

OPTIMIZING PROFIT MAXIMIZATION THROUGH EFFECTIVE INVENTORY CONTROL PRACTICE OF MANUFACTURING FIRMS IN NIGERIA

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Abstract

The study looked at the optimization of profit through inventory control practices of firms in our ever-competitive environment. Four inventory control practices formed the objectives with two hypotheses raised to guide the study. The study was empirically analysed. The findings revealed a positive significant relationship between the objectives, Just-In-Time, Material Requirement Planning (MRP), Economic Order Quantity and safety stock on profit maximization. The study recommended that an Effective (well-functioning) inventory control system ensures there is a balance between having just enough materials or products in the stores/warehouse and keeping the stock cost under control so that the firm can maximize its profits at all times.

Keywords: *Profit Maximization, Inventory Control, Just-In-Time, Material Requirement, Planning, Safety Stock.*

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1. Introduction

To satisfy consumer needs and increase profits, inventory control, also known as stock control, is the process of ensuring that the proper number of materials is always available in a company's warehouse or store. Inventory management and control are two different things. Only things that are stocked in a company's warehouse from the time they arrive until they reach their destination are subject to inventory control regulations (internal and external customers). It necessitates that store employees are knowledgeable about the items they have in stock, where they are, and how to keep them arranged to cut expenses. Inventory management is a procurement job that involves replenishing stock through order placement, determining when to place new orders, and calculating how much stock to order to prevent stockouts or overstocking (inventory). It guarantees that the appropriate inventory is available in the appropriate quantity, at the appropriate time and location. Raw materials, finished goods, semi-finished goods (work in progress), spare parts, maintenance supplies, components, consumables, etc. are among these things or inventory (Hopp & Spearman 2000; Pandey 2008). Any business needs good inventory management, but manufacturing companies, in particular, need it because inventory makes up a significant share of current assets and consumes a lot of working capital. Up to 30% of a manufacturing company's investment is made up of inventory (Gracia-Terual & Martinez 2007; Schwarz 2022).

A company's ability to maximise profits while incurring the fewest costs is known as profit maximisation. It is the ideal output level at which a company makes the most profit. Increasing per-unit income, lowering per-unit costs, or a combination of both can optimise profit (Dey 2009; Woods 2021). When marginal revenue and marginal cost are equal, profit maximisation occurs. Therefore, $MR = MC$. As a result, businesses are constantly looking for methods and techniques to increase profits; one such strategy is the use of an efficient inventory control model.

There are various inventory control methods that businesses can use to manage their inventory to save costs and increase revenues. Each inventory model provides a special method for assisting businesses in determining how much inventory to keep on hand or in storage. This seminar paper will analyse four of these models, namely Economic Order Quantity (EOQ), Just-In-Time (JIT), Material Requirement Planning (MRP), and Safety Stock, which also serve as the inventory sub-variables for this work. A review of related literature will determine how these sub-variables and profit maximisation are related.

Businesses can manage their inventory using a variety of inventory control techniques to reduce costs and boost profits. Each inventory model offers a unique way to help companies decide how much inventory to keep on hand or in storage. Four of these models—Economic Order Quantity (EOQ), Just-In-Time (JIT), Material Requirements Planning (MRP), and Safety Stock—will be examined in this seminar paper. These models also serve as the inventory sub-variables for this study. The relationship between these sub-variables and profit maximisation will be examined in the relevant literature.

Applying effective inventory control in Nigerian manufacturing companies has several advantages, including cost savings, increased customer satisfaction, and financial success. However, Nigerian manufacturing companies face some significant inventory control issues. These include the inconsistent results of human inventory tracking, the inefficiency of warehouses, erroneous data, manual documentation, excess storage space, loss of merchandise, a lack of experience, inadequate software, etc.

Study objectives

- i.** evaluate the impact of the Just-in-Time (JIT) purchasing strategy on profit maximization.
- ii.** ascertain the impact of Material Requirement Planning (MRP) on profit maximization.
- iii.** determine the impact of Economic Order Quantity (EOQ) calculation on profit maximization.
- iv.** ascertain the role of safety stock on profit maximization.

Hypotheses

H₀₁: There is no significant relationship between inventory control practices and profit maximization

H₀₂: There is no significant relationship between safety stock and profit maximization

The Problem

The managerial know-how to effectively control inventory (raw materials, work-in-process and finished goods) has remained a major challenge to many Nigerian companies, especially those in the manufacturing sector, where raw materials account for more than 50 per cent of total production costs. Most of these firms appear not to understand the significant role effective

inventory control can play in cost reduction and profit maximization. Some companies hold excess inventory in their warehouses to enable them to meet customers' demands at all times and also forestall the embarrassment caused by stockouts. In doing this, they tend to undermine the problems associated with holding large inventory such as high storage and labour costs; locked up capital, spoilage, obsolescence and poor profitability. Conversely, some companies are in the practice of keeping very low inventory to mitigate the high costs associated with carrying a large inventory. This austere method of inventory control also has its challenges, which include poor quality service, inability to meet customers' demands, frequent stockouts, loss of customers, and low profits. The major problem of manufacturing firms in Nigeria, therefore, is in making the right choice of the inventory control system to adopt; which can guarantee optimum stockholding, mitigate stockouts, ensure customer satisfaction, achieve low storage costs, and maximize profit for the firm.

2. Review of Related Literature

Conceptual Review

The goal of this sub-section is to categorize and describe key concepts used in this study and outline the relationships between them. The insights that will emerge from the reviews will provide a delineated and specific agenda for future research. The following concepts will be reviewed under this sub-section: inventory, inventory control, and effective inventory control.

Concept of Inventory

Inventory is the stock purchased with the purpose of resale to gain profit. It represents the largest cost to a manufacturing firm. For a manufacturing firm, inventory consists of between 20% and 30% of the total investment (Gracia-Terual & Martinez, 2007). Also, Sharma (2016) defined inventory as a list of goods and materials which are available in stock for business. That is to say that inventory exists in almost every organization, and an organization must have a good understanding and strategy for inventory control. Inventory control has significance for a firm in the inventory-intensive manufacturing industry (Rajeev, 2008). This idea was implicit in Pandy's (2008) classification of manufacturing inventories in the forms of raw materials, work-in-progress and finished goods. Similarly, Hopp and Spearman (2000) classified inventory into raw materials, work-in-progress, finished goods and spare parts. Whereas raw materials are the stocks that have been purchased and will be used in the process of

manufacture, work-in-progress represents partially finished goods; while finished goods represent those items of stock that are ready to be monetized (Nwankwo & Osho, 2010).

Jenkins (2020) in his research findings defined inventory as the raw materials, components and finished goods a firm sells or uses in production. He added that Inventory is a major asset on most companies' balance sheets; however, too much inventory can become a practical liability. According to Kenton (2022), the term "inventory" refers to the raw materials used in production as well as the goods produced that are available for sale. He identified three types of inventory, including raw materials, work-in-progress, and finished goods. In the same vein, Menon (1995) classified inventory into four broad categories: (1) Production inventories: (a) those purchased from the market like raw materials, spare parts and components; and (b) special parts or components manufactured in one's own company and kept in stock for use; (2) Maintenance, repairs and operating supplies (MRO) inventories: bought-out materials required for maintenance of the production process but which do not form part of the finished product. These include petrol, oil and lubricants (POL), machine repair parts, jigs, tools, etc.; (3) Work-in-progress or In-process inventories: semi-finished products usually found on the factory floor in various stages of production; Finished goods: Products that have passed or completed the manufacturing process.

Concept of Inventory Control

The general definition of inventory control or stock control is "the action of verifying a shop's stock" (Macmillan Dictionary). Additionally, it is the process of making sure that a business has the appropriate amount of supply on hand (Schwarz) (2018). Small businesses may decide to use straightforward inventory management systems like the two bin system, whilst major businesses may decide to implement complex systems like ABC inventory control or Just-in-Time (Pandey) (2008). According to Stevenson (2010), inventory control is a strategy used by businesses to manage their interest in inventory. It includes tracking stock levels, keeping an eye on them, and forecasting future demands (Adeyemi 2010). It is also a method that firms use to organize, store, and replace inventory, to keep an adequate supply of goods and at the same time, minimize costs (Daveshwar and Dhawal (2013). A more focused definition of inventory control takes into account, the science-based, methodical practice of not only verifying a firm's inventory but also maximizing the amount of profit from the least amount of investment on inventory without affecting customer satisfaction (Lewis, 2012).

Whether a firm adopts a simple or complicated inventory control method, it must ensure that the system is most efficient, effective and profit-yielding.

Effective Inventory Control System

An effective inventory control system should consist of six main criteria: ensuring an uninterrupted supply of raw materials to enable an uninterrupted production process; keeping enough manufactured goods for uninterrupted sales transactions and proficient service to customers; reducing the holding cost and period; managing assets and keeping it at the best level; allowing improved utilization of on-hand stocks by simplifying interdepartmental handovers within a company; and lastly, keeping enough stocks of raw materials in periods of shortage in supplies and expected price increases (Khalid, 2018). This results in profit maximization because it is primarily concerned with reducing the ratio of ordering costs, the ratio of holding costs, and the ratio of lead times between ordering and receiving products (Oster, 2022). Summarily, an effective (well-functioning) inventory control system is a balance between having just enough materials or products in the stores/warehouse and keeping the stock cost under control so that the firm can maximize its profits.

Steps to Achieve Effective Inventory Control System

According to ERPLY (2020), there are four steps to achieving effective inventory control in a manufacturing firm:

Step 1 - Starting Out: Have at least one person in charge of the company's inventory to begin with. In addition to installing and implementing inventory control software based on the firm's line of business and particular needs, this will guarantee that someone has a clear overview of inventories (stock) and can respond quickly to questions about the inventory. It will also ensure that there is a backup system ready for all the data in case the computer malfunctions.

Step 2 – Ordering Goods: Ensure that too much money is not spent on inventory because it is inefficient to do so, it also erodes profit, increases store expenses, materials damages, and depreciation; the firm's staff in charge of procurement of materials should possess bargaining skills as to be able to bargain price and conditions with the suppliers to strike terms suitable for both parties. Always consider whether it is cheaper to order a large quantity and how fast the supplier can fulfil your order.

Step 3 – Tracking Inventory: Once the company has the inventory in stock, it should put in place, a suitable method for tracking it by using either a simple visual control regularly or a sophisticated program; depending on the size of the stock and the speed the goods are moving in and out. If the firm has already implemented inventory control software, it does not need to worry about this step. The firm must ensure accurate tracking of its inventory to ascertain how many items it has in stock at all times. Electronic data interchange and barcode scanning can eliminate data entry error and regular checkup is also necessary. A tracking system will provide control over the inventory and also monitor turnaround times. Whether a company is using a spreadsheet or a program to keep track of its inventory, a central database is necessary to ensure that all the changes are visible to everybody and that no data will be lost.

Step 4 – Stock Optimization: A firm should determine the number of products it needs to keep on hand and also the minimum stock level. This way, it will not run out of inventory; it should put in place a list of priority products that should always be in the warehouse; it should keep track of those items that are about to be sold or taken into use but are still recorded in the stock (once they are deducted, there may not be anything left to fulfil other obligations); a firm should not get used to ordering the same products. It should always track market trends and analyze which items are selling and which ones are becoming popular; use market research to identify proper products for different markets, study the economic forecast and keep an eye on competitors; have discounts and promotions to get rid of goods that have stayed in the store for too long.

Concept of Profit Maximization

Profit maximization is the capability of a firm to earn maximum profit at a low cost (Gulle 2020). Profit maximization occurs when marginal cost is equal to maximum revenue.

An assumption in classical economics is that firms seek to maximize profits.

Profit = Total Revenue (TR) – Total Cost (TC).

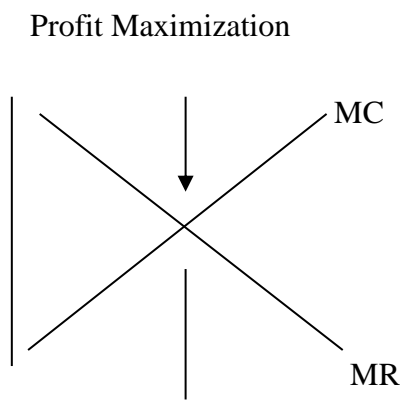
Total Revenue (TR): the amount of money a firm gets from the sale of output.

Average Revenue (AR): revenue per unit sold.

Marginal Revenue (MR): revenue gained by selling one additional unit.

A firm can maximize profits if it produces at an output where Marginal Revenue (MR) = Marginal Cost (MC).

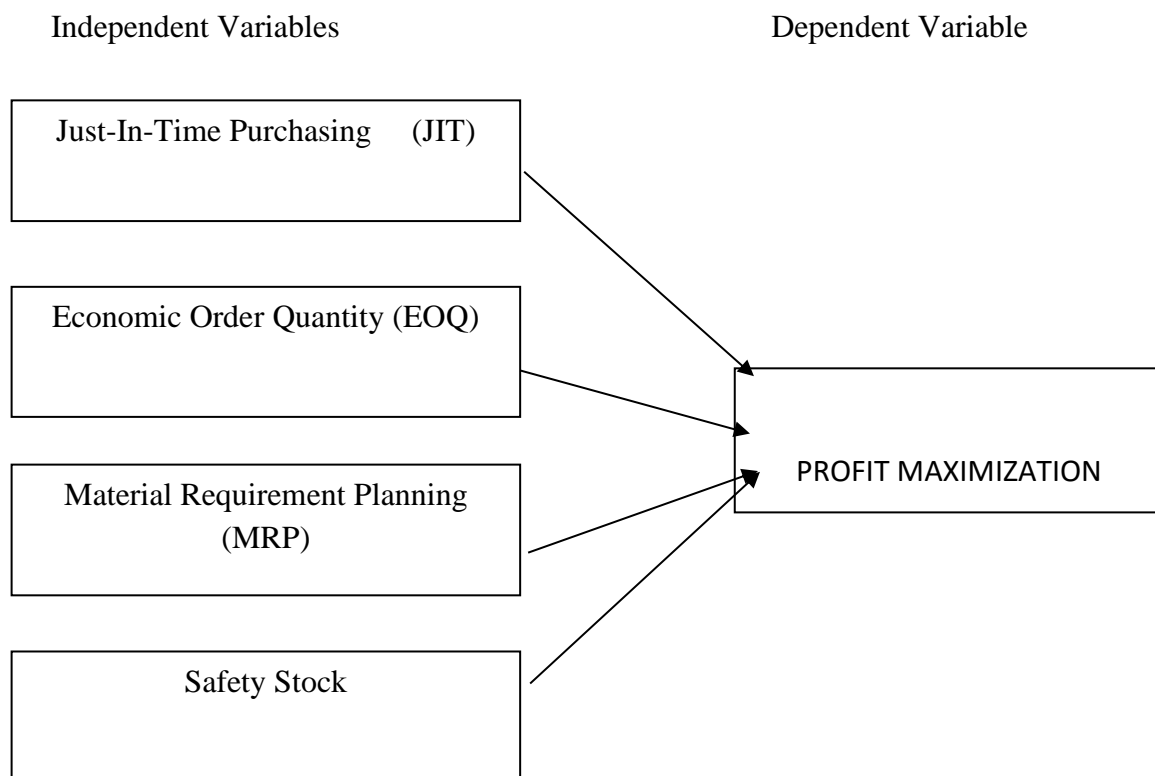
Diagram of profit maximization



Concept of Modelling

Modelling is the process of organizing knowledge about a given system. The resulting model represents a goal-directed simplification of the system under study, which is achieved by abstraction and aggregation (Jupp 2006). There are different types of models to address different types of systems. These contrasts include formal and informal models, physical and abstract models, descriptive and analytical models, system models, and others (Friedenthal) (2020). Just-In-Time (JIT), Economic Order Quantity (EOQ), Material Requirement Planning (MRP), and Safety Stock are the four models covered in this article.

Conceptual Framework of Variables



Source: Researcher’s conceptual model, 2022.

Just-In-Time (JIT) Purchasing and Profit Maximization

Just-In-Time (JIT) is an inventory control method in which materials are received from suppliers only as they are needed. The main objective of this model is to reduce inventory holding costs and increase inventory turnover (Kesavan, 2020). Firms use the JIT method to maintain the lowest stock levels possible before replenishment (Jenkins, 2020). This inventory control strategy also aims to enhance return on investment and maximize profit for the firm by reducing inventory control costs. JIT supply chain systems depend on inventory indicators that send signals to the ordering system based on previous demand. Once the ordering signal is received, the system can automatically order more products (Oster, 2022). JIT requires carefully planning the entire supply chain and usage of superior software to carry out the entire process till delivery, which increases efficiency and eliminates the scope for error as each process is monitored (Kesavan, 2020). Kesavan (2020) listed the positive impacts of a JIT inventory control model to include: reduction in inventory waste; decrease in a warehouse holding cost; giving the manufacturer more control; enhancement of local sourcing; and ensuring smaller investments in inventory.

JIT method helps a firm to maximize profit by ensuring that items which customers do not want to buy are not held in the firm's store or warehouse. It reduces warehouse storage space/cost; minimizes the incidence of stock obsolescence or spoilage; and minimizes on-hand stock while simultaneously ensuring there is adequate inventory to meet demands at all times (New Stream Enterprises (2020). Similarly, Gonzalez and Gonzalez (2010) linked profit maximization in some manufacturing firms to their usage of the Just-in-Time (JIT) inventory control model because it focuses on providing customers with stocks at the right time and with the right quantity thereby reducing carrying costs and maximizing profits at the same time.

Economic Order Quantity (EOQ) and Profit Maximization

Economic Order Quantity (EOQ) is the ideal quantity of materials a firm should purchase to minimize inventory costs including ordering costs, holding costs, shortage costs, and other inventory-related costs. The goal of EOQ is to identify the optimal number of product units to order. If achieved, a firm can minimize its costs for buying, delivering, and storing units (Fernando, 2022). EOQ model applies only when demand for a product is constant over one year and each new order is delivered in full when inventory reaches zero. There is a fixed cost for each order placed, regardless of the number of units ordered. An order is assumed to contain

only 1 unit. There is also a cost for each unit held in the store, commonly known as holding cost, sometimes expressed as a percentage of the purchase cost of the item (Nahmias, 2005). The EOQ calculation is designed to find the optimum order quantity for firms to minimize logistics costs, warehousing space, stockouts, and overstock costs (Callarman, 2020) to maximize their profits. It also minimizes stockouts, storage and holding costs; and helps firms manage their inventories effectively. A key disadvantage of this model is that it involves complicated mathematical calculations in addition to the assumption that demand for a firm's products, ordering and holding costs remain constant (Fernando, 2022).

The formula for Calculating Economic Order Quantity:

$$EOQ = \frac{\gamma (2SD)}{H}$$

Q = economic order quantity (units);

S = ordering cost per purchase;

D = demand in units (quantity order per year);

H = holding costs (per year).

In his work titled "Optimization of Economic Order Quantity and Profits under Markovian Demand", Mubiru (2016) established a positive relationship between the EOQ inventory model and profit maximization in manufacturing firms. His study showed empirically, that the EOQ model helps firms to maximize profits by ensuring that only the optimal quantity of materials are ordered at the lowest price, thereby reducing such costs as inventory ordering and holding costs, which tend to diminish firms' profits. In the same vein, Ordu (2014) in his study titled, "An Empirical Analysis of the Impact of EOQ Variables on Operating profit", in which he investigated the relevance of EOQ in enhancing a firm's profitability suggested that adherence to EOQ principles by manufacturing firms in Nigeria will lead to profit maximization. This is because the EOQ model helps firms to maintain a fixed amount of inventory in their stores/warehouses and also a reorder level that must be replenished accordingly to avoid shortages and extra costs.

Material Requirements Planning (MRP) and Profit Maximization

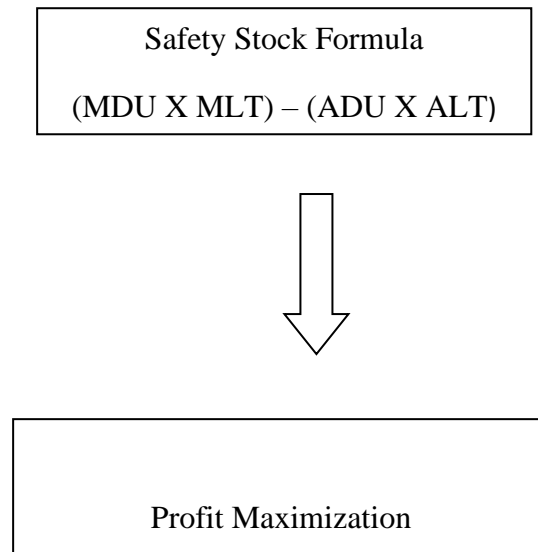
Material Requirement Planning (MRP) is an inventory control model that calculates the number of materials required for production. Its main objective is to ensure that there is a

continuous supply of raw materials until the end of the production line. Other objectives include: keeping inventory level as low as possible; avoiding production delays; improving coordination among employees; and guaranteeing that inventory level is always at its optimum (Zap Editorial, 2020). MRP aids manufacturing firms to keep optimum inventory levels; making way for efficient working capital; and improving factory operational efficiency through better use of resources. It is a software-based production planning, scheduling, and inventory control method used to manage manufacturing processes to ensure that raw materials are available for production and products are available for delivery to customers; maintain the lowest possible material and product levels in store; and plan manufacturing activities, delivery schedules and purchasing activities.

Furqon et al (2017) in their conference paper titled “Analysis of Material Requirement Planning (MRP) Implementation on the Company” underscored the influence of MRP on firms’ profitability. The study suggested that the MPR method of inventory control helps firms to maximize profits because it can minimize costs associated with inventory such as holding costs, ordering costs and set-up costs.

Safety Stock and Profit Maximization

Safety stock is an inventory control method that ensures there is always extra stock set aside in case the firm cannot replenish those items due to a delay in its supply (Jenkins, 2020). It serves as a cushion or buffer of goods available in a company’s warehouse (Fernando, 2022). It describes a level of extra stock that is maintained by a firm to mitigate the risk of stockouts (shortfall in raw material or packaging) caused by uncertainties in supply and demand (Monk, & Bret, 2009). Safety stock is also maintained to ensure a relatively high level of efficiency of deliveries to customers or to insure against relatively large delays in deliveries of materials from suppliers (Callarman (2020). There are times when demand can increase suddenly or there may be issues with a supplier that can make a company not have enough stock to service its customers. In such situations, the company can fall back on its safety stock. The amount of safety stock that a firm chooses to keep on hand can dramatically affect its business. Too much safety stock can result in a high holding cost of inventory. In addition, products that are stored for a long time can spoil, expire or break during the warehousing process. Conversely, too little safety stock can result in loss of sales, and thus, a high rate of customer turnover (Piasecki, 2011). There is, therefore, a need to find the right balance between keeping too much and too little safety stock; and this can be achieved with effective inventory control practice.



Source: Researcher’s Model 2022

Khandaker (2011) in a conference paper titled “Managing Safety Stocks in a Way to Profit Maximization for the Successful Application of Inventory Management System in a Multinational Company” delivered at Sylhet, Bangladesh, established empirically, a direct and positive relationship between optimum safety stock maintenance and profit maximization. He examined safety stock as an inventory control method under different operating conditions to ascertain its efficiency and effectiveness in helping organizations reduce costs and maximize profits. The research paper showed through mathematical calculations that effective administration of optimum safety stocks by firms tends to minimize their overall costs and maximize their profits.

3. Theoretical Review/Model

Under this sub-section, the Economic Order Quantity (EOQ) inventory control model will be x-rayed.

Economic Order Quantity (EOQ) Theory/Model

Economic Order Quantity (EOQ) is one of the oldest, most important and most durable inventory control models. It was developed in 1913 by Ford Whiteman Harris and has been refined over time. The Economic Order Quantity (EOQ) is the optimal number of units that a company should order in order to reduce its inventory costs, including holding costs, shortfall

costs, and ordering costs. In order to avoid having to place orders too frequently and having too much inventory in the stores, the EOQ model aims to make sure that the appropriate amount of inventory is ordered per batch. The model presupposes that there is a trade-off between inventory setup costs and holding costs, and that total inventory costs are minimised when setup costs and holding costs are both reduced (Tarver 2022).

The Formula for Economic Order Quantity:

$$EOQ = \frac{\sqrt{2 \times S \times D}}{H}$$

Where:

S = Setup costs (per order, generally including shipping and handling).

D = Demand rate (quantity sold per year).

H = Holding costs (per year, per unit).

How to calculate the EOQ

To calculate the EOQ for a firm's inventory, the setup costs, demand rate, and holding costs must be known. Setup costs refer to all the costs associated with ordering the inventory. Such costs include packaging, delivery, shipping and handling. The demand rate is the amount of inventory a firm sells each year. Holding costs refer to the costs associated with keeping an additional inventory, such as warehousing and logistical costs; insurance costs, materials handling costs, inventory write-offs and depreciation (Tarver 2022). Ordering a large amount of inventory increases a firm's holding costs while ordering smaller amounts of inventory more frequently increases a company's set-up costs. The EOQ model finds that quantity that minimizes both holding and setup costs.

Disadvantages of applying the Economic Order Quantity (EOQ) Model

1. It assumes that consumer demand is constant.
2. The calculation assumes that both ordering and holding costs remain constant over time.

These assumptions make it difficult for a firm adopting this model to account for changes in business such as changes in consumer demands, seasonal changes in inventory costs, and purchase discounts a firm might get for buying inventory in large quantities.

Empirical Studies Review

Ibegbulem & Okorie (2015) assessed "Inventory management and profitability of organizations" in Nigeria to ascertain the influence of inventory control on a company's profitability; adopting a survey method. The results of their study revealed a positive and significant relationship between effective inventory control and the profitability of organizations. Other findings include: profitability can be achieved through an effective inventory control system with particular attention to sourcing, receiving, storing, and issuing stock; prudent management of inventory reduces depreciation, pilferage, and wastages; and also ensures availability of materials. They concluded that for an organization to maximize profit, inventory control should be properly planned. They recommended that organizations should maintain a good record system of materials; minimize the rate of spoilage and wastages; ensure optimum materials supply to avoid stockouts; engage in periodic staff training on inventory control, and computerize the inventory control system for ease of materials tracking in the stores.

Khalid & Lim (2018) investigated the "Relationship between the inventory control system and organizational performance of manufacturing companies" in Melaka, Malaysia. The research objective was to ascertain the effect of the application of Vendor Managed Inventory (VMI), Material Requirement Planning (MRP), and Just-in-Time (JIT) inventory methods on organizational performance. The survey method was adopted. The results showed that there is a positive relationship between effective inventory control systems, which could be any of VMI, MRP or EOQ and organizational performance in manufacturing companies. The study also showed that having an effective inventory control strategy in place will directly or indirectly impact positively on the company's performance including in the area of profit maximization.

Sheakh (2018) examined the relationship between the inventory control system and company performance based on inventory days and return on asset (ROA) analysis. The study found that manufacturing companies are faced with certain inventory problems such as unorganized inventory arrangement, and inaccurate records balance due to unskilled workers.

According to Lyson (1996), inventory control increases profitability by lowering the expenses of managing and storing materials. He noted that inventory control establishes the volume of goods held in stock and enables the materials manager to carry out precise and effective

production activities for the company. He came to the conclusion that profit maximisation depends on the adequate and effective use of resources through a system of effective inventory control.

Atnafu & Balda (2018) examined the impact of inventory management practice on a firm's competitiveness and organizational performance; with data collected from 188 micro and small enterprises (MSEs) operating in the Ethiopian manufacturing sub-sector. The relationships and hypotheses proposed in the conceptual framework were tested using structural equation modelling (SEM).

The results indicate that an effective inventory control system can lead to profit maximization, competitive advantage, and improved organizational performance.

Thus, the effective inventory control system has a direct positive impact on organizational performance in terms of profit maximization.

The study recommended that owners and managers of micro and small enterprises should promote an effective inventory control practice by using different scientific models which will result in maximized profit, competitiveness and organizational performance.

Using real-world data, Pan and Hui (2017) investigated stockout risk associated with the inventory control system of a healthcare apparel service centre in Hong Kong; which provides customized apparel-making services for the elderly and physically challenged people. With its very small-sized inventory capacity, this service centre could keep a lot of fabric materials in stock. The major problem of this centre was, therefore, the backlog of requests and stockout, with attendant cost implications. As a result, the centre tried to achieve a very low stockout level, which the study termed "a stockout risk." The study adopted the optimal inventory control model, which resulted in improved efficiency in operations, and a considerable reduction in stockout level as well as the total cost incurred on an order cycle by the healthcare centre.

Shiau Wei Chan et al (2017) investigated "Factors Influencing the Effectiveness of Inventory Control in Manufacturing Small and Medium Enterprises (SMEs). Data for the study were quantitatively collected via a questionnaire from 80 employees randomly selected from the manufacturing SMEs in Batu Pahat, Johor, Malaysia. The results showed that the problems of inventory control faced by manufacturing companies were underproduction, overproduction, stockout situation, delays in the delivery of raw materials and discrepancy of records. The study

further showed that factors such as documentation/store records, planning, knowledge of employees, and staff skill significantly influence the effectiveness of inventory control systems in SMEs.

According to Choi (2012), an efficient inventory control system is crucial to the operation of any business because it enables holding the appropriate amount of stock to satisfy customers' needs without running the risk of shortages frequently while maintaining a high service level. A company's operating costs are raised by inventories in two ways: by tying up money and by raising the price of keeping and managing the inventory itself. It has been noted that the lead time (the amount of time it takes to order and receive merchandise) is sometimes lengthy and that the demand from customers is rarely fully understood (Axsater, 2006).

In his study titled, "Decision Rules for Inventory Control", Oster (2022), opines that businesses of all sizes must have effective control over inventory to maximize profits. He submitted that the inventory control system a company adopts will determine its ability to meet customer expectations; as happy customers are keys to a company's ability to generate sales and maximize profits. According to the study, the primary role of the effective inventory control system is to reduce ordering costs to the lowest possible level, as well as to control the costs related to keeping inventory in the stores. He listed inventory restraints to include storage costs, damage to goods, age of inventory and spoilage.

To eliminate or minimize these inventory problems, Oster (2022) recommended that manufacturing companies should use computerized systems to manage inventory levels. He also advised that the software adopted can be engineered to order products exactly when the stock reaches a predetermined level. The inventory software automatically orders new products on a predetermined cycle. The study concluded that if the system operates correctly, inventory-handling costs will be reduced, products will not be lost to spoilage and obsolescence; customers will receive their orders on time and the company will also maximize its profits.

Jenkins (2020), an inventory expert and Product Marketing Manager at Oracle Netsuite, presented an overview of the effective inventory control system, types, benefits and techniques. He noted that one measure of the effective inventory control system is inventory turnover; which is a reflection of how often stock is sold within a period. He concluded that poor inventory turnover can lead to unsold stock. Jenkins submitted that effective inventory control is vital to a company's health because it helps make sure there is not too much or too little stock

on hand and minimizes the risk of stockouts and inaccurate records. He listed the benefits of the effective inventory control system to include the following:

1. **Saves Money:** It allows a company to keep less stock, which decreases costs tied up in inventory and decreases the amount of stock that goes unsold before it becomes obsolete.
2. **Improves Cash Flow:** With an effective inventory control system in place, a company will only spend money on inventory that sells, so cash is always moving through the business.
3. **Satisfies Customers:** Effective inventory control system guarantees satisfaction and loyalty because it ensures that customers receive the items they want without having to wait.

Popoola (2017) in her study titled “Inventory Control and Profit Maximization in a Manufacturing Company: A Case Study of Nigeria Distilleries Limited”, sought to determine whether profit can be maximized and cost minimized through the application of efficient inventory control systems such as Just-in-Time purchasing method, Economic Order Quantity, and related inventory control models. Findings from the study showed that companies that operate an effective inventory control system, which ensures that the right quantity of orders is placed at the right time and supplies made accordingly, without compromising the lead time are most likely to maximize profits. The study also showed that companies that manage inventory effectively are also able to minimize the costs of holding inventories.

Kungu (2019) investigated the “Effects of Inventory Control on Profitability of Industries and Allied Firms in Kenya.” The study revealed that too much and too low inventories bring down the level of profitability of an organization. The study leveraged the Economic Order Quantity (EOQ) model, which minimizes costs associated with stock holding and stock ordering. The study adopted a correlation research design with data obtained from both primary and secondary sources. A sample of 71 industrial and allied companies was selected from a population of 399 industrial and allied firms in Nairobi using a stratified sampling technique. Data collected were analyzed using inferential data analysis, Pearson’s correlation, regression, and ANOVA analysis. The study revealed that there is a positive and significant relationship between inventory control practices and profitability in manufacturing companies. The study recommended that companies should install and maintain good (effective) inventory control

systems such as Economic Order Quantity (EOQ) and Just-in-Time (JIT); as this will help to maintain ideal levels of inventory that will guarantee profitability.

Ejike (2019) investigated "The Impact of Inventory Control on Operating Profits of Manufacturing Firms in Nigeria." The study adopted content analysis using a cross-sectional survey among 20 selected manufacturing firms in Nigeria. Data were obtained from the financial statements of the various firms. Inferential statistics of linear regression were used to test the research hypotheses. The results showed that manufacturing firms in Nigeria can increase their performance both in the short and long run with the adoption of an effective inventory control system. The study also showed that the firms investigated had no threats of becoming bankrupt as long as they maintained a high level of control on inventory because they could always maximize their operational efficiency and profitability.

Pamph (2016) investigated the "Impact of efficient inventory management on profitability" in selected manufacturing firms in Ghana by using cross-sectional data obtained from the annual reports of four manufacturing firms listed on the Ghana Stock Exchange between 2004 and 2014 for analysis. The study revealed that efficient raw materials inventory management has a strong and significant impact on a company's profitability. The study concluded that efficient management of raw material inventory is a major factor to be considered by Ghanaian manufacturers in boosting their profitability.

In his study titled, "Effect of Inventory Management on Financial Performance: Evidence from the Saudi Manufacturing Company", Torkey (2020) explored the relationship between inventory control and the financial performance of a manufacturing company through the use of a case study approach. It also examined factors that draw back the process of inventory control. The results of the study showed that the profitability of a company has a significant relationship with inventory management. The study concluded that if the management of inventory is done effectively, it will ensure more profitability; while poor management translates to poor financial performance.

According to Mubiru (2016), firms continuously strive to plan for optimal inventory levels that sustain random demand for items. In practice, when inventory exceeds the quantity demanded, inventory carrying costs accumulate, which affects the profit margins of the firm. Similarly, inventory levels below demand impose shortage costs and loss of goodwill from potential customers. Both scenarios drastically reduce profit margins unless proper planning and

coordination through an effective inventory system are put in place to establish optimal inventory levels.

4. Tools and Procedures

The manufacturing businesses' quasi-experimental design was used in this multi-session investigation. Based on 116 completed survey responses, the outcomes. Five chosen businesses in the Delta State of Nigeria received a total of 120 surveys through email. A survey that was sent out through email received 116 replies overall, for a 97% response rate. The organisational analysis unit is used to determine who should take the survey. It has been determined that a key position inside these businesses is necessary to comprehend inventory control procedures and their long-term profit maximisation. The General Manager (GM) office, managers, supervisors, and team leaders in charge of crucial duties including maintenance (MTC), engineering, and procurement are included in this. Additionally, there are contracts and procurement (C & P), projects (ECP), materials, and logistics. Aside from that, manufacturing and human resources (HR). All components were graded over 0.7 during the appliance's reliability testing using Cronbach's alpha coefficient, as indicated in the table below. Researchers have utilised Spearman's rank correlation coefficient to assess the direction and strength of correlations between research variables.

Table 1: Reliability Co-efficient of variable measures

Variables	Measures	Indicators	Alpha
Inventory Control Practices	Just-In-Time	3	0.882
Optimizing Profit Maximisation	Materials Requirement Planning	3	0.842
	Economic Order Quantity	3	0.764
	Safety Control	3	0.764

Source: Researcher's data output, 2022.

Hypotheses Testing

The Decision Rule

If the probability value calculated is greater than the critical level of significance, then the null hypotheses will be accepted while the alternate hypotheses are rejected and vice versa.

Hypothesis One

H₀₂: There is no significant relationship between inventory control practices and profit maximization

Hypotheses Two

H₀₂: There is no significant relationship between safety stock and profit maximization

5. Findings and analysis

According to the hypothesis, the correlation tool's Spearman's rank with a 95% confidence interval (the significance level was set to a significance level of 0.05). PV 0.005, in this case, indicates weak correlations between the studied variables, which rejects the null hypothesis. The null hypothesis is accepted when P > 0.005. Using theoretical and modelling foundations, Table 2 below demonstrates the substantial relationship between Just-in-Time, Materials Requirement Planning, Economic Order Quantity, and Safety Stock (independent variables) and profit maximisation. The study found that profit maximisation had a long-term, substantial positive connection, accepting the null hypotheses 1 and 2 at 0.457 and 0.286, respectively.

Table 2: Inventory Control practices and profit maximization

			Inventory	Safety stock	Responsive
Spearman's rho	Inventory Control	Correlation Coefficient	1.000	.625**	.457**
		Sig. (2-tailed)	.	.000	.000
		N	116	116	116
	Safety stock	Correlation Coefficient	.625**	1.000	.286**
		Sig. (2-tailed)	.000	.	.002
		N	116	116	116
	Responsive	Correlation Coefficient	.457**	.286**	1.000
		Sig. (2-tailed)	.000	.002	.
		N	116	116	116

Source: Researcher's data, 2022.

Results and hypotheses

The findings of this study support the notion that economic order quantity (EOQ), safety control, just-in-time (JIT), and materials requirement planning (MRP) have a beneficial impact on competitive advantage and are significant predictors of profit maximisation. As a result, inventory control procedures effectively leverage cost reduction, system harmonisation,

functional integration, and driving, enabling improved use of on-hand stocks by streamlining interdepartmental handovers within a company; and finally, keeping enough stocks of raw materials in times of supply shortages and anticipated price increases (Khalid, 2018). It backs up the assertion that a business can be responsive and adaptable while yet remaining competitive.

6. Conclusions and Recommendations

The study aimed to ascertain the influence of an effective inventory control system on the profit maximization of manufacturing firms in Nigeria by examining extant literature on the subject matter.

As the independent variables to evaluate the research objectives, it defined and discussed four inventory control strategies: Just-in-Time (JIT), Economic Order Quantity (EOQ), Material Requirement Planning (MRP), and Safety Stock.

The study showed that the identified independent variables—Just-in-Time, Economic Order Quantity, Material Requirement Planning, and Stock Level Determination—which are efficient inventory control models—have a significant and positive influence on the dependent variable (profit maximisation). This viewpoint is consistent with those of Nahmias (2005), Kesavan (2000), Oster (2002), and Fernando (2002).

When it comes to inventory management, the company must constantly balance two competing demands: maintaining a substantial amount of inventory to ensure effective and seamless production and sales operations and maintaining a minimal amount of inventory to minimise costs and increase profits (Pandey, 2008). Inventory that is either too little or too much is undesirable. High stockholding costs and poor profitability are risks associated with having too many inventories. As Mohammad suggests, managers can increase value for the company's stakeholders by reducing inventory levels (2011). Contrarily, keeping an insufficient level of inventory is risky since, in addition to incurring high ordering costs, it could result in a stockout, which would be bad for the company.

The adoption of any of the efficient and scientific inventory control models covered in this study, such as Just-in-Time (JIT), Economic Order Quantity (EOQ), Material Requirement Planning (MRP), and Safety Stock, is, therefore, the optimum choice, as shown by the body of existing literature.

Profit maximisation will occur from the implementation of an efficient inventory control system since it places a priority on lowering the ratios of ordering costs, holding costs, and lead times (the time lag between placing orders and receiving the products).

An efficient inventory control system makes sure that there is a balance between having just the right amount of supplies or goods in the warehouse or stores and keeping the cost of stock in check so that the company may optimize its earnings.

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