling planning control, and value engineering, etc. Information was got from the depot of 7up Bottling Company Plc, Port Harcourt, Rivers State.

h) Definition of Terms

There are terms and concepts associated with inventory management, which terms and concept are explained below.

i. *Inventory* is a record of a business' current assets or merchandise, or supplies held in transit at a particular time.
ii. *Inventory Management* is the part of operation management concerned with discoursing and maintaining the optimum level of inventory investment. It is concerned with policy-making on inventing planning and inventory control.
iii. *Inventory Control* involves the regulation of quantities of materials or inventory on hand in such a way as to ensure the meeting of the current needs of the organization while avoiding excess stocking; the calculation is on the rate of withdrawals and the time necessary for replenishment.
iv. *Inventory System* is a set of policies and controls put in place to monitor levels of inventory and determines what levels of stock should be maintained, when to replenished, and how large orders should be.
v. *Reorder level* is the stock level at which further replenishment order should be made.
vi. *Profitability:* The state of yielding a financial profit or gain, it is usually measured by price to earnings ratio; and business can earn a profit.

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vii. *Reorder quantity* is the quantity of the replenishment order.

viii. *Stock out:* When an item of stock is required but is not available in-store, then there is a stock out of that item.

ix. *Safety stock*: An amount of stock over of average inventory held in a cushion against stock-out alive to usage or uncertainty of lead time.

x. *Holding/carrying Cost:* These include the cost for storage facilities, handling costs, insurance, pilferage, obsolescence, depreciation, taxes, and the opportunity cost of capital, which is high holding cost that tends to favour low inventory and frequent replenishment.

xi. *Ordering cost:* The clerical expenses incurred in preparing orders, delivery, and material handling costs that are usually represented in a fixed amount for orders placed regardless of the quality ordered.

xii. *Stock valuation:* This is the means of assigning value to items of stock of a company. It helps company management to make inventory level decisions about the type of method to be adopted, such as - last in first out (LIFO) or first in first out (FIFO).

II. Literature Review & Theoretical Framework

a) Theoretical/ Conceptual Framework

The successful functioning of a manufacturing or retailing organization is the holding of inventories as part of their business operation, which makes up the most significant part of their current assets. No firm neglects inventory management or risks its long-run profitability, and it may end up failing in its business. The Microsoft Encarta premium defined inventory as the number of goods and materials in hand. A manufacturer's inventory refers to items ready and available for sale.

Nwaorgu (2005), talk of inventory as a tangible property held to resale in the ordinary course of business, in the production for sale to be consumed, in the production of goods and services.

Morse (1997), defined inventory as a general term describing goods which are held in the storehouse and stockyards, the bulk of which is usually intended for the connection with production or operation activities and also finished products awaiting dispatch to customers.

From the above definitions, inventory is an idle stock of physical goods that contain an economic value, and are held in various forms by an organization in its custody awaiting packing, processing, transformation, users to take delivery of them, or awaiting for future sales. Any organization which is into production, trading, selling, and servicing of a product will serve as of necessity, hold stock of various physical resources to aid in its future consumption or sales. Inventory is said to be the necessary evil of such business; when such organizations hold stock for various reasons which include speculative purposes, functional purposes, and physical necessities.

i. *Theoretical background of the study*

The theories of inventory management include the following:

i. Theory of Constraints
ii. Theory of Inventory Control
iii. The Agency Theory
iv. Demand and Supply Model.

a. *Theory of Constraints*

Theory of Constraints is a management paradigm that views any system as being limited in achieving more of its goals by a trivial number of constraints. The theory adopts the common idiom of "a chain is no longer stronger than its weakest link" this means that processes, organizations, etc. are vulnerable because the weakest person or part can always damage or break them or at least adversely affect the outcome business outfit. This theory is a method of identifying the most important factors that stands in the way of achieving a goal and then systematically improving those constraints until it is no longer the limiting factor. The theory takes a scientific approach in improvement of the existing structure; which consists of multiple linked activities, one of which acts as a constraint upon the entire system which should be spotted out and improved upon.

b. *Theory of inventory control*

Large companies use a variety of inventory control theories and mathematical formulas to help them optimize the production of storage of many thousands of units and products to help them minimize cost.

c. *The agency theory*

The Agency theory is a supposition that explains the relationship between principals, and agents in the business. Agency theory is concerned with resolving problems that can exist in agency due to unaligned goals or different aversion levels to risk. The most common agency relationship in finance occurs between the shareholders (principal) and company executives (agents). The relationship between the roles of the management including staff of the organization in the company, compared to that of a principal and agent relationship, which is known as an agency relationship. Agency theory addresses problems that arise due to differences between the goals and desires of the principal and agent. In other words, agency theory makes us understand the relationships between agents and principals. Oye (2006), stated that a possible conflict could arise when ownership of a business is separated from day to day management of an organization.

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d. *Demand and supply model*

Lawal (1988) showed the economic model of demand and supply, which necessitates the quantity of inventory at hand at a particular time and price, to react to the prevailing price to bring an equilibrium position through the consensus inventory position at the market price. The Demand and Supply model means that the inventory level is determined when the demand level and the supply level equate.

ii. *Concepts of inventory management*

The determining concepts of inventory management are those of:

The Concept of

a. Just in time
b. Stock turnover
c. Stock valuation
d. Profitability

a. *The Concept of Just in Time (JIT)*

Coyle et al. (2003) defined just in time (JIT) as an inventory control system that attempts to reduce inventory level by coordinating demand and supply by the point where the desired item arrives just in time for use. Lysons & Gillingham (2003) also defined this concept in time system as an inventory control philosophy whose goal is to maintain enough material in the appropriate period and at the right place to make just the right amount of product. In other words, the just in time system suggests that inventories should be available when an organization needs them, not any earlier, nor any later.

b. *The Concept of Stock Turnover*

Stock turnover is any metric that measures the rate at which inventory is used up. It refers to the number of times a company sells its goods and then replaces the supply in a given period, such as one year. It is measured thus:

$$\frac{\text{Cost of sales}}{\text{Average stock held}}$$

c. *The Concept of Stock Valuation*

This concept refers to the process of calculating the value of goods or materials owned by a company or available for sale in a store at a particular time. It is the method of calculating the theoretical worth of companies and their stock. The real use of this concept is to predict future market prices. Stock valuation is based on fundamental aims to give an estimate of the intrinsic value of a stock based on predictions of the future cash flows and profitability of the business.

d. *The Concept of Profitability*

Profitability means the ability to make a profit from all the business activities of an organization, company, firm, or enterprise, thereby showing how efficiently the management can make a profit by using all the resources available in the market. Profitability is the aptitude of earning returns on a given investment for the use of its resources. However, the term profitability is not synonymous with the term efficiency. Profitability is the measurement of performance of a business; and is the yardstick of efficiency that propels a company to perform better in its future operations. Though profitability is a vital benchmark for ascertaining better performance, the extent of profitability cannot be said to be the final proof of how well the business entity has performed. Sometimes satisfactory profit can mark inefficiency and, conversely an absence of yield. The net profit figure simply reveals an acceptable balance between the values received and given out. The change in operational efficiency is merely one of the factors on which the profitability of an enterprise largely depends. More so, there are other factors, which affect the profitability of a firm.

b) Overview of Seven-up Bottling Company (SBC)

Seven-up Bottling Company Plc was founded by a Lebanese on October 1st, 1960, to produce carbonated soft drinks from its set-up plant locations, the first located being at Ijora, Lagos. On the 1st day of production, the company sold a total of 24 crates of its product that is 576 bottles. Although the number didn't win the company any award, it certainly was a significant accomplishment of the company on its first day of business sales.

In creating a favourable conducive climate for her charming operations, the company went into a community relationship. Seven-up bottling company (SBC) plc was the first to introduce wreathing in Nigeria by sponsoring the late and great Mike Bamidele who won a little SBC, plc; and was also involved in the first Miss Nigeria beauty competition, which made the company continue to grow in size and importance over the years. The company still sponsors many sporting and distinctive activities, amongst which are the Pepsi football competitions, Pepsi football league, and Seven-up premier basketball, Mirinda school program, having a special business unit as Pepsi and Miranda.

The company was one of those companies quoted on the Nigerian Stock Exchange (NSE) and went public in 1984. The utmost period of growth for SBC plc began in the early '80s with the Ibadan plant set up in 1980, Ikeja plant in 1981, the Kano plant in 1985, the Aba plant in 1989, the acquisition of John Holt soft drinks with the Kaduna plant in 1989, Benin plant in 1992 and Enugu plant in 2002, with other plants and depots. Seven-up Bottling Company has not less than 37 depots and having dealers in all parts of the country. The present range of products includes seven-up (7up), Pepsi, Mirinda orange, and the latest of its range of products is Mirinda fruit, which was launched in 2002 and then mountain dew in 2008.

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c) Corporate Organizational Structure

An organizational structure refers to the working mechanisms of allocating tasks to various units, coordination and supervising them with the view of achieving organizational goals. An organization can be structured in according to its objectives, which determines the mode in which it operates.

The organizational structure expresses the allocation of responsibilities to different functions and processes and also to different entities such as branch, department, workgroup, and individuals. The organizational structure affects organizational profitability in two (2) ways:

The first a company does is to set up standard operating procedures with routine rest, and also determine decision-making processes, and thus to what extent their view enhances the organizational profitability.

Inventory management requires constant and careful evaluation of external and internal factors and control mechanisms through thorough planning and review. Most organizations have a separate department or job function called inventory planners who continuously monitor, control, and review the inventory and interface with production, procurement, and finance departments. In any organization of any size or complexity, employees' responsibility is defined by what they do, whom they report to, and for managers who report to them, which functionalities are shown in figure 2.1, and 2.2 respectively. Responsibilities are assigned to positions in the organization rather than to specific individuals, and the relationships amongst these positions are depicted in the organizational chart as in figure 2.1and 2.2. A well-articulated organizational structure depends on factors, including the type of work performed, its size of the labour force, the revenue generated, the geographical dispersion of its facilities, and the range of its businesses. All organizational structures are designed, and developed to enable the organization to accomplish its work. The structure of every organization evolves as the organization grows and changes over time.

There are four elementary decisions that managers have to take as they developed an organizational structure. First, works were divided into specific jobs such as the Personnel Manager, Inventory Manager, Marketing Manager, etc. as seen in figures 2.1 and 2.2, being referred to as division of labour. Secondly, the jobs grouped, which is called departmentalization. Thirdly, the number of people and tasks were congregated into related trades with certain number of people to be managed by one person or the span of control i.e., the number of employees reporting to a single manager. Fourthly, the level of authority and decision making authority is determined and defined. In making each of these design decisions, a range of choices is possible as to why, how, and when to make them functional.

For example, the accounting department takes care of all accounting matters under the Accounts Manager; all engineers are ceded to the Engineering Department under the Engineering Service Manager. The size of the grouping may not matter on the number of people to be managed or supervised. The degree to which authority is distributed in the organization also varies. Any structure besides the formal one to take its own designed decision is called unstructured, informal, or organic. The number of levels of authority depends largely on the size of the organization, and the jobs in the corporate organizational structure are usually grouped into departments by functions such as Accounting, Sales, Human Resources, Marketing, and Finance, etc. as shown on Figures 2.1 and 2.2.

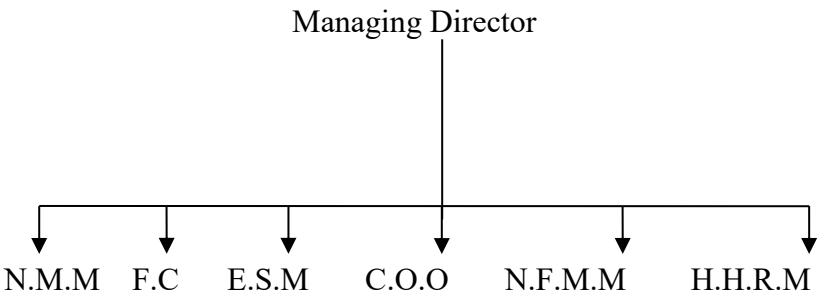


Fig 2.1: Corporate organizational structure

Keys
N.M.M: National Marketing Manager
F.C: Financial Controller
E.S.M: Engineering Service Manager
C.O.O: Chief Operating Officer
N.F.M.M: National Fleet Maintenance Manager
H.H.R.M: Head Human Resource Manager

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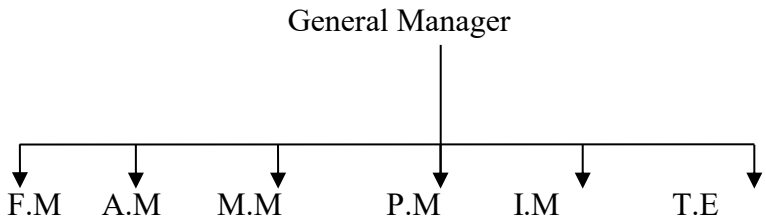


Fig 2.2: Corporate organizational structure

Keys
F.M: Factory Manager
A.M: Accounts Manager
M.M: Marketing Manager
P.M: Personnel Manager
I.M: Inventory Manager
T.E: Transport Engineer

d) Types of inventory/classification of inventory/ inventory levels

Vohra (2008) classified inventories according to the purpose of the organization. He stated that inventories might be maintained for a variety of purposes, and there are five types of inventories that an organization can use for serving these purposes and they include:

i. *Movement Inventories*

Movement Inventories is also called transit inventories. It is because transportation time is involved in transferring a substantial amount of resources; for example, when goods are on transit, they cannot provide any service to the customers.

ii. *Buffer Inventories*

Buffer inventory are stock of basic commodity which were stored under a government directive as when there were excess supplies, and the price of the product was low, which were to be used when supplies fall short; so as to meet up production at periods of high demand and supply. An organization knows its average stock and may deliberately exceed it so as to hold over the average or expected demand. The lead time may be known, but at times unpredictable events could cause the lead times, to vary.

iii. *Anticipation Inventories*

Anticipation inventories are kept for future demand when a company may embarks on the production of other items specially ordered. For example umbrellas and raincoat were store in anticipation of future demand before the rainy season sets in and is kept in store in readiness for the actual demand period.

iv. *Decoupling Inventories*

Decoupling inventory refers to the stock taking of all materials and products in- between the various machines that are being processed in them at the time of disengaging the different parts of the production system. Different machinery and people work at different times to avoid disruption of production.

v. *Cycle Inventories*

Cycle inventories refer to excess purchases in lots of large numbers, rather than the exact quantity demanded at a time. If all purchases are made on exact number demanded, there would be no cycle inventories, and yet shortage in supply will be experienced. Also buying in lots makes the unit cost cheaper than buying in units.

e) Classification of Inventories

According to Lucey (2004), inventories are classified in manufacturing companies as follows:-

i. *Raw materials*

The raw material is an unprocessed natural product used in manufacturing processes to produce a finished good that is in demand to satisfy a human want. Raw materials are those goods that have been procured, and stored for future productions of merchandises and services. They are materials which have not yet been committed to the production of finished goods and services.

ii. *Work in progress*

Work in progress refers to materials that have been committed to production, but the finished goods have not yet been created. In other words, work–in–progress inventories are semi-manufactured products.

iii. *Finished goods*

These are the goods produced out of the raw materials after the production process is complete. They can be said to be the final products of the production process ready for sale.

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f) Inventory Levels

i. *Re-order level*

The re-order level is that level of an item that demands replenishment. It also means the reserve level or quantity that reaches the level of new order for replenishment. Pandey stated that the re-order level is that level at which a fresh order should be placed to replenish the inventory. He further stated that some of the points that should be taken into consideration before the determination of re-ordering include lead time, the economic quantity, and the average time. Lead time is the time taken in receiving the delivery of the materials after the order has been placed.

ii. *Maximum stock level*

The maximum stock level is the available storage capacity in terms of cost, the supply of capital, risk of deterioration and obsolescence, and economical purchasing quantities.

iii. *Minimum stock level*

The minimum stock level or Buffer Stock is the actual materials held that are not below the quantity or number at all times so that production is never disrupted for want of stock. The minimum stock level is a precaution mark set to replenish a stock to avoid delays in delivery of new consignments ordered and so certain quantities are kept for delay replenishment which period depends on the rate of consumption during an emergency period. The minimum stock level is the lowest quantity to which a particular product should not be allowed to drop if deliveries are to be maintained (Josph Baggot, 2001). The determinant factor for minimum stock level is - length of time required for the delivery on the part of the suppliers, and for avoidance of late delivery or abnormal usage. Since demand for goods and services varies, and the actual time of delivery of purchased items may can be accurately ascertained, and sudden upsurge in demand of a commodity, there is the need to set aside certain amount or quantity of materials in store, and also to avoid total stock-out, which will be very costly to the firm; then the firm or company must have safety stock to guard against stock-out.

iv. *Optimum stock level*

The optimal stock level is the average level of stock where neither too much or too small quantity of inventory is maintained. The nature and volume of the company's operation determines the optimum stock gauge.

g) Stocktaking Methods

Stocktaking is very necessary for an efficient day to day operation in business organizations to minimize errors that may occur in the course of purchasing and supplying goods. There are two major approaches, they are:

i. *Perpetual stocktaking*

Perpetual stocktaking means nonstop but continued checking of the inventory of stock to keep constant balance of the store records after each receipt and issue of material. It also means the regular taking of account of materials, and comparing with the actual amount or quantity on hand with the stock records to avoid waste, identify shortfall due to wear and tear, or spoilage or pilfering or errors of omission or commission.

ii. *Periodic stocktaking*

Periodic stocktaking is carried out when the store is closed for business, say at the end of the month to take inventory of stock received, and issued out within a particular period; where every item is counted, marked, and valued by a team of stock takers who might be internal or external auditors.

h) Reasons for Inventory Management

There are many reasons why organizations maintain an inventory of stocks. The fundamental reasons for doing so is that it is either physically impossible or economically unsound to manufacture goods and services whenever they are demanded, thereby forcing customers to wait until the goods they ordered for are manufactured. In such a situation, a company will lose all her customers. There are some other reasons for keeping an inventory; they are; the fluctuating nature of the price of raw materials that may make an organization stock up raw materials when their prices are low, and also buy in large quantities and keep, to last through the high price seasons.

Morgan (1960), gave reasons for keeping inventory:

i. To give customers assurance of availability.
ii. To handle production variations.
iii. To provide customer service at all times and in all seasons.
iv. To await shipment to fill unexpected orders.
v. To allow for batch production.
vi. To provide raw materials storage.
vii. To keep storage equipment operational.
viii. To protect against strike and work stoppages.
ix. To be ready when unforeseen circumstances occur.

Pandey (2004) advised that a company should maintain adequate stock of materials for avoidance of an interrupted production for supply to customers.

The reasons for inventory taking are:

i. Taking advantage of seasonal price fluctuations when the price is minimized by having inventories of raw materials.
ii. Taking advantage of price discounts when ordering in large quantities.
iii. Allow firms to meet orders on time despite fluctuations in the rate of output.

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i) Inventory Valuation Method

Inventory valuation produces meaningful and accurate value for purchases of product cost and income determination.

i. *First-In-First-Out (FIFO)*

First-In-First-Out (FIFO) method is the act of issuing out the oldest materials first in the order in which they were received as a form of good and effective store keeping, which is a means of checking against obsolescence, deterioration, and depreciation of stock. This method of dealing with the materials that came in first, makes use of the actual cost, and avoids the use of unrealized profits or losses which may result from random issue of the materials. FIFO inventory fakes prices during periods of inflation as the actual cost of the goods in store are either understated or underestimated in valuation if the old prices are used.

ii. *Last-In-First-Out (FIFO)*

This method is opposite of the FIFO method because it implies that the latest materials received are issued out first thereby leaving oldest ones in stock, and this means that the items which are given out for production are charged on the current cost. In contrast, the stock on hand is valued at the oldest prices. The current production cost is simultaneous with the current sales revenue to obtain a real profit for the current period and this is because the most essential advantage of this method is that it can give the most current cost of a product, whereas the disadvantage of this technique is that the oldest merchandise in stock turns obsolescence, deteriorated, and depreciation sets in.

iii. *Base Stock Methods*

Osisioma (1990) stated that Bae Stock Method is a fixed minimum stock that credited all materials the original cost price. He went on to say that this method should not apply in an emergency, except for the minimum or buffer stock, and all other stocks should be valued as per the stock valuation method.

iv. *Standard Price Method*

Standard Price Method is the use of prevailing prices of the goods at the time of issuing them out, resulting in a profit if the actual materials price is low, and a loss if the actual price was higher. The main constraint is the inability of setting an acceptable standard price for all materials.

v. *Average Price Method*

This method is referred to as the weighted average, by dividing the total cost among the whole materials and obtains a unit cost for each item, which average price is allotted uniformly to all materials issued out, rather than using the actual cost.

j) Cost Associated With Inventory

All inventories incur cost either in ordering, storage, and issuance or checking, to have an optimal stock, and to determine the cost, we often use the cost function, which is in four components as follows:

i. *Purchase Cost*

The Purchase cost is the purchase price of an item procured from external sources and refers also to the production cost of the good that is manufactured within the organization that is to be used in further production. Generally, it is referred to as the nominal cost of inventory, which cost varies according to the quantity procured, discounts granted for bulk purchases and that of savings in production cost, as a result of longer batch run.

ii. *Ordering Cost*

This type of cost is incurred as inquiries and writing purchase order to procure goods from outside. Ordering cost accordingly to Okeke (1997), is the cost associated with replenishing an inventory. Adeniji (2008) stated that ordering cost is a cost incurred in placing the order up to the point of receiving the goods into the warehouse. Inventory ordering cost includes:

a. Cost of processing the papers.
b. Cost of communications such as expenses incurred in respect of e-mail, telephone calls and sending fax messages.
c. Carriage in costs.
d. Transport and travel.

iii. *Carrying or Holding Cost*

Carrying or Holding Costs refers to all costs relating to carrying inventories from place of purchase to buyers warehouse. Okeke (1997) stated that carrying cost refers to cost associated with maintaining the items in stock, while Adeniji (2008) opined that carrying cost is the cost incurred whenever a material is stored. Holding charges is earned because the firm has decided to maintain inventories. Carrying costs are costs associated with storing items in store, and they are proportional to the amount of the inventory and the time in which the catalogue is maintained. Carrying cost includes:

a. Cost of funds tied down
b. Insurance premium costs.
c. Inventory handling costs.
d. Heat or light or power and depreciation costs.
e. Cost of spoilage, keeping obsolescent machines, deterioration, and evaporation of volatile products.
f. General insurance and security costs.

Carrying cost is a variable cost that varies with quantity of stock. The cost of carrying an item is sometimes state as a percentage of the value of the merchandise, and it is usually invoiced in terms of the amount of money per unit of time.

iv. *Stock-Out Cost*

Stock-out cost is sustained when a customer's demand could not be met because of complete

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exhaustion of stock. Okeke (1997) stated that stock-out cost is incurred535 as a result of an item that is needed, but its inventory level is totally depleted in a manufacturing system. A stock-out might cause production delays leading to idle labour, underutilization of equipment, and sometimes emergency supply order from the warehouse or retail production, and this may lead to loss of sales. This is the opportunity cost of not having a stock item when demanded. Stock-out causes loss of profit, loss of future sales and customers, wages being paid for idle time, loss of customers goodwill and customers cancelling their orders because of delay in delivery.

k) Purposes of Inventory Control

Inventory control is carried out for obvious reasons as enumerated below:

i. To minimize cost
ii. To maximize profit
iii. To maximize the return on investment
iv. To avoid running out of stock
v. To prevent unnecessary surplus stock
vi. To maintain average inventory within storage capacity availability.
vii. To control capital investment.
viii. To checkmate mismanagement and

l) Inventory Models

An inventory model represents an inventory problem that demands decision answer. Inventory model allows us to reasonably decide how much quantity of a good to buy, and when to buy. Right decisions are taken as an inventory model combines decision variables with situational constraints or considerations such as customers' demands, lead time; C1, C2, and C3, unit price; and any uncertainties associated with them. It may also include special features such as quantity discounts, inflationary factors, budget or space constraints, etc.

Naddor (1966) talks about inventory model as a mathematical relationship that involves three-related cost C1, C2, and C3, and that minimum of two of these three costs has to be placed in a state of being controlled. If C_1 and C_3 are relevant, ($C_2 = \infty$) then it is type (1, 3) inventory model. There are different approaches to inventory models as there are various authors namely Star & Miller (1975), Naddor (1966), Fabrycky & Banks (1967), Love (1979), and Hollier & Vrat (1978) depending upon the decision variables and situational parameters including inventory policies employed as operating doctrine in the management of inventories.

m) Inventory Policies

Inventory policy is a standard operating procedure (SOP) used in the implementation of an inventory model, which depends upon the choice of a particular inventory policy, that results in an inventory graph as a function of time. An inventory policy illustrates how the inventory position changes over time, and whenever procurement interpolation takes place.

There are three inventory policies that are generally engaged as follows:

i. *Economic Order Quantity (EOQ):* Which is the quantity ordered that minimizes total inventory holding and ordering costs. It is a production scheduling models used to determine the order quantity. It is also called Wilson EOQ Model or Wilson Formula, which was developed by Ford W. Harris in 1913, but was first applied by R. H. Wilson, a consultant to a firm, who was credit with the formula for his in-depth analysis according to Hax, AC, and Candea, D. (1984).

EOQ is applied when there is a demand for a particular product in the year, and delivery of a new order is supplied in full when inventory reaches zero. Every order placed has a fixed cost, irrespective of the number of units ordered. There is also a storage cost for each component stored known as holding expenses that is calculated as a percentage of the purchase cost. Inventory monitoring was continuous so that it will not fall below the minimal level called Reorder Point (ROP), having a replenishment order of fixed quantity called Economic Order Quantity (EOQ). Thus EOQ is represented by (Q), and ROP is represented by (R), both being the two decision variables involved in solving the problem of how much to buy. Figure 2.3 shows the graphical process of the Q, R policy. Such an inventory model must have (Q, R) as decision variables.

The policy requires that inventory levels be monitored unceasingly, calls for constant watch at stock levels, while in a computerized inventory control system, it is easy for an alarm will blow once the minimal is reached. Still in manual systems, its administrative cost of operation could be more. To ease this situation, a very ingenious method of manual monitoring of this policy has been evolved and is in practice for long and is called the two- bin' policy. Under the two bin policy, the total stock is kept in two bins. The second bin has the stock required during the lead time, and the first, box contains the Q minus the quantity of materials in the second bin. The consumption is met from the first bin until it gets consumed, and the reorder level is redeemed to have reached, and a replenishment order of size (Q) is placed. During the replenishment period, the demand is met, using the stock from the second bin.

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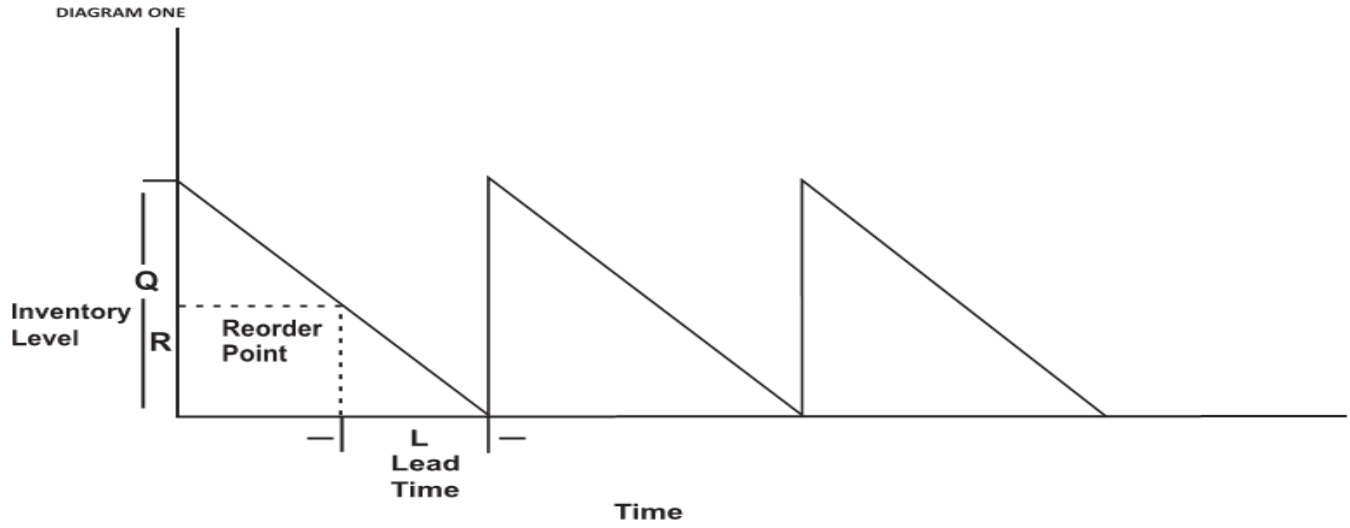


Figure 2.3: EOQ- ROP policies

In this age of computerization of inventory records, the stock status can be monitored continuously with ease without the use of two bin policy, which calls the keeping of two storage units for each item. Economic order quantity (EOQ) policy is the most widely used policy in inventory control literature, and it is the oldest scientific model of inventory control.

Assumptions of Economic Order Quantity (EOQ)

Horvgren (2007) postulated some assumptions as follows:

i. There must always be demand for materials on a continuous and constant over time.
ii. The same quantity of materials is being ordered at each re-order point.
iii. The lead time is known and fixed.
iv. The delivery time is instantaneous.
v. The purchase price of the item is constant; that is no discount is available for bulk purchases.
vi. The inventory replenished is immediate, as the stock level gets to zero.
vii. There should be no stock-out at any time.
viii. The per-unit holding and ordering cost are constant with same range of quantities ordered.

ii. *Periodic Inventory Review Policy*: The stock position is occasionally revised under this policy after a fixed time interlude (T), and when the review period is reached, the order is placed, which is determined by the following relationship:

Q= order quantity= (S-X)

Where S=maximum stock level

X= stock on hand at the time of review.

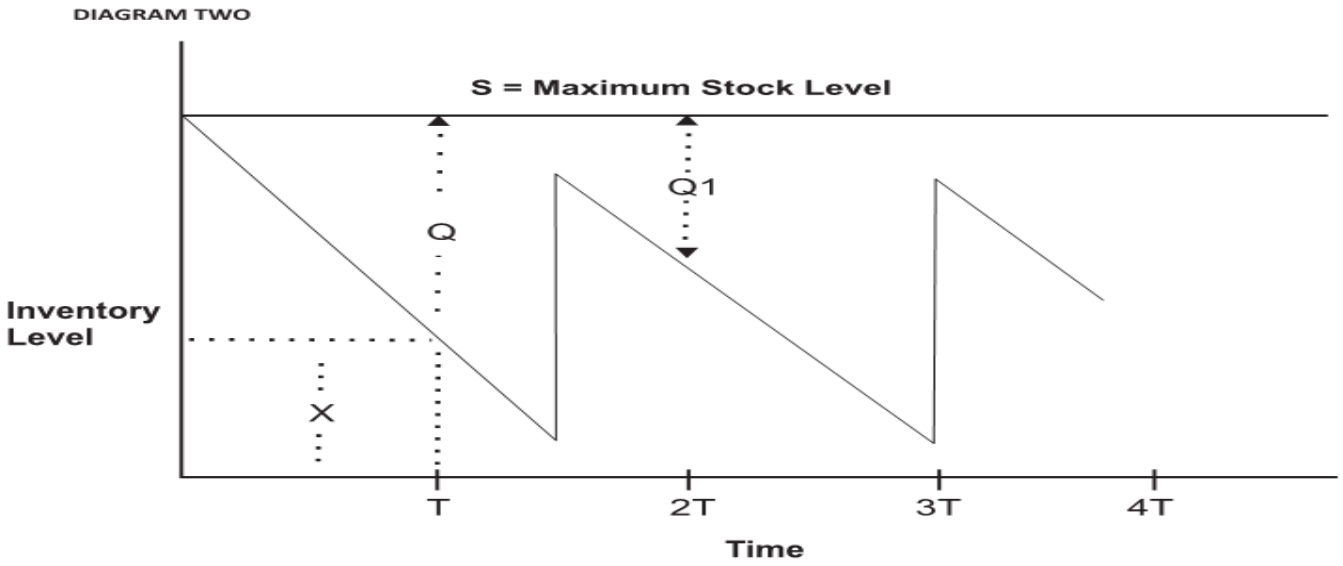


Figure 2.4: Illustrates the periodic review policy graphically.

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Under the periodic inventory review policy, the maximum stock level (S), and time of interval between two reviews (T) are the two decision variables for optimization, called (S,T) policy. The operation of this policy is relatively easy as the status of inventory is taken only after a fixed time interval. However, this policy is quite sensitive to depletion during the review cycle. An order has to be compulsorily placed even if the stock levels are quite high at the review period even if the order size is a small quantity. To simplify the model, one may specify one of the decision variables, S or T so that S is defined, and T will be the only decision variable. On the other hand, if T prescribed, then it is called (S, T_P) policy with S as a decision variable.

iii. *Optional Replenishment Level:* This is a variant of periodic review inventory policy wherein there are two levels of inventory identified as S (the maximum level) and s (the minimum level) which needed to be examined periodically at fixed time interval T. If at the time of review, the stock level is more than the minimum level, then, replenishment decision is deferred to the subsequent review phase; and there shall be no order placed because the current stock is adequate for the time being. On the other hand, if at the time of review, the stock level (X) is less than or equal to (s), then the order quantity (Q) is determined, and a new order is placed so that the level of the stock shall be raised to S.

Thus we have,

$$Q = S - X$$

if $X = 0$

then:

$$X > s$$

Fig 2.5 depicts the operation of this policy graphically.

DIAGRAM THREE

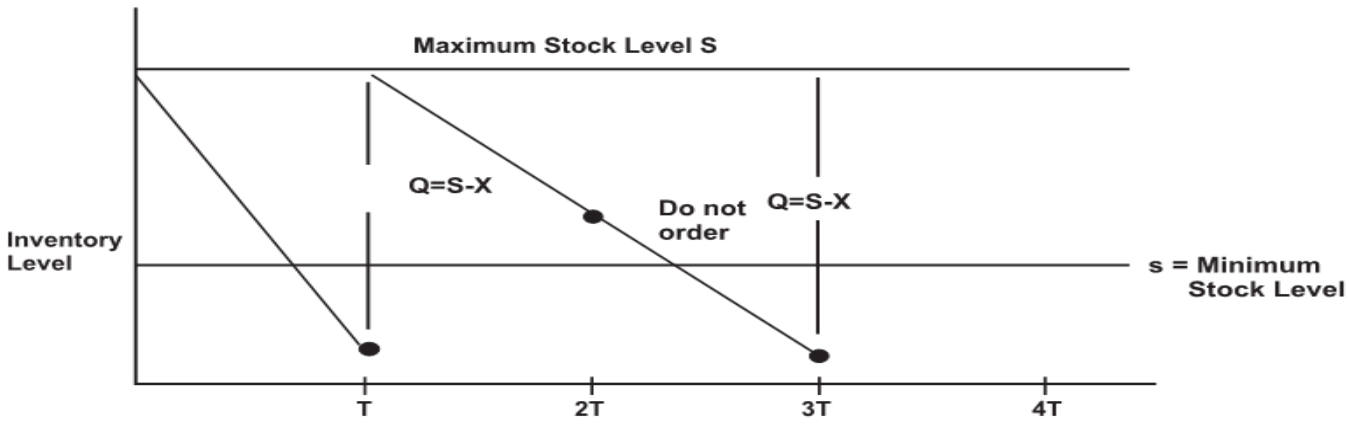


Figure 2.5: Optional (s, S) inventory policy

This policy is also known as minimum-maximum stock level policy or (s, S) or Optional Replenishment Policy (ORP) because there is an option of skipping the replenishment decision to the next review period if the current inventory on hand is more than the minimum level prescribed. Thus, this would appear to be better than (S, T) policy provided that, (s, S) and T are optimized.

For an inventory model to be developed to bring about optimum choice of the decision variables, a choice of policy has to be made. If (s, S, T) are optimized, then the optional replenishment policy is the best among the three policy options outlined above. The optimization of these three decisions simultaneously leads to a very complex model of inventory in case of probabilistic demands and lead times. For practical purposes, the EOQ- ROP policy is a better choice for efficient record keeping of high usage items. In contrast, the (S, T) policy is good for items of low demand.

We want to illustrate how to determine the optimal number of units to be to minimize the total cost associated with the purchase, delivery, and storage of the product. The required solution will depend on the yearly total demand for materials, the purchase price for each item, the fixed cost per order, and the yearly storage cost for each item. The number of times for an order needs to be known which will also affect the total cost.

The variables for the solution are:

= Purchase price of the item and unit production cost.

= The quantity to be ordered.

= The optimal order quantity.

= The quantity demanded annually.

= The fixed cost per order, setup cost (i.e. cost of ordering, shipping and handling). h= The annual holding cost per unit (i.e. carrying cost or storage cost, capital cost, warehouse space, refrigeration, insurance, etc. that are not related to the unit production cost)

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n) The Total Cost function

The single-item EOQ formula is used to obtain the minimum point of the following cost function:

i. Total Cost made up of the purchase or production cost, the ordering cost and holding cost i.e. TC= PC + OC + HC.
ii. Purchase cost is the variable cost of goods that is made up of purchase unit price multiplied by the annual demand quantity i.e. PC = P × D.
iii. Ordering cost is the cost of placing orders, and each order has a fixed cost (K), and we need to order as many times a year, ie. K × D/Q times per year.
iv. Holding cost is the cost of holding in stock the average quantity, i.e. HC= h × Q/2.

The Total Cost Function is therefore stated as follows:

$$TC = PD + \frac{DK}{Q} + \frac{hQ}{2}$$

We determine the minimum point of the total cost curve by partially differentiating the total cost to Q and holding all other variables constant, and set all equal to 0. Hence,

$$0 = -\frac{DK}{Q^2} + \frac{h}{2}$$

We solve for Q to give us Q* which is the optimal order quantity.

$$= \quad Q^{*2} = \frac{2DK}{h}$$

Therefore:

Economic Order Quantity

$$Q^* = \sqrt{\frac{2DK}{h}}$$

Q* is independent of P; and it is a function of D, K, and h.

Grubbström, Robert W. (1995) brought out the optimal value (Q*) by expanding these equations as follows:

$$TC = \frac{DK}{Q} + \frac{hQ}{2} + PD = \frac{h}{2Q}(Q - \sqrt{2DK/h})^2 + \sqrt{2hDK} + PD,$$

Expanding the equation removes the non-negative quadratic term to give $Q = \sqrt{2DK/h},$ and by bringing out the minimum cost, we have $TC_{min} = \sqrt{2hDK} + PD.$

o) Quantity Discounts

According to Abomaye-Nimenibo (2019), an essential extension to the EOQ model of Wilson is to accommodate quantity discounts, which is given by Hax (1990) as all-units, and incremental, and stated numerically as follows:

i. *Incremental unit discount:*

If you buy Units 1-100 cost ₦30 each; Units 101-199 cost ₦28 each; Units 200 and up cost ₦26 each. By ordering 150 units of the item will give a total cost of ₦4,400 (₦30*100 + ₦28*50 = ₦4, 400).

ii. *All units discount:*

If you order items between 1-1000 units the costs is ₦30 each; and if an order of 1001-5000 units is made, the costs is ₦45 each; while an order of more than 5000 units will costs ₦40 each. To enjoy all units discount, assuming you ordered 1,500 units, your total cost will be ₦67, 500 (₦45*1,500 = ₦67, 500).

p) Design of Optimal Quantity Discount Schedules

The availability or presence of a strategic customer, who responds optimally to the discount schedule, calls for the design of an optimal quantity discount scheme by the supplier is an intricate scheme

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and has to be done carefully. An optimal quantity is granted when the demand of the customer is undefined. When a customer's demand is indeterminate and such demand reduces the order quantity, what is called "reverse bullwhip" policy will be applied to take care of the consumer's demand in case of unexpected increase or decrease (Altintas, N.; Erhun, F.; Tayur, S., 2008).

i. *Other Extensions of EOQ*

Numerous extensions the EOQ model has been developed to solve back-ordering costs and multiple items. The economic order interval problems has been worked out using the EOQ, and the monetary production quantity model has also been used to work out the optimal production quantity problem.

The Baumol-Tobin model has been applied in inventory just the same way it was applied to determine the money demand function for holding money balances as a parallel function in the firm's holding of inventory (Andrew Caplin and John Leahy:2010).

An Example of Using EOQ in Problems Solving:

Assuming an annual requirement quantity (D) of a firm = 20,000 units,

Cost per order (K) = ₦3

Cost per unit (P) = ₦10

Carrying cost percentage (h/P)(percentage of P) = 0.03

Annual carrying cost per unit (h) = ₦0.3

$$\text{Economic Order Quantity} = \sqrt{\frac{3D*K}{h}} = \sqrt{\frac{3*20{,}000*3}{10*0.03}} = 775 \text{ units}$$

$$\text{Number of orders per year using EOQ Figure} = \frac{20{,}000}{775} = 26 \text{ orders}$$

Total cost = $P * D + K\,(D/EOQ) + h\,(EOQ/3)$

Total cost = 10*20000 + 3(20000/775) + 0.3(775/3) = ₦200,154.92

= (200000+77.42+77.5 =₦200, 154.92).

If we decided to order 900 units per order, then our total cost will increase as follows: Total cost = 10*20000 + 3(20000/900) + 0.3(900/3) = ₦200,156.67

= (200000+66.67+90 = ₦200, 156.67).

From the above workings, it is cost effective to place order according to the Economic Order Quantity.

ii. *Multi-Criteria EOQ*

The Multi-Criteria EOQ is introduced by Malakooti (2013) to work out a system where the total cost, the inventory order quantity as well as shortages were reduced to the barest minimized; so that the Economic Production Quantity (EPQ) remains constant as production continues. There also exists the classical Newsvendor model for the random demand of the product. However, when demand varies over time, we apply the Dynamic lot size model.

III. Empirical Literature

A review of related literature is to establish the basis for the investigation of the effect of inventory management and organizational profitability of 7up Bottling Company. The assessment covered previous but similar empirical studies conducted in various places or countries on the same subject matter.

Raheman and Nasr (2007) studied the current ratio of the net operating profit of Pakistani firms, and observe the effects of inventory turnover in days. A total of 94 Pakistani firms that were listed on the Karachi Stock Exchange were chosen for the study for the period 1999-2004. They found a negative relationship between the inventory conversion period and profitability of the firms.

Falope and Ajilore (2009) also studied 50 Nigerian non-financial firms for the period 1996-2005, using panel data econometrics in a pooled regression where time-series and cross-sectional observations. They also found that profit making and inventory turnover have negative.

Abdulraheem, Yahaya, Isiaka, and Aliu (2011) used multiple regressions in their study of inventory management on the performance of small businesses in Nigeria, which result revealed that there is a strong positive relationship between inventory management and profitability among Nigerian small businesses.

Okwo and Ugwunta (2012) also studied the influence of input costs on the profitability of the breweries industry in Nigeria. They analyse their findings with Ordinary Least Squares and multiple regression

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techniques, using ratios of selling, general administrative expenses, cost of goods sold (inventory), receivables, payables, and depreciation as independent variables; while profitability was the dependent variable. They found among others that the cost of goods sold (inventory) had a positive relationship with profitability.

Anichebe & Agu (2013) assessed the impact of proper inventory management on the performance of organizations in Nigeria, and used a sample of 248 respondents and collected data using a questionnaire and oral interviews. The findings of the study revealed that a significant relationship exists between inventory management and business effectiveness in an organization. The study also established that inventory management had a significant effect on the productivity of an organization, and there was a strong positive correlation between inventory management and profitability of an organization. The study concluded that decent inventories management was practised, which was key to the growth and success of these organizations.

Augustine and Agu (2013) studies was on effective inventory management vis-à-vis organizational effectiveness and profitability of manufacturing companies, and their findings revealed a positive relationship between inventory management and organizational efficiency and turnover.

Hassan, Imran, Amjad, and Hussain (2014) studied non-financial firms in Pakistan that were listed on the Karachi Stock Exchange for the period 2007 to 2010, over their effective working capital management and performance. They used Ordinary Least Square technique to analyse data collected. Among the independent variables used as a proxy for working capital management, the average age of inventory, their result find an insignificant positive relationship with gross profit margin and return on assets, with negative effect on return on equity.

Prempeh (2015) also carried out a study of manufacturing firms in Ghana over inventory management and profitability, using raw material inventory management and profit as variables. The result of their findings revealed the existence of a significant positive relationship between raw material inventory management and profitability.

a) Summary of Related Literature

In summary, we discuss the concept of inventory, which is central to materials management. Inventory is a "usable but idle" resource, and various types and classifications were outlined. The need to keep proper records and maintain corporate organizational structure is stressed. The two kinds of stock-taking methods of perpetual and periodic stock-taking were discussed, and the various costs associated with inventory, which include: purchase, ordering, carrying or holding, and stock out costs, etc.

The theoretical and empirical literatures states the varies theories and studies carried out with respect to inventory control system, the purpose of inventory control, and the various inventory levels, which include: re-order level, the maximum, minimum, and optimal stock levels. The different inventory valuation methods were also discussed, amongst which were the first-in-first-out, last-in-first-out, standard price method, and average price method. Three types of inventory policies were also emphasized with their relative strengths and weaknesses.

However, the right choice of the inventory model is crucial for the success of inventory management. Selective inventory management is necessary, whereas indiscriminate rigour in inventory control for all items could be counterproductive.

IV. Methods of Study

a) Research Design

Research design is the plan and structure of this investigation to obtain answers to research questions postulated. The research design also explains the method and nature of the research instrument used by the researchers to execute a particular research study. For this study, descriptive and expository research methods were adopted.

b) Population of the Study

The population refers to all elements (individuals, objects, and events) that meet the sample criteria for a study (Burns and Grove (2003). The population of this study consist of all the staffs both Management and other ranks that are directly involved in the inventory handling in Seven Up Bottling Company, Port Harcourt. We distributed seventy-five (75) questionnaires to the staff and employees in the production department of the company.

c) Sample and Sampling Techniques

Sampling is a crucial component of any investigation and involves several considerations. The researchers adopted the simple random sampling techniques because it gives every member of the population equal chances of being selected. In this study, the researchers randomly distributed the 75 questionnaires to each respondent according to their groupings in the people. The total survey questions returned depended on the timing and to those who were willing to give information as required. The distribution is classified into three categories of Management Staff, Supervisors, Senior Staff, Junior Staff, and the entire Inventory Department.

d) Method of Data Collection

This study relied on both primary and secondary data, which includes: internet search, articles, magazines, journals, and books from the library. These data collected from different secondary sources

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were used, and the literature which guides us in finding the impact of inventory management on the financial condition of the organization. Data obtained through the use of questionnaires, an in-depth interview, and examination of Seven-up Company's annual report and accounts from 2012 - 2016, Central Bank of Nigeria, (CBN) bulletins on prudential guidelines, journals, and magazines, articles and research papers were of great help.

e) Estimation Techniques

Pearson coefficient for correlation technique was used to test the nature and strength of the relationship between inventory management and organization effectiveness concerning productivity, general operation, and profitability. In contrast, Spearman rank correlation was used to compare the relationship between inventory management and the other variables in 7up Bottling Company.

The Pearson correlation formula is;

$$r = \frac{N\sum Xy - (\sum X(\sum y)}{\sqrt{[N\sum X^2) - (\sum X)^2][N\sum (y^2) - (\sum y)^2]}}$$

Where:

r_{xy} = correlation coefficient n = number of sample size

$\sum xy$ = summation of xy

$\sum x$ = summation of x

$\sum y$ = summation of y

The spearman ranking order correlation coefficient (rs) is used in obtaining the degree of association between two variables measured in an ordinary scale.

$$rs = \frac{1 - {}^{6\Sigma}d^2}{N(N^2-1)}$$

Where

rs = spearman's ranked correlation.

$\sum d^2$= sum of squared differences in the ranking of subjects of two variables.

N = Number of subjects ranked for the test of the level of significance on the Spearman's Rank order correlation coefficient.

f) Reliability and Validity Test

The reliability test was estimated by examining the consistency of the responses between the three tests. Data from the primary sources are more reliable if the same results will be obtained accurately and consistently, meaning that the information should be very dependable.

The statistical tools used in this study are very reliable because overtime they are unswerving to prove the relationship over two variables.

V. Data presentation, Analysis, and Discussion of findings

a) Data Presentation

This section presents the research data, the analysis, and findings. The relevant data used in this research were assembled, as shown in various tables, using specified method of study, and the empirical results from the sample study were analysed.

The data collected for the research covered information concerning inventory management and the profitability of the organization under study, the sources of data collection as specified above through questionnaires and personal interviews, and applying descriptive statistics in the analysis.

i. *Response Rate*

The table below shows the number of questionnaires administered to staff of 7up bottling company in respect of the elements of inventory management and profitability of the organization.

The questionnaire has a 5 point scale in each of the questions that were administered to the three (3) categories of staff in the company. They were the Management Staff, Senior Staff, and the Junior Staff.

Table 4.1: Administration of Questionnaire

Category of staff	No. of questionnaire	Percentage (%)
Management staff	25	33.33%
Senior staff	25	33.33%
Junior staff	25	33.34%
Total	75	100.00

Source: Questionnaire of 2019 Survey.

From table 4.1, each category of staff ministered with 25 copies of questionnaires containing ten (10) sets of questions representing 100% of the total distributed.

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Table 4.2: Analysis of Returned Questionnaires.

Category of staff	Number of the returned questionnaire	Number not returned	Percentage of returned
Management staff	16	9	21.3%
Senior staff	22	3	29.3%
Junior staff	24	1	32.1
Total	62	13	82.7%

Source: Questionnaire Survey, 2019

From Table 4.2, the analysis showed that the management staff returned 16 out of 25 questionnaires administered, which represent 21.3%, while the senior category filled and returned twenty (22) copies representing 29.3%. The junior staff returned twenty-four (24) copies representing 32.1%. In summary, a total number of 62 copies of the questionnaires were filled and returned, representing 82.7%, while thirteen (13) copies representing 17.3% were lost.

Table 4.3 is an analysis of responses to questionnaires from the length of service with the company in section.

Table 4.3: Length of Service

Yrs	Management Staff	Senior Staff	Junior Staff
1-5	-(0%)	- (0%)	10 (16.13%)
6-10	-(0%)	4 (6.45%)	7 (11.29%)
11-15	-0(%)	6 (9.68%)	5 (8.06%)
16-20	9 (14.52%)	9 (14.51%)	2(3.23%)
21& above	7 (11.29%)	3 (4.84%)	- (0%)
	16(25.81%)	22 (35.48%)	24(38.71%)

Source: Questionnaire Survey, 2019

From the table above, it was noticed that out of a total of 16copies of the questionnaires returned by the Management staff of which nine (9) copies representing 14.52 percent of the respondents were filled and retrieved by those who had served 7up bottling company from 16 to 20 years, and seven (7) copies of returned questionnaires were completed by Management staff that has served the Company from 21 years and above representing 11.29% of the whole respondents. On the part of Senior Staff category, the survey showed that four (4) copies (6.45%), six (6) copies (9.68%) and three (3) copies (4.84%) in the respective years of service of (6-10 years), (11- 15), (16 - 20), and (21 years & above) respectively. In the junior staff category, the respondents fall between 1 to 20 years of service, we found that ten (10) respondent had served the company between 1 – 5 years, i.e., 16.13 percent, seven (7) respondents representing 11.29 percent are of the 6 – 10 years of service, five (5) persons representing 8.06 percent have served the company for 11 – 15 years and two (2) respondents representing 3.23 percent have served for 16 – 20 years and there was no junior staff that has served in the category of 21 years and above.

b) Data Analysis

Table 4.4 is the analysis of responses to question 1 in section B of the questionnaire – whether inventory management exists in 7Up Bottling Company?

Table 4.4: X-ray the response on the inventory management system

Responses	STAFF CATEGORIES			Grade Point
Allocation of Point	Management staff	Senior staff	Junior staff	
Yes (3points)	8 (24 pts)	13(39 pts)	15(45 pts)	108
No (2 points)	7(14 pts)	8(16 pts)	7(14 pts)	44
No idea (0 points)	1(0 pts)	1(0 pts)	2(0 pt.)	0
Total	16	22	24	

Source: Questionnaire Survey 2019

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The table 4.4 above x-ray the responses on inventory management system in the company, the management affirmed the existence of inventory system at (24 points), while those who thought there is no inventory management system scored (14 points) and one of the management staff had no idea 1(0 points) whether inventory management system ever existed in the company. The Senior Staff responses also follow the same direction. Those who affirmed the existence of inventory management system score (39 points), those who said 'No' scored (16 points), and a single person had no idea with (0 points). On the part of Junior Staff, 15 of them confirmed the existence of inventory management system in company with (45 points), 7 of the staff said 'No' with (14 points), and 2 of the junior category had no idea about inventory management system in the company with (0 points).

In summary, from the various categories of Respondents, the responses showed that there exist Inventory Management System (IMS) in the company. Those with "NO" answer may be due to their line of duties are not related to the inventory section, or they do accept in totality the mode and manner of handling inventory in the company. Those with no idea means they are ignorant of inventory management in the company.

From the analysis, it was deduced that there exist an inventory management system in the organization of 7up Bottling Company with 108 points as against 44 points from all categories.

Table 4.5: Analysis of question 2, section B of the questionnaire: To what extent was the application of inventory management procedures.

Staff categories	Great extent (5pts)	Considerable extent(4pts)	Moderation extent (3pts)	Slight extent 2pt	No idea (0pt)
Mgt. staff	6 (30)	4 (16)	3 (9)	2 (4)	1(0)
Senior staff	8 (40)	8 (32)	2 (6)	1 (2)	3 (0)
Junior staff	10 (50)	7 (28)	4 (12)	2 (4)	1 (0)
Total	24 (120)	19 (76)	9 (27)	5 (10)	5 (0)

Source: Questionnaire Survey 2019

From the table about, 24 (120) of the respondents agreed that the inventory management produce had been applied to a great extent in the company. In contrast, 19 (76 points) out 82 respondents said it is to a considerable extent, 9 with 27 points is said to a moderate, 5 (10 points) out of 63 said to be of slight extend while five (5) respondents out of the 62 had no idea of the inventory management procedure as is applicable to the company.

Table 4.6: Analysis of question 3 of section B, whether there are procedures put in place that will enhance inventory management in the company?

Staff categories	Storage procedure (1pt)	Carrying procedure (1pt)	Ordering procedure (1pt)	All of the above (2pts)	No of the above (0pt)
Mgt Staff	4 (4)	3 (3)	2 (2)	9 (18)	0 (0)
Senior staff	3 (3)	2 (2)	1 (1)	15 (30)	0 (0)
Junior staff	2 (2)	2 (2)	3 (3)	16 (32)	0 (0)
Total	9 (9)	7 (7)	6 (6)	40 (80)	0 (0)

Source: Questionnaire Survey 2019

From the analysis of table 4.6, it was made clear that inventory management is practiced following the procedures put in place in handling the inventory, which includes stored procedures, carrying procedures as well as ordering procedures.

The table showed that 40 respondents out of 62 agreed that all the procedures mention above enhanced proper handling showing a grade point of (80) meaning that those who prefer storage rules alone had (9 points), those with carrying methods had seven (7) points, and those with ordering systems which enhances inventory management had (6 points). None of the respondents stated that the techniques of handling inventory do not promote inventory management.

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Table 4.7: Analysis of Q4 on Productivity and Q5 on Profitability, in Section B of the questionnaire, revealed the following.

Question	Staff categories	Great extent (5pts)	Considerable extent (4pts)	Moderate extent (3pts)	Slight extent (2pts)	No idea of the extent (0pts)
Q4	Mgt staff	8(40)	6(24)	2(6)	2(4)	0(0)
	Senior staff	8 (40)	8(32)	3(9)	2(4)	1(0)
	Junior staff	12 (60)	4(16)	3(9)	2(4)	1(0)
Total		28 (140)	18 (72)	8(24)	6(12)	2(0)

Source: Questionnaire Survey 2019

From the above table it was revealed that in answer to question 4, 28 respondents with a grade point of (140) confirmed that inventory control enhances effective productivity to a great extent. In contrast, a larger number of the respondents are 18 out of 62 with a grade point of (72) agreed that inventory control enhances inventory management to a considerable extent. In comparism 8 and 6 respondents with a grade point of (24) and (12) respectively agreed that inventory control enhances productivity to a moderate and slight extent respectively.

Table 4.8: Analysis of Q5 on Profitability in Section B of the questionnaire, revealed the following.

Question	Staff categories	Great extent (5pts)	Considerable extent (4pts)	Moderate extent (3pts)	Slight extent (2pts)	No idea of the extent (0pts)
Q5	Mgt staff	6(30)	7 (28)	3(9)	2(4)	0(0)
	Senior staff	9(45)	6 (24)	3(9)	3(6)	1(0)
	Junior staff	9(45)	8 (32)	2(6)	2(40	1(0)
Total		24(120)	21(76)	8(24)	7(14)	2(0)

Source: Questionnaire Survey 2019

In question 5 the analysis revealed that 24 respondents out of 62 with a grade point of 120 points believed that inventory management enhances the profitability of the company to a great extent, 21 responses with 76 points were of the view that it was to a considerable extent, eight (8) respondents with 24 points stated that inventory management causes profitability to a moderate level. In contrast, seven (7) respondent to a grade point of 14points said inventory management brings about profitability to a slight magnitude while two (2) respondents did not have any idea.

Table 4.9: Shows analysis of question 6, indicating the practice of best methods in Inventory Management.

Staff category	Traditional inventory Mgt. (2pts)	JIT inventory Mgt. (2pts)	None of the above (1pt)	No idea (0pt)
Mgt staff	10(20)	6(12)	0(0)	0(0)
Senior staff	14(28)	8(16)	0 (0)	0(0)
Junior staff	12(24)	7(14)	3(3)	2(0)
Total	36(72)	21(42)	3(3)	2(0)

Source: Questionnaire Survey 2019

From table 4.9 which analyses revealed that 36 respondents out of 62 with a grade point of 72 preferred traditional inventory management system as the best which they recommended for the company, while 21 responses indicating 42 points suggested Just-in- time (JIT) inventory management system, and three (3) respondents did not prefer any technique. In comparism, two (2) respondents had no idea about the system of inventory management in the company.

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Table 4.10: Analysis of question 7 on inventory handling cost effect on the profit performance of the company.

Question	Staff categories	Great extent (5pts)	Considerable extent (4pts)	Moderate extent (3pts)	Slight extent (2pts)	No idea (opt)
Question 7	Mgt. staff	6 (20)	6 (24)	2 (6)	2 (4)	0 (0)
	Senior staff	6 (40)	8 (32)	2 (6)	3 (6)	1 (0)
	Junior staff	9 (45)	19 (44)	3 (9)	2 (2)	0 (0)
Total		23 (115)	25 (100)	7 (21)	6 (12)	1 (0)

Source: Questionnaire Survey, 2019

Table 4.10 analysed question 7 (To what extent does inventory handling cost affects the profitability performance of the company). The result showed that 23 respondents out of 62 with a grade point of (115 points) agreed that inventory handling cost affects the company profit to a great extent, 25 (100 points) expressed that it affects the turnover to a considerable extent, seven (7) respondents (21points) said that the inventory handling costs affects profitability to a moderate degree. Six (6) respondents with 12 points stated that inventory handling costs affect profitability to a slight magnitude, while one (1) respondent says he has no idea. Given their responses, all categories of staff in the company are aware that inventory handing cost is one of the overheads that leads to proper management of inventory that boosts the profit of the organization.

Table 4.11: Analysis of question 9 on the effect of constant inventory check for re-order brings about the profitability of the company.

Question	Staff categories	Great extent (5pts)	Considerable extent (4pts)	Moderate extent (3pts)	Slight extent (2pts)	No idea (opt)
Question Q9	Mgt staff	9 (45)	3 (12)	2 (6)	2 (4)	0 (0)
	Senior staff	10 (50)	9 (36)	2 (6)	1 (2)	0 (0)
	Junior staff	8 (40)	10 (40)	3 (9)	2 (2)	1 (0)
Total		27 (135)	22 (88)	7 (21)	5 (10)	1 (0)
Question	Staff categories	Great extent (5pts)	Considerable extent (4pts)	Moderate extent (3pts)	Slight extent (2pts)	No idea (opt)
Question Q10	Mgt. staff	5 (25)	8 (32)	3 (9)	1 (2)	0 (0)
	Senior staff	8 (40)	10 (40)	2 (6)	1 (2)	1 (0)
	Junior staff	9 (45)	10 (40)	3 (9)	1 (2)	1 (0)
Total		21 (110)	28 (112)	8 (24)	3 (6)	2 (0)

Source: Questionnaire Survey, 2019

Responses to question 10 as per Table 4.11revealed that, 21 out of 62 respondents with a grade point of (110) were of the view that reorders and replenishment of inventory enhances the profitability of the company to a great extent. In contrast, 28 out of 62 with a grade point of (112) agreed that catalogue reorders and replacement increases profit performance of the company to a considerable level, eight (8) respondents with 24 sockets considered reorder and refill of portfolio boost profit performance of the company to a moderate extent. In contrast, 3 (6 points) were of the view that its profitability was to a slight degree.

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Table 4.12: Analysis of response to question 8 with respect to personal and interval inventory check in the company under study.

Staff categories	Weekly (1pt)	Monthly (1pt)	Quarterly (1pt)	Yearly (1pt)	No idea (0pt)
Management Staff	12 (12)	4 (4)	0 (0)	0 (0)	0 (0)
Senior Staff	10 (10)	8 (8)	2 (2)	2 (2)	0 (0)
Junior Staff	12 (12)	8 (8)	2 (2)	2 (2)	0 (0)
Total	34 (34)	20 (20)	4 (4)	4 (4)	0 (0)

Source: questionnaire survey, 2019

From Table 4.12, our analysis showed that 43 respondents out of 62 with a grade point of 43 stated that the organization does and should carry out inventory check weekly, 20 with a grade point of 20 says the organization do and should carry out personal and interval check monthly. Four (4) of the respondents stated that inventory check is practiced and carried out quarterly. In contrast, the last four (4) respondents who know little or nothing about inventory management considered yearly inventory. We are to note that 54 of all the respondents had an idea of the interval to which inventory management was practiced.

From the date of analysis, the researchers summarize that the grade point of all the questions in the questionnaire to work out the X and Y variables using the great extent as (X), and considerable extent as Y in a tabular form as follows:

Table 4.13: Summary of the grade point from respondents using Table 4.4 to 4.12 on the productivity of the company.

N	X	Y	XY	X^2	Y^2
1	108	44	4,752	11,664	1,936
2	120	76	9,120	14,400	5,776
3	9	7	63	81	49
4	140	72	10,080	19,600	5,184
5	120	76	9,120	14,400	5,776
6	72	42	3,024	5,184	1,764
7	115	100	11,500	13,225	10,000
8	135	88	11,880	18,225	7,744
9	110	112	12,320	12,100	12,544
10	34	20	680	1,156	400
∑	963	637	72,539	110,035	51,173

Source: Researcher Computation, 2019

Table 4.13 showed the computation for X and Y to calculate the sample correlation coefficient (rxy).

$$r = \frac{N\sum Xy - (\sum X)(\sum y)}{\sqrt{[N\sum X^2) - (\sum X)^2][N\sum (y^2) - (\sum y)^2]}}$$

$$r = \frac{10(72,539 - (963)(637)}{\sqrt{\{10(110035) - (963)^2\}\{10(51173) - (637)^2}}$$

$$r = \frac{725,390 - 613,431}{\sqrt{\{1,100,350 - 927,369\}\{(511,730 - 405,769)\}}}$$

$$= \frac{111,959}{\sqrt{(172,981)\,(105,961)}}$$

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$$= \frac{111,959}{\sqrt{18,329,239,741}}$$

$$= \frac{111,959}{135,385.52}$$

$$= 0.8269 \text{ i.e. } 82.69\%$$

The result showed a correlation coefficient (rxy) of 82.69%. The findings indicated that the method used by 7up bottling company to manage her inventories in both raw materials and the finished product was efficient as the amount of naira saved in the course of purchase have more effect on the profitability of the company during production/ selling of the finished goods. The result further disclosed that the nature and strength of the relationship between inventory management and organization effectiveness concerning productivity, general operation, and profitability were all right, leading to the high profitability of the company.

Similarly, the researchers summarize that the grade point of all the questions in the questionnaire to work out the X and Y variables using the responses from Table 4.4 to 4.12 using moderate extent as (X), and slight degree as Y in a tabular form as follows:

Table 4.14: Summary of the grade point from respondents using Table 4.4 - 4.12 on the Profitability of the Company

N	X	Y	XY	X^2	Y^2
1	108	44	4,752	11,664	1,936
2	27	10	270	729	100
3	6	80	480	36	6,400
4	24	12	288	576	144
5	24	14	336	576	196
6	3	0	0	9	0
7	21	12	252	441	144
8	21	10	210	441	100
9	24	6	144	576	36
10	4	4	16	16	16
∑	262	210	6,748	15,064	9,072

Source: Researcher's Computation, 2019

The table above showed the computation for X and Y from a considerable and moderate extent to determine how inventory management affects the operational efficiency of the company.

$$r = \frac{N\sum Xy - (\sum X(\sum y)}{\sqrt{[N\sum X^2) - (\sum X)^2][N\sum (y^2) - (\sum y)^2]}}$$

$$r = \frac{10(6,748) - (262)\,(210)}{\sqrt{\{10(15,064) - (262)^2\}\{10(9,072) - (210)^2\}}}$$

$$= \frac{67,480 - 55,020}{\sqrt{\{150,640 - 68,644\}\{90,720 - 44,100\}}}$$

$$= \frac{12,460}{\sqrt{81,996 - 46,620}}$$

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$$= \frac{12,460}{\sqrt{35,376}}$$

$$= \frac{12,460}{188.085}$$

$$= 66.25$$

The result showed that the company, through its effective and efficient application of timely inventory management, had a profit of over 66%.

Table 4.15: Summary of the grade points from the respondents' views from Table 4.4. to 4.12 using considerate extent and moderate extent for the profitability of the company.

N	X	Y	XY	X^2	Y^2
1	108	44	4,752	11,664	1,936
2	76	27	2,052	5,776	729
3	7	6	42	49	36
4	72	24	1,728	5,184	576
5	76	24	1,824	5,776	576
6	42	3	126	1,764	9
7	100	21	2,100	10,000	441
8	88	21	1,848	7,744	441
9	112	24	2,688	12,544	576
10	20	4	80	400	16
∑	701	198	17,240	60,901	5,336

Source: Researcher's computation, 2019

From the table, the researchers completed for x and y to determine the inventory contribution to the profitability of the company.

$$r = \frac{N\sum Xy - (\sum X(\sum y)}{\sqrt{[N\sum X^2) - (\sum X)^2][N\sum (y^2) - (\sum y)^2]}}$$

$$r = \frac{10(17240) - (701)(198)}{\sqrt{\{10(60,901) - (701)^2\}\{10(5336) - (198)^2}}$$

$$= \frac{172400 - 138,798}{\sqrt{(609,010 - 491401)(53,360 - 39,204)}}$$

$$= \frac{33,602}{\sqrt{117,609 - 14,156}}$$

$$= \frac{33,602}{\sqrt{103453}}$$

$$= \frac{33,602}{321.64}$$

$$= \underline{104.47}$$

$$= 104.47\%$$

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The result shows that the relationship is more than a 100% correlation between productivity and profitability.

c) Re-Statement of Hypotheses

In line with section 1.5, we restate the following hypotheses:

Ho: 1 there is no significant relationship between inventory management and organizational productivity.

HO: 2 there is no significant relationship between poor inventory

Ho: 3 there is no significant relationship between inventory management and profit performance.

Testing the hypotheses

1. *HO: 1* for productivity where the researchers rank the result

$$Rxy = 1 - \frac{\sum D2}{n(n^2 - 1)}$$

$$= 0.9755 = 97.5\%$$

The general opinion showed that inventory management contributes 66.2% to productivity, while the specific assessment showed 97.5%.

$$O.975 \geq \text{Productivity} \geq 0.662$$

Therefore we accept null hypothesis HO: and reject Ha; that inventory management does not contribute significantly to productivity.

2. *HO: 2* for operation, the general view revealed that inventory management has contributed to the profit of the company by 97.5 %.

$$0.975 = \text{Operations} = 0.975$$

Therefore we reject null hypothesis Ho: and accept Ha: that inventory management contributed significantly to the operations of the company.

3. *HO: 3* for profitability, the general view displayed 64 % while the specific view rank is 97. 5%.

$$\therefore 0.975 \geq \text{profit} \geq 0.640$$

With 0.64 results, we reject the null hypothesis (Ho) and accept the alternative (Ha).

d) Discussion of Findings

From the analysis, we observed that 97 % of the staff of the company agreed that there is an inventory management system in the company, and those inventory management procedures are adhered to.

The study also revealed that the company operates traditional inventory management. The deduction was drawn based on the responses of the respondents. From the statistical analysis, it has been established that inventory management scores 97.5% which means, that there is a high level of the inventory management system that contributed about 66.2% to the organization's productivity, and other factors also contributed about 38.8%.

In terms of the general operations of the company, the result showed that operations are at par with the organizational inventory management system, which means that inventory management contributes significantly to the running of the company. For the profitability of the company, the result showed that the inventory management system contributed about 64% to the profit of the organization. Hence the company should continue to maintain a decent inventory management system since other activities and factors contributed about 36% of the total turnover of the company.

VI. Summary, Conclusion and Recommendation

a) Summary of Findings

Of a truth, profit and wealth maximization are variables that trigger the idea of business outfits. For manufacturing companies, the place of inventory management and the need to control it for increased profitability is a measure of effectiveness and efficiency. The continuous decrease in profitability and performance; and the resultant liquidation of manufacturing firms in Nigeria as a result of lack of proper inventory informed this study. After preliminary research, we found that accurate record of materials in stock constitutes a bigger percentage of the current asset growth and with other assets that form a worthy proportion of total assets in manufacturing firms. Some firms neglect its control, which amounts to endangering the long-run profitability and sustainability of these firms.

In terms of the general operation of the company, the result showed that the setup is at par with the organizational inventory management system, which means that inventory management contributes significantly to the well-being of the company. For the profitability of the company, the result showed that inventory management contributed about 64% to the profit of the organization. Hence the company should maintain a decent inventory system, as other activities and factors contributed about 36% of the total turnover of the company.

b) Conclusion

The understanding of inventory management at any given point is very significant, not only for controlling and managing the present situation but in predicting future trends. The notch of inventory management affects the profit of firms and invariably overall performance depending on methods adopted; which is an imperative aspect of profitability. It is imperative to know and use inventory management methods, and have perfect knowledge of experience and presentation skills in its control. Finally, there is a high prospect for improvement in the performance of 7up Bottling

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Company if more attention is hinged on modern methods of inventory management.

c) Recommendations

Inventory management is a philosophy that has been of tremendous benefit in the western world, especially with the application of modern methods like Just-in-Time Method, which is still sprouting. Its positive return on investment is too glaring to flout. To ensure sufficient realization of the merits derived from inventory management and tackle the obstacle posed to the real inventory management program, the following recommendations are made based on the research findings:

i. Since companies' profitability is a function of the inventory management method, it is our candid recommendation that firms should adopt modern approaches in inventory management, which ensures high probability and success.
ii. Every business outfit in Nigeria should, as a matter of urgency, take on the contemporary techniques of inventory to have the dividend of reduction in storage cost, carrying cost, and ordering price, which also affects the level of performance.
iii. The old method of inventory keeping gives the sub-optimal result, and even if, in use, they should not be applied in isolation.
iv. Nigerian Companies that will like to enjoy a high and consistent success rate should apply a better inventory management method.
v. Companies should train their staff on Inventory Control Management to avoid overstocking or understocking.
vi. The application of modern inventory management be made a priority and be closely monitored and well-guarded and avoid liquidation.
vii. For companies to have immediate and lasting benefits in the uses of modern inventory management should employ professionals in inventory management to enable them to reap the full benefits of this method.
viii. An adoption and application of the Economic Order Quantity (EOQ) model to save cost and make the operations more efficient.
ix. EOQ model should adopt a fixed order for continuous productivity, which will lead to effective market operations and profitability.
x. Companies should shift from manual tasks to computerization to enhance profitability.
xi. Companies should continue to carry out workforce development, which will greatly enhance the performance of manufacturing firms.

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