

Effect of Inventory Management Practices on Operational Performance of Flour Milling Companies in Nigeria

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Abstract: This study examined the effect of inventory management practices on operational performance of selected flour mills companies in Nigeria. The study adopted cross-sectional survey research design. The target population comprised 2,237 staff of the selected flour mills companies. A stratified random sampling technique was used to select the sample size of 776. A structured self-administered survey questionnaire was adapted, validated and used for collecting data for the study. The Cronbach's alpha coefficients for the constructs ranged between 0.783 and 0.971. The response rate to the 776 copies of the questionnaire administered was 82.6%. Data were analyzed using descriptive and inferential (Pearson Product Moment Correlation and Regression Analysis) statistics. Findings revealed Finding revealed that automated inventory system was found to be positively and significantly related to operational performance ($B = 0.806$, $p\text{-value} < 0.05$). Inventory shrinkage was found to be negatively and significantly related operational performance ($B = -9512539.85$, $p\text{-value} < 0.05$ level of significance). Inventory investment was found to be positively and significantly related to operational performance ($B = 0.220$, $p\text{-value} < 0.05$). Inventory record accuracy was found to be positively and significantly related to operational performance ($B = 329.426$, $p\text{-value} < 0.05$). Inventory turnover was found to be positively and significantly related to operational performance ($B = 0.707$, $p\text{-value} < 0.05$). The study concluded that inventory management practices significantly influenced operational performance of flour mills companies in Nigeria. It recommended that the companies should ensure that stocks were sufficient to meet production requirements and customer demands at all times and avoid holding unnecessary surplus stocks that might increase holding costs and thus ensure enhanced customer satisfaction.

Keywords: Inventory management practices, Operational performance, Cost effectiveness, Flour mills companies, Automated inventory system

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1. INTRODUCTION

In recent years, many firms in the world have faced several challenges particularly in inventory management and control, thus affecting their operational performance. There have been cases of materials overstocking which eventually got expired or out dated, under stocking, lack of stock-taking, theft of materials by workers and delay in delivery of materials into the organizations among others. Many manufacturing firms have more than 50% of total assets invested in

working capital, which includes inventory, as well as accounts receivable and accounts payable (Beheshti, 2010; Darun, Roudaki, & Radford, 2015; Gill, Biger, & Mathur, 2010).

The basic method of managing stock by quantity by manufacturing firms are by means of fixing for each commodity stock levels which are recorded in the stock control system and subsequently used as a means of indicating when some actions are necessary. Most firms cannot work properly without stock and therefore they have to consider its management. There is a need for organization to maintain a minimum, ordering, hastening and maximum stock levels (Harrisson, 2001 cited in to Munyao, Omulo, Mwithiga, & Chepkulei, 2015). Bainsong and Bainsong (2016) argue that stock levels should be carefully received at suitable intervals, such as quarterly, monthly or even weekly and adjusted to meet any changes in circumstances. If this is not done, the original fixed level will be less than expected, become outdated and the system of stock control is rendered ineffective. The amount of stocks held at the warehouse of manufacturing firms can drastically affect cost and hence finances. This therefore, demands strong monitoring of the changing conditions of stock levels in stores.

The planning and control of inventories and related activities are critical to the success of manufacturing industry. Managers of organizations have sought reliable and effective inventory practices and systems to remain competitive. Nsikan, Etim, and Ime (2015) assert that various organizations have employed the basic inventory management techniques or inventory control methods to keep their inventory costs in check. The various inventory management best practices that have been adopted by organizations include economic order quantity model (EOQ), just in time (JIT), vendor managed inventory (VMI), collaborative planning (CP), forecasting and replenishment, automatic replenishment, agile system, and material requirement planning and so on. However, some researchers have suggested that managers who turn to inventory research may find it to be of little significance (Boone, Craighead, & Hanna, 2008) or conclude that it has little to offer in terms of enhancing inventory practices (Wagner, 2002). This implies that a gap exists between inventory theory and practice in the manufacturing industry including the Nigerian flour milling industry, and the need to bridge the theory-practice gap is imperative.

The studies on the relationship between inventory management practices and performance of manufacturing companies in Nigeria have focused majorly on the techniques for controlling inventories such as EOQ model, Just-in-Time technique, associated with variables such as profitability, customer satisfaction, and efficient delivery. Also, despite several models (both deterministic and stochastic) that have been adopted in practice by manufacturing firms, an assessment of the effect of internal inventory management practices in enhancing operational performance of flour milling companies in Nigeria are currently lacking. Previous studies such as Adamu (2016), Ogbo and Ukpere (2014), Takim (2014) and so on, have related inventory management practices with various aspects of organizational performance such as financial and economic performance, and most of these studies have focused on external inventory management practices. Specific study exclusively on the effects of inventory management practices on operational performance of flour milling companies in Nigeria by Nsikan *et al* (2015) did not basically used operational performance variables, rather used financial variables. In addition, most studies that attempted to focus on operational performance concentrated on solvency and operating performance of firms based in Kenya and India such as Kamau and Kagiri (2015), Oballah, Waiganjo and Wachiuri (2015), and Shafi (2014). Very limited study has been done on inventory management practices and operational performance of flour milling

companies in Nigeria. It is therefore evident that knowledge gap exists on the specific relationship between internal inventory management practices and operational performance. This study intends to bridge this gap by determining the relationship between internal inventory management practices and operational performance of flour mills companies in Nigeria.

Statement of the Problem

It has been confirmed that organizations worldwide have adopted inventory management systems into their operations (Swaleh & Were, 2014). However, despite the increasing attention given to inventory management in the practical and academic fields, the performance of manufacturing firms in Nigeria including Nigerian flour milling companies have been very disappointing. The flour milling manufacturing firms operating in Nigeria are facing problem in determining appropriate inventory level that should be kept to ensure that customer needs are met and production process is not interrupted. Nsikan *et al* (2015) indicated flour milling companies in Nigeria have a problem of inaccurate forecasts mainly because they lack real time inventory information on customers' demand. This has in turn led to late deliveries, inadequate deliveries and lack of consistency in the delivery of products and thus leading to lack of customer satisfaction. Investment in inventories creates opportunity for manufacturing organisations to gain market advantage by outperforming competitors in terms of attracting more customers with distinguished products and charge premium prices (Marfo-Yiadom & Kweku, 2008). The flour milling companies in Nigeria has also had problems of investments in less critical stocks leading to unnecessary costs, inaccurate forecasts, and poor responsiveness to customers' orders leading to decline performance (Njoku & kalu, 2015). The poor investment in inventories have undermined operational performance of flour milling companies by losing out on potential sales, and potential market share as well (Chukwuemeka & Onwusoronyem, 2013). This resulted to a significant loss of customers to competitors in the industry. The problem of inventory control is another important concept in organizational management (Ziukov, 2015). Research has shown that inventory control was one of the most neglected management areas in most firms, thus straining on a business operation (Mogere, Oloko, & Okibo, 2013). Empirical evidence has shown more and more manufacturing firms have failed inventory control, and therefore suffered losses (Kariuki, 2013). Nsikan *et al.* (2015) noted that most of the Nigerian flour milling companies were still using traditional methods of inventory control and valuation which was considered inappropriate and unsophisticated. Anichebe and Agu (2013) stated that flour milling companies at times do not control their inventory holding, resulting in under stocking and causing the organizations to stay off production, thereby resulting to high cost overrun.

Another inventory management system that influences organizations business and operational performance is the inventory turnover. Inventory turnover is a measure of management's ability to use resources effectively and efficiently. However, in spite of the large size of Nigeria flour milling industry, the industry is suffering from low level of operational performance. According to Adesiyon (2015), flour milling companies are not performing up to average. Their dismal performance has been attributed to poor inventory turnover leading to lower operational efficiency. Research has shown that the issue of inventory inaccuracy is a common problem affecting manufacturing firms in achieving their goals and objectives (Oballah *et al.*, 2015). As noted by Okiridu (2014) and Ayomoh, Oladeji and Oke (2004), many firms in Nigerian flour mill industry have not establish the central purchasing department, lack computerized stock

management and were not able to employ the services of well qualified stores officers to take charge of record management. The problems have made the raw material control policies and internal control measure very weak. It has also led to the failure to meet delivery commitment and consequent loss of sales (slow sales growth). From the literature, it is observed that inventory management is a critical management issue for manufacturing companies across (Mukopi & Iravo, 2015). In order to realize the benefits of effective inventory management, manufacturing firms should attempt to automate their inventory management operations (Kitheka, 2012). Furthermore, research by Owoye *et al.* (2015) and complemented by Nsikan *et al.* (2015) showed that majority of manufacturing companies in Nigeria and flour mills companies in particular, have not yet adopted computerized inventory management system or automated management system (Kitheka, 2012; Kitheka & Gerald, 2014). They have majorly concentrated on manual and mathematical models of inventory management. This challenge has created minimal utilization of resources, high operating costs and inappropriate planning leading to poor work efficiency, and low productivity (Nsikan, *et al.*, 2015; Owoeye *et al.*, 2015).

Objective of the study

The purpose of the study was to examine the relationship between inventory management practices and operational performance of flour mills companies in Nigeria. The specific objectives of the study were:

- i. determine the effect of inventory shrinkage on customer's satisfaction of the selected Flour Mills companies in Nigeria;
- ii. examine the influence of inventory investment on the competitive advantage of the selected Flour Mills companies in Nigeria;
- iii. find out the relationship between inventory control and cost effectiveness of the selected Flour Mills companies in Nigeria;
- iv. assess the effect of inventory turnover on the operational efficiency of the selected Flour Mills companies in Nigeria;
- v. identify the relationship between inventory record accuracy and the customer service delivery of the selected Flour Mills companies in Nigeria; and
- vi. establish the influence of automated inventory system on the productivity of the selected Flour Mills companies in Nigeria.

Research Hypothesis

The study formulates the following null hypothesis:

- H₀₁: Inventory shrinkage has no significant effect on customer's satisfaction of the selected Flour Mills companies in Nigeria.
- H₀₂: Inventory investment has no significant influence on the competitive advantage of the selected Flour Mills companies in Nigeria.
- H₀₃: There is no significant relationship between inventory control and the cost effectiveness of the selected Flour Mills companies in Nigeria.
- H₀₄: Inventory turnover has no significant effect on the operational efficiency of the selected Flour Mills companies in Nigeria.

- H₀₅: There is no significant relationship between inventory record accuracy and the customer service delivery of the selected Flour Mills companies in Nigeria.
- H₀₆: Automated inventory system does not have significant influence on the productivity of the selected Flour Mills companies in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Review

This section contains the definitions, characteristics, advantages and disadvantages of the main variables and the sub-variables of this study. The two main variables are inventory management practices and operational performance. These variables guide the framework of the review in order to achieve objectives of the study.

Inventory Management Practices

Inventory is a vital ingredient in production of goods or services alongside other factors of production. Inventories such as finished goods, work-in progress, components, raw materials, stores, spares, and so on constituted 80 per cent or more of the working capital in many organizations. Inventory management has to do with 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 (Lwika, Ojera, Mugenda & Wachira, 2013). Naliaka and Namusonge (2015) described inventory management as a fine line between the replenishment lead time, carrying costs, asset management, inventory forecasting, valuation of inventory, future inventory price forecasting, physical inventory, inventory visibility, available space for inventory, quality management, replenishment, returns, defective goods and demand forecasting. Inventory management practices as one of the supply chain management practices is an activity that organizes the availability of goods to the customers from sales items to consumables and spare parts (Tungo, 2014). It is a balancing act that enables a system (or operations) to have long runs of operation for better efficiency and ensuring high inventory are ready for sale, purchasing long run orders for better efficiency and balancing act of working capital and cash flow. Furthermore, inventory management practices involve the use of many techniques of managing inventories in an organization, these techniques are EOQ method, Stock levels, ABC analysis, Strategic Supplier Partnership, EDI, JIT, EPOS, Bar coding, Lean inventory system, MRP, ERP and VMI. All these methods can be used by any organization in managing inventories (Tungo, 2014). A broad review of all the variables of Inventory Management Practices used in this study will be explained in the following sub-headings (Inventory Shrinkage, Inventory Investment, Inventory Control, Inventory Turnover, Inventory Record Accuracy, and Automated Inventory System).

Inventory Shrinkage

The term 'shrinkage' refers to something becoming smaller or a gradual contraction over time an impact not considered to be serious or of much concern (Beck & Peacock, 2009). Inventory shrinkage means the amount of inventory that exists in account records but no longer exists in actual records. It is the discrepancy between the physical count of the inventory and its book value. In inventory management, shrinkage is classified as risk costs resulted particularly from product obsolescence, theft (that is, from customer shoplifting and employee theft), natural disaster, poor inventory storage, among others. It was described as a shortage occurring when the

final calculated inventory value in a company's accounting records fall below the final valuation from the physical inventory. Gilbert (2003) and Levy and Weitz (2004) see inventory shrinkage as the difference between the recorded value of stock in the inventory stock system, which records merchandise received at the store, and the value of actual inventory in the store, as determined by a physical count of inventory. Shrinkage is usually expressed in the actual naira amount difference, or as a percentage of the total inventory balance.

There are several classifications of inventory shrinkage and one of the common classifications is based on origin of shrink, such as shrink due to external causes, and shrink due to internal causes (Salah, 2008). External causes of inventory shrinkage include customer theft, organized crime ring (theft for profit), vendor dishonesty or/and administrative errors. The internal causes include employee theft, administrative errors and/or system failure (Bramfield, 2004 cited in Salah, 2008). Internal theft, according to Carl and Shaun (2014) refers to the loss of goods carried out by people directly employed within the organization. Dunne, Lusch and Griffith (2002) described theft of stock by employees to includes direct theft form stock rooms and shop floors, or collusion with customers and suppliers to steal stock or defraud the retailer (Newman & Cullen, 2002) as well as cashier fraud (Newman & Cullen, 2002). External theft or an act of theft from a retailer is a crime committed during hours the store is open to the public by a person who is or appears to be a legitimate customers Carl and Shaun (2014).

Inventory shrinkage has also been categorized into known and unknown losses (Carl & Shaun, 2014). Known losses are those that can be readily identified, recorded and processed by business, like an incidence of shop thieves who have been caught red handed and the goods they attempted to steal recovered but could not be subsequently sold (if the goods have already been damaged). The association with this incidence is recorded as shrinkage due to external theft. Grasso (2003) cited in Carl and Shaun (2014) described this class of shrinkage as retail crime losses. The Unknown losses are those losses in which the cause cannot be ascertained (Carl & Shaun, 2014). According to Carl and Shaun (2014), these losses are mainly identified when the organizations undertake regular stock audits and realize that there are differences between what the book stock suggests should be in the store and what an actual physical count of the stock identifies. The difference between the two numbers is regarded to as Unknown Shrinkage. This also regarded to as unexplained stock losses.

Inventory Investment

According to Ali and Asif (2012), inventory investment is an investment in physical stock of raw materials, work in progress and finished stock. In contrast to fixed investment, inventories are constantly being 'turned over' as the production cycle repeats itself, with raw materials being purchased, converted first into work in progress, then into finished goods, then finally being sold. The amount of inventory investment directly affects company's profit and cash flow. Inventory investment, according to Poljacovic (2006), refers to those goods that businesses put aside in storage, including materials and supplies, work in process, and finished goods. It is the change in the stock of materials, works in process, and finished goods within a firm, industry, or entire economy over a specified period of time. Kamau and Kagiri (2015) explained that objectives of inventory management practices are to minimize inventory investments and to maximize customer service. It is a plan to see that, the goals can be inconsistent or even indirectly conflict the role of the material's management which is thus to balance the objective in relation to the existing conditions and environmental limitations (Thummalapalli, 2010). Inventory investment

is a measurement of the change in inventory levels in a firm from one time period to the next. Store managers watch these levels closely, as they are often tied to the level of the firm's total product. If inventory levels go up from one point in time, inventory investment is classified as positive, and it is classified as negative if levels fall.

Inventory Control

Controlling is a process by which some aspect of system is modified to achieve a desired change in system performance. Hailing and Guochao (2011) defined inventory control as a process in which the materials and parts carried in stock are regulated within pre-determined limits or set in accordance with the policy and procedures implemented or adopted by the manufacturing firms. Jeff (2010) points out that inventory control is the process of managing inventory in order to meet customer demand at the lowest possible cost and with a minimum investment. In the view of Naliaka and Namusonge (2015), inventory control is a mean by which associated materials of the right quality and quantity are made available as when required with due regards to the economy of shortages, ordering cost, purchase price and working capital. Inventory control determines the extent of stock holding materials. It equally makes it possible for material manager to carryout accurate and efficient operation of the manufacturing organization through decoupling of individual segment of the total operation and it entails the process of assessing of stock into store house and the issue of stock. A good inventory control system minimize the possibility of delays in production that are caused by lack of materials, permits a company to exercise economics in purchasing, essential for an efficient accounting system is deterrent to people who might steal materials from factory is desirable to expedite the production of financial statement; allows for possible increase in output; insure advantage of quality discount, creates buffer between input and output; insures against scarcity of materials in the market and avoid inventory build-up (Carter, 2002). There are several inventory control techniques that firms could adopt to ensure that all costs are kept at a minimum. These techniques are ABC Analysis, Economic Order Quantity, Just in time (JIT), Max-Min System, Periodic Review System, Fixed Order Quantity System, Development of inventory catalog, Action Level Methods, and Batch control (Indira, 2018). Without material control the entire functioning of storekeeping may either be ineffective therefore inventory control gives birth of material control (Sabure, 2020). The materials control inhales in itself the entire materials and allied functions.

Inventory Turnover

According to Rao and Rao (2009), inventory turnover has to do with "the number of times that an inventory "turns over" or cycles through the firm in a year" (p.42). For instance, inventory turnover of 12 means the average inventory moves through the firm once per month. It measures the speed of goods moves through and replenished by the system (Tipparat & Sawat, 2013). Inventory turnover measures the speed at which inventories are moving through the warehouse of the company and measures the flow (liquidity) of a main part of its current assets (Marijan, Ivan, & Maja, 2015). It also indicates how quickly a company is turning over its inventory. Koumanakos (2008) as cited by Namagembe and Munene (2016) further defined inventory turnover as the number of times inventory is converted into cash. It is a ratio showing how many times a company's inventory is sold and replaced over a one-year period. Furthermore, inventory turnover is the speed at which the trading company sells its inventories or how much turnover the average inventory generates in one year. Moridipour and Mousavi (2014) explained that proper inventory turnover is in maintaining optimum inventory and proper marketing to sell inventory

and in time order. The importance of inventory turnover is to indicate how rapidly the inventory is turning into receivables through sales. Generally, a high turnover is indicative of good inventory management. A low inventory turnover implies excessive inventory levels than warranted by sales activities, slow moving or obsolete inventory. However, a relatively high inventory turnover may be a result of low levels of inventory will results in frequent stock outs; the firm may be living from hand to mouth. The turnover will also be high if the firm replenishes the inventory in small batches (Salawati, 2012). In other words, the ability of rapid inventory turnover indicates the success of a company in the use of their investments in inventory that are the primary current assets of the manufacturing companies. In addition, quick inventory turnover minimizes overstocking and helps keep costs down. On the other hand, an unreasonably long inventory holding period may indicate an economic recession, obsolete inventory, poor sales and marketing, a change of customer taste or bad inventory management.

Inventory Record Accuracy

Inventory accuracy is the ability to predict the true demand of a product (Fisher, 1997). It refers to stock audit, which in the view of Bramball (2010) was the most tried and tested method to ensure that the book value and actual condition value of company's physical assets match.

Rossetti, Buyurgan, Bhonsle, Gumrukcu, & Chittoori (2012) argued that if a discrepancy exists between the on-hand quantity and an actual physical count then the record is considered inaccurate. Inventory record accuracy for a firm's SKUs is typically defined mathematically as:

$$\% \text{ Overall SKU Record Accuracy} = \frac{\text{Total number of accurate records}}{\text{Number of records checked}} \times 100$$

The concept of inventory record accuracy has also been linked to inventory record inaccuracy. In this respect, the notion of inventory record inaccuracy was introduced by Schrady (1970) as a discrepancy between the recorded inventory quantity and the actual inventory quantity physically present on the shelf. To measure accuracy and account for discrepancies, firms must audit their inventory. This involves the physical counting of the on-hand inventory, the comparison to recorded values, and the correction of records as needed. The process for measuring stock accuracy is therefore to create records of significant discrepancies regularly, using either picking or inventory checking as a basis (or both), and to measure the quantity and size of inaccuracies observed. These should be added by category so that an overall figure of accuracy can be measured. On the other hand, discrepancy within an inventory record's quantity field undermines the operation of inventory control policies. Inaccurate inventory information leads to ineffective replenishment decisions, which, in turn, result in poor service levels and higher inventory costs. Researchers such as Namagembe and Munene (2016), and Owolabi and Ajidagba (2014) have also indicated that a lack of inventory record accuracy clearly reduce chain profits due loss of sales and inventory carry costs, which may run as high as 10 percent of existing profits. The techniques of inventory record accuracy demystified in literature include perpetual and periodic methods. Both methods provide details of the inventory quantities and values whenever they are needed and ensure that the inventory account is updated to reflect the actual value of the ending inventory on the balance sheet and the corresponding amount is recorded as cost of goods sold (COGS). Kilonzo *et al.* (2016) explain that an efficient and sound inventory tracking system is capable of assisting a firm in maximizing profits. In addition, keeping accurate records help firms reduce pilferages and theft as well as maintain ideal levels without distracting operations.

Automated Inventory System

Automation is the replacement of human workers by technology. Vijay (2004) defines automation as a technology dealing with the application of mechatronics and computers for the production of goods and service. According to Mbuvi, Namusonge, and Arani (2016), automation refers to a variety of applications using computer technology, which includes the generic software, such as word processing, spread sheet and database applications, or specially written records management applications. Computers can be stand alone, or linked using networks (LANs, WANs, intranets, or the Internet), and can use a wide range of peripheral devices such as scanners, bar code readers, printers and among others. Automation is broadly classified into manufacturing and service automation (Kitheka & Gerald, 2014). An automated or computerized inventory control system refers to the integration of sub-functions involved in the management of inventory into a single cohesive system. It is software installed on the computer systems that enables a firm to keep a check on the inventory levels by performing the automatic counting of inventories, recording withdrawals and revising the stock balance. It is simply an inventory management system that is automated. The driving forces for the implementation of automated inventory management by firms include increasing customer requirements, the need for networked organizations and the opportunity of networked inventory management (Kitheka, 2012). But the system itself requires a lot of information processing within and outside the organization and the transformation, storage and communication of information about the inventory in the stock points as well as in the intermediate processes across the supply chain for it to be efficient. The various techniques to automate inventory management include Materials Requirement Planning (MRP), Vendor Managed Inventory (VMI), Radio Frequency Identification (RFID), Enterprise Resource Planning (ERP), Electronic Point of Sale (E-POS), and E- Procurement (Ken et al. 2010; Simchi-Levi et al. 2009; Sople, 2010).

2.1.2 Operational Performance

Operational performance described a firm's operational performance as a measure of how well a firm uses its assets from its core operations and generates revenues over a given period of time. This measure is thus compared to some given industrial average standard of similar firms in the same industry (Mwichigi & Waiganjo, 2014). According to Malonza (2014), operational performance encompasses production reliability and defect rates, production cycle time, on time delivery, cost of quality and scrap minimization, productivity, and inventory. In the same vein, Brown (2008) perceived operational performance as firm's performance measured against standard or prescribed indicators of effectiveness and efficiency. Birech (2011) outlines various performance measures as within operations area namely (i) standard individual performance measures include: productivity measures, quality measures, inventory measures, lead-time measures, preventive maintenance, performance to schedule, and utilization. (ii) Specific measures include: Cost of quality - measured as budgeted versus actual, variances - measured as standard absorbed cost versus actual expenses, period expenses - measured as budgeted versus actual expenses, safety - measured on some common scale such as number of hours without an accident, profit contribution – measured in dollars or some common scale. In this study, operational performance is expressed as: customer's satisfaction, competitive advantage, cost effectiveness, operational efficiency, customer service delivery, and productivity.

Customer Satisfaction

Morgan and Rego (2006); Fornell (2006) define customer satisfaction as a measure of a firms' customer base in terms of size, quality and loyalty. Customers' expectations according to (Howgego, 2002) are largely dependent on the flexibility of the supply chain partners. Kotler and Keller (2006) view customer satisfaction as a person's feelings of pleasure or disappointment resulting from comparing product's perceived performance (or outcome) in relation to his or her expectation. Manufacturing organizations may identify customer satisfaction in terms of on-time delivery as well as meeting customer specification needs (Eckert, 2005). Variables such as customer needs (having the products immediately and on hand to satisfy the customer's needs), vendor partnerships (sharing of information regarding sales, sales forecasts as well as amount of inventory) and data integrity (data on SKU and location which assists in overall inventory management) (Lee & Kleiner, 2001) often define customer satisfaction among the manufacturing sector. Firms must respond to the changing customers' needs in the increasing competitive environment (Zhang, 2005).

Competitive Advantage

Tracey, Vonderembse, and Lim (1999) argue that competitive advantage comprises of distinctive competencies that sets an organization apart from competitors, thus giving them an edge in the marketplace. They further add that it is an outcome of critical management decisions (Umoh, 2002). Miltenburg (2005) states that when a manufacturing company can defend and attract customers it has competitive advantage, which today is crucial for manufacturing companies' survival (Mescon & Thill, 2006). The sources of competitive advantage are: making the highest-quality product, providing superior customer service, achieving lower costs than rivals, having a more convenient geographic location, designing a product that performs better than competing brands, making a more reliable and longer-lasting product, and providing buyers more value for the money (a combination of good quality, good service, and acceptable price). Inventory management can be competitive advantage by effectively matching supplies of goods with demand. Supply chain management involves coordinating internal and external operations to achieve timely and cost-effective delivery of goods throughout the system.

Cost Effectiveness

Drury (2004) cited in Kinyugo (2014) argued that cost effectiveness deals with cost reduction as well as continuous improvement and change instead of cost containment. The term cost reduction could be used in place of cost efficiency. According to Kinyugo (2014), cost effectiveness consists of those actions that are taken by managers to reduce costs, some of which are prioritized on the basis of information extracted from the accounting system. Kinyugo (2014) noted that while traditional cost control systems have been applied on a continuous basis in organizations, cost effectiveness tends to be applied on an ad hoc basis anytime opportunity for cost reduction is identified. Similarly, majority of the approaches that are incorporated within the area of cost effectiveness do not necessarily involve the use of accounting techniques. In contrast, cost control relies heavily on accounting techniques. Cost reduction is measured by evaluating whether the manufacturers' cost is higher, equal, or lower than their industrial competitors. In addition, manufacturers were asked to respond whether they are lagging, below averaged, average, above, or the leader in the industry in terms of meeting customers' requirement. Gourdin (2001) adds that three types of costs must be considered in setting inventory levels namely: holding cost, ordering cost and stock out cost.

Operational Efficiency

The term ‘operations’ describe the processes and resources that organization use to produce the highest quality products or services as efficiently as possible. Operational efficiency on the other hand refers to the capability of an organization to deliver products or services to its customers in the most cost-effective manner possible while still ensuring the high quality of its products, service and support (Nasra, 2014). Operational efficiency looks at an organization’s capabilities and performance. Amarjit, Manjeet, Neil and Harvinder (2016) perceive operational efficiency as the extent to which changes in the cash conversion cycle, operating expenses to sales revenue ratio, operating cash flow, total asset turnover, total debt to total assets ratio, firm size, and operating risk impact the future performance of the firm. Operational efficiency (OE) plays an important role in improving current and future firm performance of a business enterprise. In order to attain operational efficiency a company needs to minimize redundancy and waste while leveraging the resources that contribute most to its success and utilizing the best of its workforce, technology and business processes (Muhittin & Reha, 1990). The reduced internal costs that result from operational efficiency.

Customer Service Delivery

Several definitions of service levels are used in the literature as well as in practice. These may differ not only with respect to their scope and to the number of considered products but also with respect to the time interval they are related to. According to Wanjoi, Mugo and Wagoki (2013), customer service delivery refers to the fulfillment of customer’s orders efficiently, effectively and at the minimum cost. It involves meeting customers’ expectations with regard to order fulfillment through shorter lead times, consistent and on time delivery, complete orders, quicker response to customer requirements and ability to meet unique and special requests of the customers (Chopra & Meindl, 2004). Inventories offer service in terms of satisfying customer demand. Inventory influences the time and costs of service. The location of inventory determines the time in which the customer will be served while a company policy concerning the economic order quantity, safety stocks, placement procedures and time will determine the cost at which the customer will be served. In many cases, increasing customer service levels involves adding personnel and increasing overall expenditures. Unfortunately, these additional expenses can erode profitability. One proven method for increasing customer service without incurring additional long-term expenses is the implementation of an inventory management system.

Productivity

Productivity is an overall measure of the ability to produce a good or service. More specifically, productivity is the measure of how specified resources are managed to accomplish timely objectives as stated in terms of quantity and quality. Productivity may also be defined as an index that measures output (goods and services) relative to the input (labor, materials, energy, and so on., used to produce the output). Kamau (2011) argue that the concept of productivity is linked closely with the issues of efficiency and encompasses several efficiency elements such as price efficiency, allocative efficiency, technical efficiency and scale efficiency. The overall productivity level of an organization depends on all these elements (Kamau, 2011). Efficiency, however, is generally seen as the ratio of the time needed to perform a task to some predetermined standard time. In production management, productivity can be measured in two main ways, the partial-factor productivity, which is the ratio of output (measured in specific units) to any input (also measured in specific units), and total factor productivity (TFP), which is the ratio of total outputs to total inputs used in production (Kamau, 2011). Partial measures can

be defined for specific operational attributes such as total revenue per labour unit, expenses as a percentage of total assets, and return on assets. In contrast, TFP measures estimate the overall effectiveness of utilization of inputs to produce the outputs. Production frontier analysis (PFA) and index number approaches can be used to estimate TFP.

2.2 Theoretical Review

This section reviews the theoretical framework on which the concept of Inventory Management Practices for operational performance is anchored on. Inventory Management is based on many theories of which this study was supported by the following theories: Deterministic Inventory Model (DIM), Resources Based View theory (RBV), Adaptive Structuration Theory (AST), Theory of Constraints (TOC).

Deterministic Inventory Model

The Economic Order Quantity (EOQ) is one most common deterministic inventory models. The EOQ is a mathematical model formulated within the scope of operations management to determine the optimal inventory level. EOQ is the level of inventory that minimizes total inventory holding costs and ordering costs.

Ross, Westerfield, Jaffe, and Jordan (2011) stated that Economic Order Quantity (EOQ) model is an approach of determining the optimal inventory level that takes into account the inventory carrying costs, stock-out costs and total costs which are helpful in the determination of the appropriate inventory levels to hold. The model was developed by F. W. Harris in 1913 and is also known as Wilson EOQ model, who critically analyzed the model. The EOQ only applies when demand for a product is constant over the year and that each new order is delivered in full when the inventory reaches zero. There is a fixed cost charged for each order placed, regardless of the number of units ordered. There is also a holding or storage cost for each unit held in storage (William, 2007). EOQ is used to obtain the optimal number of units of the product to order so that to minimize the total cost associated with the purchase, delivery and storage of the product.

Blackburn (2010) is among researchers who agree that EOQ is one of the models widely used to manage inventory in many industries. Economic Order Quantity approaches have proven to be effectively inventory management technique when the demand and lead time are relatively stable, as well as when significant variability and uncertainty exist. However, the use of EOQ model has shown increase in some costs as other costs decline, an example of ordering costs declines with the inventory holdings, while holding costs rise and the total inventory associated costs curve have a minimum point. Another disadvantage of EOQ is that it ignores the need to have buffer stocks, which are maintained to cater for variations in lead-time and demand making it difficult to be observed in practice. In addition, the EOQ model not account for seasonal or economic fluctuations and is most limited by the assumption of a one-product business, and the formula does not allow for combining several different products in the same order.

Resources Based View theory (RBV)

Resource based view theory is a major research theory in strategic management propounded in order to understand the source of sustained competitive advantage of a firm. The theory was initiated in the mid-1980s by Wernerfelt (1984), Rumelt (1984) and Barney (1986). Resource

based view theory proposed that there are two major sources of competitive advantage within the internal environment of an organization that are important to the preparation of firm strategy and the efficient and effective application of these resources can enable organization to achieve sustainable competitive advantage (Ringim, Razalli, & Hasnan, 2012). These sources are identified as assets which are either tangible or intangible in nature. Resource based view theory also argue that in order to achieve competitive advantage, an organization's unique combination of resources must be economically valuable, rare, difficult to imitate and non-substitutable (Wiranttanapornkul, 2012).

Resource based view theory holds two major assumptions which state that resources must be heterogeneous in nature. The heterogeneous nature of resources assumes that firms achieve competitive advantage when organization makes use of resources that are significantly different from that of competitors (Kim, Shin, kim & Lee, 2011). The second assumption of resource-based view theory is that firm's resources are non-movable and non-transferable that is, resources attributed to a particular company do not move from one company to another at least in a short run (Akio, 2005). A company achieves a competitive advantage when it has key resources (these can be physical resources, human resources or organizational resources) that its competitors do not have (Barney, 1991).

In the context of resource-based view, a firm might lose its competitive advantage if important inventory management skills are scarce or getting lost as they are not easily duplicated or substituted. Inventory management skills are valuable as they help providing supply strategies for future needs and developing supply management strategies to support company strategies (Carr & Pearson, 2002). Sulastrri (2006) argued that RBV approach is useful by employing various strategies in controlling inventories in the organization through optimal utilization and allocation to be more competitive and improve on performance. However, the RBV has been largely criticized by several critics. One of the major draw backs of resource-based view theory raised by critics is that the theory is operationally invalid in the sense that this theory is only applicable in a static environment which is not the case for real life situation (Therious, Aggelidis, & Theriou, 2009). Resource based view theory has been largely criticized from the dynamic point of view and this view remains the most prominent of all other critical views.

Adaptive Structuration Theory

Structuration theory was proposed by Anthony Giddens in his Constitution of Society in 1984, which was an attempt to reconcile social systems and the micro/macro perspectives of organizational structure. Structuration theory demonstrates that ICTs are structured by users in their contexts of use (Barley 1986; Orlikowski, 1992; Walsham, 1993; Weick, 1990). The AST has been applied to various aspects of organizational communication by many researchers, particularly in ICT use (e.g., Contractor & Seibold, 1993; DeSanctis, Snyder, & Poole, 1994; DeSanctis & Poole, 1994; Poole & DeSanctis, 1990; Poole & DeSanctis, 2004; Scott, Quinn, Timmerman, & Garrett, 1998). AST provides the model whereby the interaction between advancing information technologies, social structures, and human interaction is described, and which focuses on the social structures, rules, and resources provided by information technologies as the basis for human activity. AST specifically focuses on changes that occur when ICTs are introduced in social settings and communication processes. AST assumes that the effects of ICTs are not a function of the ICTs themselves but of the way they are used. Structures, like ICTs, can be divided into structural features and spirits. Structural features deal with the specific

rules, resources, and capabilities of the technical parts of ICTs, while spirit deals with the intention that the technology features. The spirit of an ICT involves “the general goals and attitudes the technology aims to promote” (Poole & DeSanctis, 1990).

AST is a viable approach in studying how information technology affects effective inventory management in an organization because it examines the change from distinct perspectives (Kingori, & Ngugi, 2014; Koin, Cheruiyot, & Mwangangi, 2014; Ondari & Muturi, 2016). The reason why Poole and DeSanctis added the concept of adaptive is that adaptation to a situation is seen as the primary goal of action. Hence, the approach accepts different outcomes under identical conditions. AST is relevant in today’s inventory management practice due to the expanding influence that advancing technologies have had with regard to the human- interaction aspect of AST and its implication on socio-biologically inspired structuration in security software applications (Ramakrishna, 2005). AST theory presents specific advances in information technology that are driving organizational changes in the areas of business alignment, IT planning, and development show that AST is being used as a driving force of effective management within organizations. The study will use the theory to investigate how complexity of inventory management is influenced by Information Technology (Ramakrishna, 2005). In conclusion, AST is a viable approach in studying how information technology affects effective inventory management in an organization because it examines the change from distinct perspectives.

Theory of Constraints

Theory of Constraints (TOC) is a management philosophy developed by Goldratt (1984) in his book, ‘The Goal’ that is geared to help organizations continually achieve their goals. The Theory of Constraints facilitates the examination of assumptions underlying traditional manufacturing rules, policies, and measures (Stein, 1997). It focuses on the few critical constraints that limit the success of the system (Gary, 2014). Further, it precludes sub optimization by ensuring that solutions to complex problems are effective at the company level. It aimed to initiate and implement breakthrough improvement through focusing on a constraint that prevented from achieving a higher level of performance (Nwangangi, *et al.*, 2015). It postulates that an organization is a system, and every system has at least one constraint limiting it from achieving its goal of making (more) money. In order to improve the performance of the system, these constraints must be identified (described) and corrective measures taken (a prescription). Identifying the constraints help to focus the limited resources to the weakest part for the system to improve.

Theory of Constraints provides a global system methodology that promotes achieving the organizational goal of making more money both now and in the future (Lakshmii & Ramakrishna, 2012). Cyplik, Hadaś, and Domański (2009) stated that the Theory of Constraints approach could be used to guide a single firm to concentrate on exploiting resources based on different logistics cost along the supply chain. This study is concerned with inventory as constraint that can be focused on to cause system improvement. The approach uses certain parameters to ensure appropriate levels of inventory. These parameters are: a) inventory is held as close as possible to the demand and source to ensure quick shipping of goods. b) Upper limits of stock are kept by having buffer inventory. c) Quick placement of orders whenever inventories decrease d) buffer inventory should always be adjusted to reflect changes in the rates of demand. There are constraints that complicate successful inventory management: uncertain demand, costs

lead times, production prices and so on (Gunus & Guneri, 2007). Underlying this research is the belief that inventory management in Flour Mills companies is faced with some challenges such as escalating inventory costs, untrained personnel, inaccurate record keeping and demand variability. The Theory of Constraints used to help Flour Mills companies in inventory management. By Theory of Constraints methodology, a logistics was analyzed by means of a holistic view, in other words, it was defined as a group of dependent elements and, therefore, logistics performance was dependent on the efforts of inventory management. Every system must have had at least one constraint, and this was explained by the fact that if there were nothing to limit the system's performance, it would have been infinite (Bowersox, Closs, & Cooper, 2010). Theory of Constraints was therefore useful in accessing the influence of inventory management on performance of flour milling companies in Nigeria.

2.3 Empirical Review

Inventory Shrinkage and Customer's Satisfaction

Mazanai (2012) stated that stock shortages are a headache for most organizations as expressed by and it leads to customer's dissatisfaction which eventually leads to low performance of a firm. Kurano, Grigore, Devika and Senthikumar (2014) in their used statistical process monitoring tools with inventory levels and stock – outs as key metrics in achieving proactive inventory policy intervention in the context of cooperative supply chains. Their results showed the possibility of detecting out-of-control supplier signals beforehand and significantly reducing stock-outs through dynamic adjustments of inventory level. Carl and Shaun (2014) conducted a research on the assessment to Determine the Impact of Retail Shrinkage on the Sustainability and the Profitability of the XYZ Franchise Retailer Stores in the Western Cape Region of South Africa". The findings revealed that a definite link exists between shrinkage and store profitability. Also, the findings revealed that shrinkage reduction presents an opportunity for the average XYZ Franchise owner to increase their profitability.

Inventory Investment and Competitive Advantage

Godfrey (2010) conducted a research on financial Stability, inventory Investment, and profitability of SMEs. The findings revealed that inventory investment is sensitive to SMEs competitive advantage. Likewise, Gaur and Bhattacharya (2011) conducted a study on the linkage between the performance of the components of inventory such as raw material, work in progress and finished goods and financial performance of Indian manufacturing firms. The study revealed that finished goods inventory as inversely associated with business performance while raw material inventory and work in progress did not have much effect on same. They emphasized that instead of focusing on total inventory, an attempt should be made to concentrate on individual components of inventory so as to adequately manage the same. Cagliano, DeMarco, Rafele and Volpe (2011), argued that adoption of inventory management systems has huge initial cost implications for the firm but the firm stands to benefit in the long run. Some of the benefit of adopting inventory management stated by Cagliano *et al.*, (2011) are: increased operational efficiency, lower institutional and operational costs, shorter leads-times and reduced inventory.

Inventory Control and Cost Effectiveness

Farzaneh (2012) presents a mathematical model to assist companies in their decision to switch from the economic order quantity (EOQ) to the Just in Time (JIT) purchase policy. The author highlights that the economic order quantity model focuses on minimizing the inventory costs rather than on minimizing the inventory. From the mathematic model presented, Farzaneh (2012) concludes that JIT can eliminate the storage, capital, insurance, ordering and transportation costs. Ogbo, Onekanma, and Wilfred (2014) assessed the impact of effective inventory control management on organizational performance of 7up Bottling Company in Enugu, Nigeria. The study revealed that flexibility in inventory control management is an important approach to achieving organizational performance. It was found that organizations benefit from inventory control management by way of easy storage and retrieval of material, improved sales effectiveness and reduced operational cost. Sani (2014) examined application Inventory Control Models for Agricultural Business Managers in Nigeria. The study revealed that inventory control is the centre stage of entrepreneurial existence, survival, growth and sustainability. Also, the study established that inventory is a road map that gives direction to a new business for making decisions about management of cash, raw materials, finished goods and receivables. The findings revealed that the risks associated with daily business deliveries are high.

Inventory Turnover and Operational Efficiency

Andreou, Louca, and Panayides (2015) examined the impact of vertical integration on inventory turnover and operating performance” using a causal model. The study revealed that vertical integration has a positive effect on raw materials inventory (RMI) and finished goods inventory (FGI) turnover but no significant effect on work in progress inventory (WIP) turnover. FGI contributes to a reduction in supporting processes costs which causes an improvement in Return on Sales (ROS). Vertical integration impacts ROS directly. In United State of America, Chen, Frank, & Wu (2007). investigated whether the inventory turnover for U.S. retailers and wholesale firms have improved or not over the period from 1981 to 2004. They find that the average inventory that the firms carry decrease in manufacturing and wholesale firms, so wholesale firms increased their inventory turnover year by year. On the other hand, until 1995, inventory turnover ratios of retail firms remain stable. After 1995, retail firms started to improve the inventory turnover. Aghazadeh (2009) presented the correlation between company’s annual inventory turnover and its performance in retail industry. Using an empirical model, the author finds that future stock performance could be predicted by an indicator, which is the variance of annual inventory turnover of the firms. Various firms in different segments are analyzed in terms of their inventory turnover ratios. The author concludes that if managers are able to control inventory turnover, both stock performance and management quality of firms are affected positively.

Inventory Record Accuracy and Customer Service Delivery

Kök and Shang (2004) discussed inventory record inaccuracy in a single stage inventory system with a single item where backlogging is allowed. The aim of the study is to find a joint inspection and replenishment policy minimizing total cost over a finite horizon. The study shows that an “inspection adjusted base-stock policy (IABS)” is optimal for a single period whereas, another cycle counting heuristic “Cycle Count Policy with State Dependent Base-Stock Levels (CCABS)” is nearly optimal for a finite horizon. The trade-off between inventory inspection and

its associated costs is discussed. In the cases where the cost of putting into effect the inspection is high, then carrying more inventory in order to hide the effects of inventory inaccuracy is suggested. Thiel, Hovelaque, and Vo (2010) studied the impact of inaccurate inventories on a multi-product batch production line with fixed capacity. Their research reveals that there is a non-monotone relationship between the inventory inaccuracy rate and the service quality level of different products sharing the same production line with fixed capacity and product priorities, in which the service level initially increases and then declines as the inaccuracy rate increases.

Automated Inventory System and Productivity

Automation of inventory control could be a better solution, which is a set of hardware and software-based tools that automates the process of inventory management. Owoeye et al (2014) established that the use of computer programmed software in inventory management is the best tool to maintain stock levels that set the three main costs, holding cost, ordering cost and stock-out costs are at a minimum. Mbuvi, et al. (2016) examined the factors affecting automation of inventory management in micro, small and medium enterprises in Kenya. The study revealed that automation of inventories had positive impacts on the productivity of small and medium enterprises in Kenya. Wanjohi, Mugo and Wagoki (2013) examined effectiveness of electronic inventory systems on customer service delivery in selected supermarkets in Kenya. The, the study indicates that majority of the supermarket chains had integrated the use of electronic inventory systems which had enhanced effective customers service delivery and also lead time had also been influenced positively the use of electronic inventory systems as well as the quality-of-service delivery which in turn led to effective customers service delivery. Haiyan and Ranathunga (2015) empirically studied automated inventory management system with Bayesian inference Algorithm. The study investigated two major asset-tracking practices; manual or barcode inventory management system versus automated inventory management system and they empirically validate both systems with modeling, simulation and observation of the system performance. The results statistically indicate strong support for the improvement of efficiency and accuracy of automated inventory management system.

2.4 Conceptual Framework

The theoretical review provided the basis for the development of the conceptual framework for the study. The study tested hypothetical model arising from the conceptual framework displayed in figure 1.

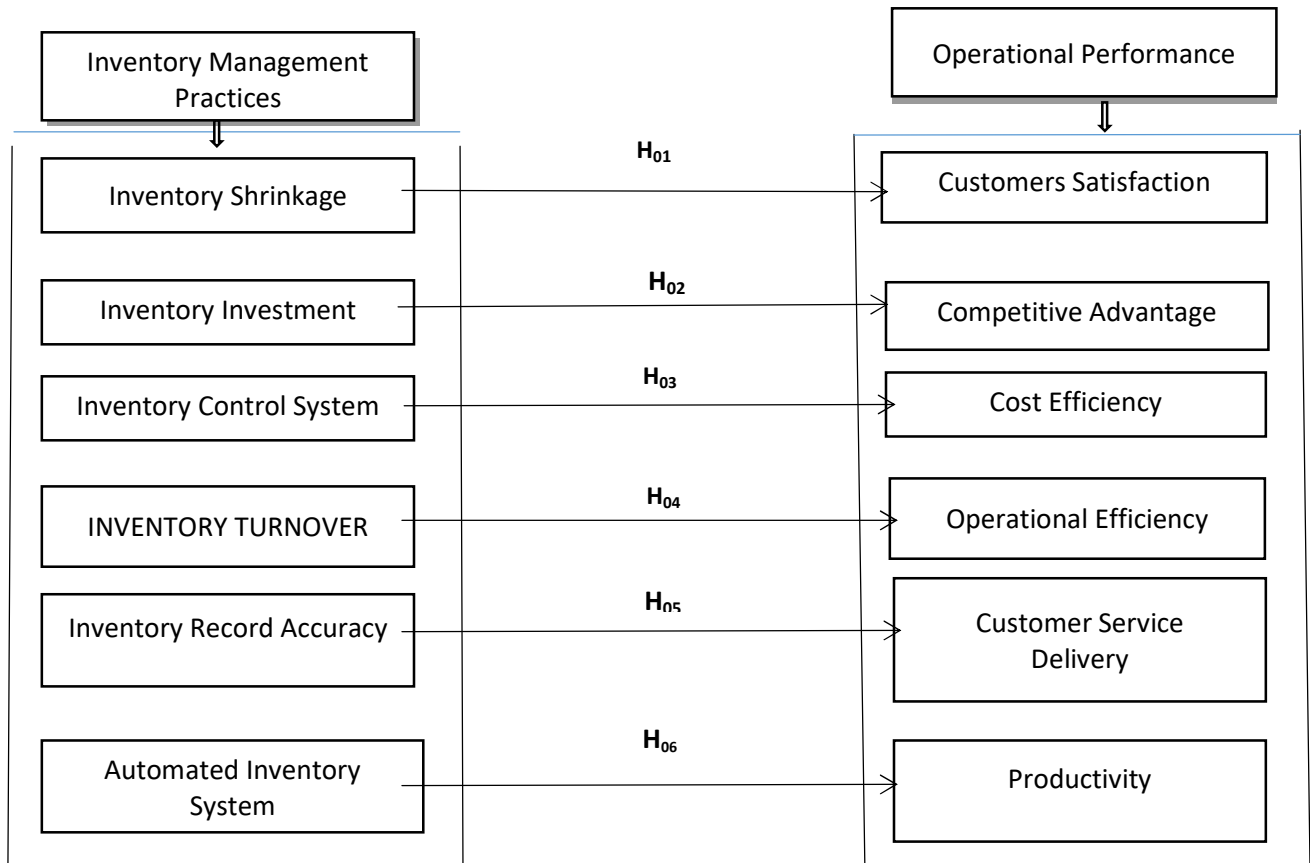


Figure 1: Conceptual framework of the relationship between Inventory Management Practices and Operation Performance

Source: Researchers' Conceptualisation from Review of Literature (2020)

3. METHODOLOGY

Research Design

This study adopted a cross-sectional survey research design. The research design was chosen because it facilitates the collection of a considerable amount of data quickly, efficiently and accurately (Oso & Onen, 2005). Nyabwanga and Ojera (2012), and Nsikan, *et al.* (2015) used cross-sectional survey research design in their studies.

Population of the Study

The Nigeria Flour Mills Industry comprised of 22 players segmented on the basis of their installed capacity owned by 11 milling groups in Nigeria. The primary population for this study consisted of all the flour mills companies in Nigeria and the secondary population was all flour mills companies listed on the Nigerian Stock Exchange. The target population therefore consists of two thousand, two hundred and thirty-seven (2,237) employees in charge of inventory management and policy of the leading and quoted flour milling companies operating in Nigeria. They are Dangote Flour Mills, Flour Mills of Nigeria Plc, and Honeywell Flour Mill Plc. These companies control over 65% of the market (Leadcapital, 2016). They have a total installed

capacity (production) of 15, 360 metric tons per day with Flour Mills of Nigeria Plc controlling 49% (Sterling Capital, 2016).

Sampling Frame

This is a list, directory or index of cases from which a sample can be selected (Mugenda & Mugenda, 2013). Therefore, the population of the study covered all flour mills companies that are listed on the Nigerian Stock Exchange. Out of the four (4) flour milling companies listed on the Nigerian Stock Exchange, three (3) flour milling companies have been selected for the study area.

Sample Size Determination

The sample size for this study was determined using table of sample size determination developed by Krejcie & Morgan in 1970 and obtained from the Research Advisors (2006). At 0.035 margin of error and 95% confidence level, the sample size for this study is 597. However, to provide for the instruments that may not be returned, 30% of the sample size was added and that brings the sample size to approximately 776 (Israel, 2010).

Sampling Technique

A multiple sampling technique was adopted in selecting the sample from the working population of this study. These included stratified sampling technique in the selection of listed flour milling companies on the Nigeria Stock Exchange among the 22 players in the industry. The proportional stratified sampling technique in the distribution of questionnaire to the three (3) listed flour milling companies in Lagos State. And random sampling method, in selecting the final respondents from each flour milling company.

Research Instrument

The data gathering instrument that was used in this study was structured questionnaire. A six (6) point modified Likert-scale type was used to elicit response for every question in the questionnaire, and this would cover two extremes of 'very often' and 'rarely' and 'very high' and 'very low'. The questionnaire consisted of three (3) sections: section A deals the demographic variables; section B focused on inventory management practices while section C focused on operational performance. The questionnaire was adapted from previous researches related to the study.

Pilot Study

A pilot study was conducted at Standard Flour Mills Ltd and Crown Flour Mills Limited located in Lagos State using 78 staff (10% of sample size). The data obtained through the pilot study was thereafter used for assessing reliability and validity of the instrument. Content and construct validity were carried out. The content validity was ascertained by discussing the research instrument with experts in the field of operations research. The construct validity of all the variables was established through an exploratory factor analysis (EFA) different from principal component analysis (PCA) used to determine sampling adequacy. All the questionnaire items load very high under each of the variable (see Appendix). Also, construct validity was confirmed

by assessing for convergent validity using the Average variances extracted (AVEs) which were all found to be above 0.5.

Reliability is the degree of consistency in assignment of similar words, phrases or other kinds of data to the same pattern or theme by different researchers (Hussey & Collis, 2009). Internal consistency method was used to by the researcher to ascertain the reliability of the instrument and is used for three-, four-, five- or six-point Likert scale items with 0.7 being the cut-off point (Akpa, Akinlabi, & Okusanya, 2021). The Cronbach 's Alpha coefficients for all the variables range from 0.797 to 0.952.

Method of Data Collection

The primary sources were used in gathering data for this study. The primary data were collected by use of the questionnaire. The instrument consists of three (3) sections: section A deals with the demographic variables in which the respondents were asked to provide some basic background information; section B was focused on inventory management practices while section C was put in place to assess operational performance. The questionnaire was adopted from combination of sources and modified to meet the need of this study. Inventory shrinkage, Inventory Control and Inventory Investment questions were obtained from Raymond, Vincent, Mercy, & Bellah (2015); Oballah *et al.* (2015); Kamau and Kagiri (2015); Automated inventory system questions were gathered from Kitheka and Gerald (2014); Kitheka (2012). Productivity questions were collected from Ndirangu (2014); Nyabwanga & Ojera, (2012). Inventory Turnover items was gathered from the study of Kamau and kagiri (2015); Jefwa and Owo(2015). Inventory record accuracy items was obtained from Jefwa and Owuor (2015) and Enemu and Nwazuruike (2012); Automated Inventory System questions were from Kitheka and Gerald (2014); Kitheka (2012); Customer Satisfaction and Competitive Advantage items were gathered from Thogori and Gathenya (2014); Cost Efficiency and Customer Service Delivery from Nwangangi (2016); Operational Efficiency from Onyoni (2015) while Productivity were from the studies of Ndirangu (2014); and Nyabwanga and Ojera, (2012). A six-point modified Likert scale type was used to elicit responses for every question in the questionnaire, and this would cover two extremes of 'very often' and 'rarely' and 'very high' and 'very low'. This scale is expected increase the reliability of the responses; and also, to gain more effective screening power (Sin & Tse, 2002; Osuagwu, 2006).

Method of Data Analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS version 24.0). All the questionnaires received were referenced and items in the questionnaire coded to facilitate data entry. Descriptive statistics and inferential data analysis were done using Pearson product-moment correlation and regression analysis. A regression was used because the procedure uses two or more independent variables to predict a dependent variable. The *p*-value at the 0.05 level of significance was used as decision criterion.

4. RESULTS AND DISCUSSION

Response Rate

A total of 776 questionnaires were administered, 641 were filled and returned, which represent 82.60% response. The other 135 questionnaires were lost or not included in the analysis, due to

the problems from respondents and some contained incomplete information. This was considered sufficient for this study in line with Jankowicz (2000) recommendation that a response rate of 80% and above is excellent while that of between 60% and 80% is just sufficient for a study.

Testing of hypotheses

The hypotheses formulated for the purpose of this research are stated in negative forms. The hypotheses specified different relationships between the variables under the study. In the testing and analysis of the hypotheses, the statistical test adopted are Regression analysis and correlation.

Hypothesis 1

H₀₁: Inventory shrinkage has no significant effect on customers' satisfaction of the selected Flour Mills companies in Nigeria.

Table 1: Summary of Linear Regression Analysis of Inventory Shrinkage on Customers' Satisfaction

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	22.054	.431		51.168	.000
	Inventory Shrinkage	-.134	.015	-.338	9.066	.000

$R = -0.338$; $R^2 = 0.114$; $F(1,640) = 82.196$, $p < 0.05$

a. Dependent Variable: Customer Satisfaction

Source: Author's Compilation

Findings on Table 1 revealed that inventory shrinkage has a significant Negative effect on customers satisfaction ($\beta = -0.134$, $t = 9.066$, $p < 0.05$). The regression coefficient was -0.134. This implies that customer satisfaction decreases when the level of inventory shrinkage rises. That is, for every unit increase in the incidence of inventory shrinkage, customers' satisfaction falls by 0.134. The result shows that inventory shrinkage and customers' satisfaction move in the opposite direction (that is, has inverse relationship). This finding is supported by F-statistic of 82.196 and p-value of 0.000 which is less than the adopted level of significance 0.05. The model R^2 was 0.114, which implies that 11.4% of the variations in customer satisfaction are explained by inventory shrinkage. 88.6% variations of customer satisfaction cannot be explained by inventory shrinkage in this study necessitating interrogations through research on other variables influencing customer satisfaction in this industry. The p-value equals to 0.000 indicates that inventory shrinkage significantly affects customers' satisfaction of the selected Flour Mills companies in Nigeria. Therefore, the null hypothesis one (H_{01}) is hereby rejected.

Hypothesis 2

H₀₂: Inventory investment has no significant influence on the competitive advantage of the selected Flour Mills companies in Nigeria.

Table 2: Summary of Linear Regression Analysis of Inventory Shrinkage on Customers' Satisfaction

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	30.782	1.490		20.664	.000
	Inventory investment	.590	.061	.723	9.672	.002

$R = 0.723$; $R^2 = 0.522$; $F(1,639) = 9.754$, $p < 0.05$

a. Dependent Variable: Competitive Advantage

Author's Compilation

The results as displayed on Table 2 shows that inventory investment has a significant Positive influence on competitive advantage of the Flour Mills companies ($\beta = .590$, $t = 9.672$, $p < 0.05$). The t value of 2.547 and p-value of 0.001, implies that the coefficient of the model parameter is statistically significant at $p < 0.05$. The regression coefficient indicates that taking all other independent variables at zero, a unit increase in inventory investment will lead to a 0.590 increase in competitive advantage of the selected Flour Mills companies in Nigeria. The finding revealed that inventory investment influence competitive advantage with F-statistics of 9.754 and p-values of 0.002 which is less than the significance level of 0.05 adopted for this work. Table 2 shows that inventory investment is responsible for 52.2% variance in competitive advantage. Hence, inventory investment is significant and it can be said that inventory investment has significant and positive influence on competitive advantage. The null hypothesis two (H_{02}) is also rejected.

Hypothesis 3

H₀₃: There is no significant relationship between inventory control and the cost efficiency of the selected Flour Mills companies in Nigeria.

Table 3: Summary of Correlation Analysis between Inventory Control System and Cost Effectiveness

		Inventory Control System	Cost Efficiency
Inventory	Pearson Correlation	1	.775*
	Sig. (2-tailed)		.000
Control System	N	641	641
	Pearson Correlation	.775*	1
Cost	Sig. (2-tailed)	.000	
	N	641	641

Source: Field Survey Result, 2016

Table 3 show that the relationship between inventory control system and cost efficiency is strong and positive ($r = 0.775, p < .05$). This relationship was significant at $p = 0.000$ which is less than the level of significance 0.05 adopted for the study. This means that as the value of inventory control system increases, so does the value of cost effectiveness. Therefore, we reject the third null hypothesis, implying that the relationship between inventory control and cost effectiveness of the selected Flour Mills companies in Nigeria is significant.

Hypothesis 4

H₀₄: Inventory turnover has no significant effect on the operational efficiency of the selected Flour Mills companies in Nigeria.

Table 4: Summary of Linear Regression Analysis of Inventory Turnover on Operational Efficiency

Coefficients		Unstandardized		Standardized	t	Sig.
Model		Coefficients	Std. Error	Coefficients		
		B		Beta		
3	(Constant)	30.133	1.657		18.186	.000
	Inventory Turnover	.339	.053	.604	6.396	.001

$R = 0.604$; $R^2 = 0.364$; $F(1,639) = 6.948, p < 0.05$

a. Dependent Variable: Operational Efficiency

Author's Compilation

Results of linear regression analysis of inventory turnover and operational efficiency is presented in Table 4. The result in Table 4 revealed that inventory turnover has positive and significant effect on operational efficiency of flour mills companies in Nigeria with $\beta = .339$, F ratio of 6.948, t value of 6.396 and P-value of 0.000 which is less than the level of significance 0.05 adopted for the study ($\beta = .339, F = 6.948, t = 6.396, p < 0.05$). The F-statistics implies that the regression of inventory turnover on operational efficiency is statistically significant at $p < 0.05$. The t-value implies that the coefficient of the model parameter is statistically significant. The regression coefficient shows that a unit increase in inventory turnover would increase operational efficiency of the selected Flour Mills companies by 0.339 units. In addition, the results further show that 36.4 percent of the variation in operational efficiency is explained by inventory turnover ($R^2 = 0.364, p < 0.05$), which is significant. However, the model does not explain 63.6 percent of the variation in operational efficiency, suggesting that there are other factors associated with inventory turnover, which were not captured in the regression model. This result implies that inventory turnover has a significant and positive effect on the operational efficiency of the selected Flour Mills companies. Based on the findings, the null hypothesis four (H₀₄) is therefore rejected.

Hypothesis 5

H₀₅: There is no significant relationship between inventory record accuracy and the customer service delivery of the selected Flour Mills companies in Nigeria.

Table 5: Summary of Correlation Analysis between Inventory Record Accuracy and Customer Service Delivery

		Inventory Record Accuracy	Customer Service Delivery
Inventory Record Accuracy	Pearson Correlation	1	.559*
	Sig. (2-tailed)		.000
	N	641	641
Customer Service Delivery	Pearson Correlation	.559*	1
	Sig. (2-tailed)	.000	
	N	641	641

*. Correlation is significant at the 0.05 level (2-tailed).

Author's Compilation

The result on Table 5 shows a positive and moderate correlation between inventory record accuracy and the customer service delivery ($r = .559$, $p < .05$). This correlation is statistically significant at $p = 0.000$ which is less than the level of significance 0.05 adopted for the study. This implies that as the value of inventory record accuracy increases, so does the value of customer service delivery. Hence, the null hypothesis five (H_{05}) is hereby rejected.

Hypothesis 6

H₀₆: Automated inventory system does not have significant influence on the productivity of the selected Flour Mills companies in Nigeria.

Table 6: Summary of Linear Regression Analysis of Automated inventory system on Productivity

Coefficients		Unstandardized		Standardized	T	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	47.483	1.465		32.412	.000
	Automated Inventory System	.614	.241	.691	2.547	.001

$R = 0.691$; $R^2 = 0.477$; $F(1, 639) = 62.805$, $p < 0.05$

a. Dependent Variable: Productivity

Author's Compilation

Table 6 above presents the results of linear regression analysis for automated inventory system as a predictor of productivity. The result shows that automated inventory system has a positive and significant influence on firm productivity ($\beta = .614$, $p < 0.05$). The t value of 2.547 and p-value of 0.001, implies that the coefficient of the model parameter is statistically significant at $p = 0.001$ which is less than 0.05 adopted for the study. The result in Table 6 shows that the correlation coefficient (0.691) indicates a positive and statistically significant relationship between automated inventory system and productivity. The R-squared statistic, as explained by the fitted

model, implies that about 47.7% of the total variation in the measure of productivity is explained by the variations in automated inventory system. The ANOVA results are statistically significant, with F-value of 62.805 and $p < 0.05$. Therefore, the null hypothesis (H_{06}) is rejected, and hence it can be concluded that automated inventory system has a significant influence on productivity of the selected Flour Mills companies in Nigeria.

4.1 Discussion and Conclusion

Inventory Shrinkage and Customer's Satisfaction

The study sought to determine the effect of inventory shrinkage on customer's satisfaction of the selected Flour Mills companies in Nigeria. From the findings, the study revealed that inventory shrinkage has a negative and significant effect on customer's satisfaction of the selected Flour Mills companies in Nigeria. It shows that excessive stock-out could specifically leads to loss of production time, low-capacity utilization, and inability to meet production targets (Akindipe, 2014). The result of this hypothesis supports the finding of (Bowersox, Closs, & Cooper, 2010; Kwadwo, 2016; Ogonu, Ikegwuru, & Nwokah, 2016; Nsikan, *et al.*, 2015; Nwangangi, Guyo, & Arasa, 2015) that lean inventory management system emerged as the most significant positive impact on customer satisfaction. Cacioappo (2000) indicated that dissatisfied customers have the tendency to tell nine others while customers who are satisfied have the tendency to tell five other people about company's products and services and the way there were handled. Mehfooz and Muhammad (2012) added that loyal customers are six times more likely to repurchase or recommend the purchase of the product or service to someone else. Some other studies have shown that on average, four percent of the customers will be dissatisfied or complain about the product and/or service. Eckert (2007) claimed that a well-managed system of inventory has a direct linkage to customer satisfaction. Widing (2003) affirms that customers derive more satisfaction when suppliers are able to respond and fulfill their orders in a given time period. This desire to satisfy the customer enables the supply chain member to accumulate buffers stocks.

Inventory Investment and Competitive Advantage

The study further sought to examine the influence of inventory investment on the competitive advantage of the selected Flour Mills companies in Nigeria. The results of the analysis that inventory investment significantly affects competitive advantage of the selected Flour Mills companies in Nigeria. These results are consistent with the result of Naliaka and Namusonge (2015) and Suhong, *et al.* (2006). They discovered that higher levels of inventory investment and SCM practice led to enhanced competitive advantage and improved organizational performance. Their study also revealed that competitive advantage has a direct, positive impact on organizational performance. This can be explained easily because of the impact of the inventory investment, has widely discussed in the literature. However, the result is in contrast with the findings of Koumanakos (2008) who found a negative relationship between inventory investment and competitive advantage. Capkun *et al.* (2009) also found a negative association between inventory investment and profitability of manufacturing firms and, therefore, indicated that firms that decrease inventory relative to sales increase both gross profit and operating profit. The researchers also claimed that negative effect of inventory investment on profitability is more severe in financially constrained manufacturing firms.

Inventory Control and Cost Effectiveness

The study further sought to find out the relationship between inventory control and cost effectiveness of the selected Flour Mills companies in Nigeria. The finding reveals there was a positive and statistically significant relationship between inventory control system and cost efficiency of selected Flour Mills companies. The finding of this study is in consonance with the findings of Enemuo and Uwazuruike (2012), Farzaneh (2012), Odiro (2014), and Takim (2014), who found that effective optimization of inventory control models such as economic order quantity (EOQ) and Just in Time (JIT) can eliminate the storage, capital, insurance, ordering and transportation costs, thereby improves cost minimization. The finding also corroborated the finding of Ogbo, *et al.* (2014) that there is a relationship between operational feasibility, utility of inventory control management in the customer related issues of the organization and cost effectiveness technique are implemented to enhance the return on investment in the organization. Adeyeye, Ogunnaiké, Amaihian, Olokundun, & Inelo, (2016) asserted that inventory control is an integrated functioning of an organization dealing with supplies of materials and allied activities in order to achieve maximum co-ordination and optimum expenditure on materials. Williams and Tokar (2008) are of the opinion that inventory control is the most important function of inventory management, and it forms the nerve centre in any organization that has inventory. Aarti and Dhawal (2013) opined that inventories need proper control as it is one the largest assets of a business. The finding is also supported by lean theory, according to Mogere *et al.* (2013) lean theory is an extension of ideas of just in time. Kros, Falasca, and Nadler (2006), elaborate just in time as a pull-based system designed to align the production and business processes throughout the supply chain. Green and Inman (2005), assessed the impact of lean theory on financial performance.

Inventory Turnover and Operational Efficiency

The study also sought to assess the effect of inventory turnover on the operational efficiency of the selected Flour Mills companies in Nigeria. The study found that inventory turnover has a positive and significant effect on the operational efficiency. The findings of hypothesis four supports empirical evidence on the relationship between inventory turnover and operational efficiency of manufacturing firms. The findings of this study are in accordance with the study of Oballa *et al.* (2015) that inventory turnover have effect on service level and inventory turnover leads to low cost of operation of Kenyatta National Hospital. The findings of this study is also in agreement with the findings of Mwangi (2013) that inventory turnover in days has negative relationship with Return on Equity which means that a company's financial performance can be increased by reducing inventory in days. The findings supported Weston and Eugene (1979) findings that incorporating accounts receivable and inventory turnover measures into an operating cycle concept provides a more appropriate view of liquidity management than does reliance on the current and acid-test ratio indicators of solvency. These additional liquidity measures explicitly recognize that the life expectancies of some working capital components depend upon the extent to which three basic activities- production, distribution (sales), and collection - are non-instantaneous and un-synchronized. The findings of this study is in contrast with the study of Lazaridis (2006) in his research titled 'The relationship between cash conversion cycle (CCC) and financial performance of listed companies listed in Athens Stock Exchange between 2001 and 2004.

Inventory Record Accuracy and Customer Service Delivery

The study sought to measure the relationship between inventory record accuracy and the customer service delivery of the selected Flour Mills companies in Nigeria. The findings of this study is supported by Stock Record Practice theory. According Jessop and Morrison (1994), inventory personnel must review various inventory records to ensure accuracy. During the review, they should ensure that quantities are legible and have a correct unit of issue, and that all added items are identified and legibly recorded. Enter any remarks legibly and state them explicitly. This confirms the assertion of Tundura and Wanyoike (2016) who posits that stock taking, inventory records accuracy one of the popularly used inventory management practice can be used to enhance customer service delivery. Their study also found out that the more frequently inventory counting is done, the more accurate the inventory records are likely to be. The finding is in consonance with the finding of Mwangi (2013) that successful stock records system has a significant positive relationship with regulating the flow of items in such a way that the right quantity is available when required to meet operational needs, access information to assist in making future decisions in relation to price and source of supply and derive the benefits of perpetual stock verification system.

Automated Inventory System and Productivity

The study finally sought to establish the influence of automated inventory system on the productivity of the selected Flour Mills companies in Nigeria. The findings reveal that automated inventory system significantly influence the productivity of the Flour Mills companies. This finding is in consonance with Ngumi (2015) investigated inventory management practices and productivity of large manufacturing firms in Nairobi, Kenya. The study revealed that inventory Management Practices positively affect the productivity of large manufacturing firms in Nairobi, Kenya. The result is in line with the findings of Adu-Fosu (2016) who tested the relationship between Inventory Management and Productivity in Ghanaian Manufacturing Industries. The findings revealed that no significant relationship exist between inventory management practices at Guinness Brewery Ltd and productivity such that the inventory management practices were not significantly related to productivity. The result also agrees with the findings of Piyachat (2015) that medium and large companies' employees who operated machines had their performance at 80-90% based on the measurement by using cycle of take time received from customers, or set standard time using time and motion study. Additionally, Owoeye *et al* (2014) found that the use of computer programmed software in inventory management is the best tool to maintain stock levels that set the three main costs, holding cost, ordering cost and stock-out costs are at a minimum. Kitheka and Ondiek (2014) study on inventory management automation and the performance of Supermarkets in Western Kenya revealed that inventory management automation affected the performance of the supermarkets and that there was a positive linear relationship between inventory management automation and the performance of the supermarkets in Kenya.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Considering the finding of the study, the concluded that inventory shrinkage has negative and significant effect on customer's satisfaction. The study revealed that stock out situations and underproduction often occur in the companies because of delays in delivery of raw materials to the companies by the suppliers creating production bottlenecks. The study also concluded that inventory investment significantly influences competitive advantage of the selected Flour Mills companies in Nigeria. The study revealed that capital invested in inventory by the Flour Milling companies are very high. These optimal investments in inventories gave the companies opportunity to have advantage over competitors by offering high quality products and services to customers. The study further concluded that there is positive and significant relationship between inventory control and cost effectiveness of the selected Flour Mills companies in Nigeria. The study found that the companies use inventory control system. The study showed that Just-in-Time and Economic Order Quantity (EOQ) were the commonly used inventory control practice in the companies. The overall production costs comprising inventory running cost, Total ordering and holding cost, as well as cost of stock out are high in the companies. The study further concluded that Inventory turnover had a significant effect on the operational efficiency of the selected Flour Mills companies in Nigeria. The study indicated that there is high reduction in shortages and stock out costs, production costs, and in delivery/lead time. Hence, there is high improvement of continuous production across the companies. The study in addition concluded that there is relationship between inventory record accuracy and the customer service delivery of the selected Flour Mills companies in Nigeria. The study revealed that there is a proper inventory documentation by the selected Flour Milling companies. In addition, documentation and availability of materials delivery in and out of the stores are done very often. It further indicated that verification of document in receiving and issuing of inventory is carried out very often. Furthermore, the use of order tracking systems is very high in the Flour Mills companies. Finally, the study concluded that automated inventory system significantly influences productivity of the selected Flour Mills companies in Nigeria. The study found that General Automation of the system, Materials Requirement Planning System (MRP), and Enterprise Resource Planning (ERP) are used by the companies. Inventory management practices would improve availability of product, quality of products/services, and reduction in inventories wastages.

Recommendations

The study recommends that the Flour milling companies in Nigeria should ensure that stocks are sufficient to meet production requirements and customer demands at all times, and the same time avoiding holding unnecessary surplus stocks that may increase holding costs and enhanced customer satisfaction. Flour milling companies in Nigeria should also embrace efficient inventory management practices that could ensure optimal investment in inventories as strategy for gaining competitive advantage over competitors. The study further recommended that flour milling companies in Nigeria should adopt more modern sophisticated techniques such as the Just-In-Time systems, Economic Order Quantity model, and so on in their operations to ensure control of inventory so as to obtain cost efficiency and effectiveness. Furthermore, flour milling companies in Nigeria should properly monitor and track their inventories. Further, stocks should be adequately analyzed before it gets to one year with no sales or use and parts should sell individually at discounted prices to best chances of recouping capital spent to procure the stocks. This strategy will increase chances of higher stock turnover and fill rate signifying higher operational efficiency. Moreover, flour milling companies in Nigeria should develop or aligned their internal inventory control policies to accommodate cycle counting strategies such as

opportunity based, transaction based, and location-based inventory cycle counting. These strategies will enhance inventory record accuracy. Finally, procurement practitioners, production managers, and store supervisors of selected flour mills companies and flour mills companies in Nigeria should adopt and implement computerized procurement and control of inventory.

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APPENDIX

Table 3.1: KMO and Bartlett Test for Each Variable in the Research Instrument

Variables	KMO Measure of Sampling Adequacy	Bartlett's test of sphericity tests
Inventory shrinkage	0.870	143.564 (.000)
Inventory Investment	0.912	165.298 (.000)
Inventory Control	0.817	159.764(.000)
Inventory Turnover	0.783	175.542(.000)
Inventory record accuracy	0.908	181.818(.000)
Automated Inventory System	0.856	162.118(.000)
Inventory Management Practices		
Customer Satisfaction	0.787	230.151(.000)
Competitive Advantage	0.971	197.417(.000)
Cost Efficiency	0.875	188.276(.000)
Operational Efficiency	0.890	179.443(.000)
Customer Service Delivery	0.968	208.149(.000)
Productivity	0.799	224.641(.000)
Operational Performance	0.882	289.683(.000)

Source: Author Compilation

Table 3.1: Reliability Test Results

Items			Cronbach's Alpha	Average Variance Explained
Inventory Management Practices			0.917	
	Number of items	Cronbach's Alpha		
	Inventory shrinkage	7	0.882	0.836
	Inventory Investment	5	0.932	0.798
	Inventory Control	6	0.804	0.896
	Inventory Turnover	7	0.797	0.772
	Inventory record accuracy	7	0.952	0.813

	Automated Inventory System	9	0.897		0.843
Operational Performance				0.939	0.818
	Customer Satisfaction	7	0.876		0.891
	Competitive Advantage	8	0.911		0.765
	Cost Efficiency	5	0.873		0.718
	Operational Efficiency	8	0.789		0.837
	Customer Service Delivery	9	0.821		0.859
	Productivity	8	0.948		0.765
Overall		86		0.928	0.761

Source: Field Survey, 2016