

Inventory Management Practices and Performance of Manufacturing Firms in Kogi State

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Abstract

Manufacturing sub-sector play a significant role to the socio-economic development of Nigeria. However, its effectiveness largely depends on materials handling mechanism. This study on inventory management practices and performance of manufacturing firms in Kogi State is written to examine the extent in which management of inventory influences performance of inventory in Kogi State. The study which is qualitative adopts content analysis. The research concludes that inventory management practices influences the performance of manufacturing firms in Kogi State. The study therefore recommends that a computerized inventory management system be instituted and retain while training of staff at the relevant units be carryout periodically to enable them cope with the dynamics associated with material management.

Keywords: Inventory, Management, Performance, Manufacturing

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Introduction

Inventory management is pertinent to management of small, medium and large firms. Thus, for any business to thrive it must be effective in integrating its material handling technique such as raw material, work-in progress and finished products. Agu et al (2016) revealed that the role of inventory management is to balance demand and supply so as to ensure that inventory are made available to stakeholders at any time such as required at the most efficient cost and time. To this end, inventory turnover at the focus of any manager considering the fact that apart from the fact that such will ensure smooth production and minimize cost, customers' satisfaction will also be guaranteed. It is therefore worthy to note that prudent management of inventory guarantees the success of such as firm as such is capable of reducing penalty cost, minimizes depreciation, wastages and pilferage thereby facilitating attainment of firms' immediate and overall objectives. Therefore, demand management specifically guarantees customers' satisfaction while putting up measures towards effectively managing inventory cost satisfactorily leads to firms operational efficiency (Amodu & Audu, 2018). Despite the adoption of effective material management mechanism it is very difficult to holistically ascertain the exact material volume and processes that will last for a reasonable time owing to the dynamics of business environment, customers perpetual perceptual incongruence market forces and difficulty in making a reliable material forecast. Based on the foregoing, no business manager can be certain of guaranteeing an effective material management without considering these dynamics. Therefore, this study examines how inventory management practices influence performance of manufacturing firms in Kogi State.

Concept of Inventory Management Practices

Inventory constitutes the largest current asset available for firms operations in both manufacturing and services organization. Thus, inventory could be in form of raw materials work-in-progress, semi-finished or finished products which are available for firms operations. Thus, Nzioka and were noted that inventory refers to the worth of raw materials, work in progress, semi finished products which

are either stored or kept for immediate and future use. According to Onchoke et al (2016) inventory could be seen as the quantity of products, raw materials as well as other kinds of resources which are idle at that particular point in time. This implies that inventory to manufacturing firms could be seen as the list of stock of products firms acquires as either raw material, partly finished products or its manufactured products that are available for sales either at the immediate or future period management is seen as the planning organizing, directing and controlling of human and material resources with the view to accomplish firms immediate and strategic objectives (Tende, 2017). Therefore, management play a significant role to manufacturing firms considering the fact that the application of management techniques such as planning, organizing, directing and controlling could guarantee effective handling of stocks and coordination of performance charged with the responsibility of floating or operating these inventories at their various stages of operations.

Inventory management refers to the policies and procedures that logically determine and regulate the stock of items to order, when to place order and what quantity should be kept (Chemaiywo, 2014). This implies that inventory management entails array of activities which deals with the way and manner stocks should be handle to maximize firm performance as well as enhanced customers' satisfaction. Concurring this definition Vasundhara and Pallawi (2019) noted that inventory management is also concerned with the level of order fulfillment by customers thus making firms to float the right and sufficient number of products, at the right ace and time so as to strengthen customers' confidence on the firm strategically.

Ahmed (2018) see inventory management as the art and science charged with maintaining the level of firm stock while incurring minimal cost which is consistent with the immediate and long term objectives of the firm. More so Raparia (2017) revealed that inventory represents large amount of firm expenses in terms of acquisition of raw materials and warehouse management which therefore ensures that the business operations has right quantity to avoid stock out, shrinking as well as maintaining proper accounting. This view conforms to the definition of Ontita (2013) which states that inventory management encompasses all activities targeted at mobilizing raw materials and supplies to the point of production as well as moving in process through the firm. In addition, Mbah e al (2019) defined inventory management to involve the systematic processes of efficiently overseeing the constant flow of units in an out of an existing inventory. This implies that such entails controlling the movement of units in and out of the production site so as to prevent inventory from either becoming too high or stock-out which could affect an effective manufacturing processes.

Inventory management is also seen as the process of specifying the size and quantity of goods to be stocked by a firm. Therefore, inventory management is needed at several points within the factory or within multiple locations of firm supply network with the view to ensuring smooth manufacturing operations and meeting customers target through an efficient demand management. It means that for inventory management to be effective, it entails proper application of managerial techniques to meet firms' immediate and strategic objective.

Ahmed and Cross (2018) defined inventory management as the systematic handling of raw materials, work-in-progress, finished goods and supplies required for creation of the firm Products or services. This implies that inventory entails any stocks or resources that can be applied either for production progress or offered to sales to meet the firms' objective.

Basic Classification of Inventories

Inventory according to Umar and Ibrahim (2016) and Akande (2018) can be classified into three such as the raw material inventory, work-in-progress inventory and finished product. Raw material is seen as all kinds of items purchased by a firm which can be used for further production process. The raw material for production of cement include calcium, carbonate, silica, alumina and iron ore and these items are extracted from limestone, chalk and clay. More so, the raw materials for the production of ceramic products are clay minerals and aluminum oxide. Work in progress is also seen as partly finished products which are between manufacturing stages. This implies that work in progress has passed the stage of raw material but not yet converted to finished products. The raw material could also be referred to as goods-in-progress inventories which at the immediate stage of raw material inventory that are yet to be completed. Thus, work in progress entails materials that have been partly possessed at the production stage by not yet completed for consumption.

In addition, Anichebe and Agu (2013) noted that finished goods are the products which has been completed and awaiting shipment or to be moved to the warehouse. The moment products has been completed the next stage is how to make sure it is delivered to the customers while the remaining stock which may not be required immediately are warehouse. Thus, finished products could be seen as those outputs from the production process. For effective management of stock the basic knowledge of various stock levels is required;

- a. **Minimum Stock Level:** Minimum stock level refers to the level of item of stocks which the firm will not allow it to fall below. This according to Elsayed (2014) refers to the minimum quantity of a particular item of material which must be hold in the stores consistently. The minimum stock level is also referred to as safety stock or buffer stock and the aim is to ensure continuous flow of production. Barde (2015) Umar, Ibrahim (2016) and Onitala (2013) noted that the factors that must be put into consideration are average level of material consumption, the time required to obtain to obtain new products, re-order level, production requirement of such material and the lowest amount of inventory that could be procured with the most efficient cost. The illustration of minimum stock level is given thus, formula for minimum stock level = re-order level less the normal consumption per week by normal delivery time.

Hence, the average normal consumption = 900 units weekly, normal delivery time is 3 weeks and the Re-order level is = 7200 units. Therefore the minimum stock level = $7200 - (900 \times 3) = 7200 - 2700 = 4500$ units. For minimum stock level to be effectively executed it is important to take note of lead time, rate of consumption, nature of material as well as the re-order levels. Lead time according to Based (2015) is the time required to process the order and in doing this it is pertinent to sustain the same level to be able to meet production requirements. Barde (2015) noted that to determine the re-order level the formula = maximum usage multiply by maximum re-order period. This implies that if the average usage material for the firms is 120 – 160 and the lead time is between 6-9 weeks, the re-order level will be determine as 160 by 9 which will give 1440 units.

- b. **Maximum stock level:** the maximum stock level is seen as the maximum quantity of stock. Those firms should not exceed. This is because, the moment firms keep stock beyond these quantities it become overstocking and will amount to several associated cost which would have been avoidable. Umar and Ibrahim (2016) argued that overstock could amount to unnecessary tying down capital, pilferage obsolescence and so on. Raparia (2017) revealed that firm maximum stock level largely depends on certain conditions such as available capital, maintaining

cost, likelihood of stock/production fluctuation, firms policies as well as available storage facilities.

- c. **Danger level:** The danger level is seen as the level below which materials should not fall below. This implies that there is need to put up mechanism for instantaneous replacement by firms if danger level must be managed effectively. To determine danger level the technique could be executed using the formula: danger level = average consumption by maximum recorder period for emergency procurement. Thus, danger lever will be determine where average consumption is 2800 units and maximum period for emergency procurement is 3 weeks, the danger lever is $2800 \times 3 = 8400$ unit.
- d. **Average stock level:** The average stock level is determined using the formula: minimum stock level + 0.5 of reorder quantity. This implies that for this information where maximum consumption = 320 units per day, minimum consumption = 160 unit per day normal consumption is 200 units per day, reorder period = 12-18 days, reorder quantity = 1900 units and normal reorder period is 12 days. To determine the reorder level = maximum consumption by maximum reorder period = $320 \times 18 = 5,760$ units, minimum stock value = reorder level less (normal consumption by normal reordering period). Thus, we have; $5,760 - (200 \times 12) = 5,760 - 2400 = 3360$ units

More so, the maximum stock level = reordering level + reorder quantity – (maximum consumption by reorder period) = $5,760 + 2400 - (200 \times 12)$

$$= 5760 + 2400 - 2400 = 5760$$

Demand Management

Demand is seen as the amount of commodity consumers are willing and able to buy at a particular price and given time (Uwaleke and Uwaleke, 2017). This implies that for a demand to be effective it must be backed up with the ability of the customer to pay as well as willingness of the firm to offer such products for sales. Agu et al (2016) argued that demand management is a strategic and systematic managerial techniques focused to consciously estimate and handle customers' demands with the aim of applying the information to make informed decision. More so, demand management is an integrated technique of identifying, controlling and tracking firm internal purchasing operation (Mbah et al 2019). Therefore, the instrumentality of demand management technique aid firms to retain and technique aid firms to retain and improve their supplier ability as well as effectively executing external spending factors, articulate purchasing order thereby minimizing wastage additionally, the instrumentality of demand management according to Anichebe and Agu (2013), and Agu et al, (2016) focuses on the amount of goods procured rather than product pricing. To this end, demand management which Agu et al (2016) revealed that could be called consumption management commences with a broadened perception of the immediate business target, historical buying behavior as well as the estimated products expected by the firm. To this end, Ogbo et al, (2014) Shivaji (2018) and Agu et al (2016) noted that demand management aids in streaming purchasing techniques which must ensure that there are available options for product volume discount, order timings impact on product pricing, determine option on the expectant to which most efficient suppliers are being reached as well as precise focus in describing contractual procedures. Therefore, Vrat (2014) revealed that demand management aids in integrating quantity of demand and suppliers quantity ratio, monitors expenses that are related to demand and demonstrates the rationale behind continuing strengthening controllable and uncontrollable variables attached to effective relationship management.

Concurring to the above Wangusi and Kagiri (2015) went further to state that demand management being charged with the process concerned with creating balance between customers requirement with the capability of firm supply chain thereby making enabling firm to be proactive in meeting anticipated demand as well as being reactive to unanticipated demand. Thus, for firm to be successful in handling its demand management technique it must put in place adequate strategic management process which Keely (2016) identified to include customer relationship management, customer service management, order fulfillment, manufacturing flow management, supplier relationship management, product development and commercialization and returns management.

Inventory Cost

Inventory cost is a cardinal aspect of inventory management practices. Thus, Amodu, Audu (2018) and Shivaji (2018) identified the various types of costs associated with inventory as:

1. Cost of holding stock: this kind of cost is also known as carrying cost which include the cost of handling materials insurance, security, pilferage, deterioration, storage charges running cost and obsolescence.
2. Cost of ordering or procurement: This cost is also called the cost of obtaining stock which includes clerical and administrative costs, transportation cost, and the cost setting up a production firm.
3. Cost of stock: This is the cost ducts directly or the cost of production.
4. Stock out cost: The stock out cost is associated with the running out of stock. It s on the premise of avoiding this kind of cost that stock are kept in the first instance but sometimes when becomes unavoidable the firm has to incur this cost in order to retain customers.

In effectively executing cost related matters in inventory management economic order quantity is the technique used to ensure that the most economical buying quantity is determined. Therefore, the application of these costs is given thus;

- a. Given the demand for manufacturing product as 22,000 per annum and the cost of holding ₦14, cost of procurement as ₦200 where instantaneous replacement. Determining the optimum economic order quantity number of orders by year and total cost per year if the cost of one unit is ₦9.

Therefore, using economic order quantity $EOQ = \sqrt{\frac{2COD}{ch}}$

Where D = demand, ch = holding

Cost and Co = cost of procurement. Thus, $EOQ = \frac{\sqrt{2 \times 200 \times 22,000}}{14}$

$$EOQ = \frac{\sqrt{8,8000,000}}{14}$$

$$= \sqrt{628,571.43}$$

$$EOQ = 792.8 \text{ units}$$

To determine the number of orders by day we have the formula

$$N = \frac{D}{4} = \frac{22,000}{792.8} = 27.7$$

More so, to determine the total cost per year if the cost of one unit is N9 we have

$$TC = \frac{DCO}{Q} = \frac{Qch}{2} + Dp$$

Where Tc = total cost, P = price we have:

$$\frac{22,000(200)}{792.8} + \frac{792.8(14)}{2} + (22000 \times 9)$$

$$\frac{4,400,000}{792.8} + \frac{11099.2}{2} + 198,000$$

$$5549.95 + 5549.6 + 198,000$$

$$\text{N}209,099.55$$

However, using the same information for situation where replenishment is not instantaneous thus attracting penalty cost of N3700 per unit annually, and determining the economic order quantity, optimal stock level, optimal shortage level and number of orders by the formular;

$$EOQ = \sqrt{\frac{2COD}{ch} \left(\frac{Ch+Cs}{Cs} \right)} \text{ is applied}$$

$$\sqrt{\frac{2 \times 200 \times 22,000}{14} \left(\frac{14+3700}{3700} \right)}$$

$$\sqrt{\frac{8,800,000}{14} \left(\frac{3714}{3700} \right)}$$

$$\sqrt{628571.43 (1.00)}$$

$$792.8 \times (1.00)$$

$$= 792.8 \text{ units}$$

To determine the optimal stock level (m) we use the formula

$$\sqrt{\frac{2COD}{C} \left(\frac{Cs}{C + Cs} \right)}$$

$$M = \sqrt{\frac{2 \times 200 \times 22,000}{14} \left(\frac{3700}{14+3700} \right)}$$

$$M = \sqrt{\frac{8,800,000}{14} \left(\frac{3700}{3714} \right)}$$

$$M = \sqrt{628,571.42 (0.99)}$$

$$M = 792.8 (0.99)$$

Therefore $m = 784.9$ units

In addition, determining the optional shortage level, we adopt the formula $S = Q - M$

$$\text{Hence, } S = 792.8 - 784.9$$

$$S = 7.9 \text{ units}$$

Finally, we determine the number of orders per year using the formular

$$N = \frac{D}{Q}, \text{ where } D = 22,000 \text{ and } Q = 792.8, \text{ hence, } \frac{22,000}{792.8}$$

$$N = 27.7 \text{ times per year.}$$

Overview of Firm Performance

Firm performance whether private or public profit or non-profit has been at the fore of their objective hence these firms put both immediate and strategic measures to ensure that they accomplish their objective competitively. Though Shishia et al (2014) argued that firm performance should be targeted towards the 3Es of economy, efficiency and effectiveness it is also important to note that firm performance broadly considers the ability to attain their goals through adequate utilization of both human and material resources. This implies that firm performance is largely depends on the ratio between combine resources efforts extended as well as the results being accomplished. To this end, Omar (2016) noted that firm performance should be target at enhancing customers' satisfaction, operational performance, and lead time, inventory to sale ratio and inventory turnover which should also be constantly reviewed towards improvement.

More so, Omondi and Namisonge (2015) and Osoro et al (2016) argued that though performance is the major target of firms practicing strategic inventory management it is important to note that in achieving effective performance the firm must consider both the internal controllable as well as external uncontrollable environment.

Customers Satisfaction

Customer refers to the clients who either directly or indirectly benefits from the products or services being offer by a firm Jader (2017) sees customer satisfaction as the comprehensive evaluation based on the cumulative procurement and consumption experience of products or services over a given period of time.

Osoro (2016) revealed that for customer satisfaction to be effective it must not only considers what the customer expects but there must be strategic marketing strategies to put innovative measures considering the dynamic nature of customers' tasks and preferences. Moreover, customers satisfaction is not only influence by only specified product or service attributes it is also influenced by their emotional, economic, social and demographic attributes. Again, customers' satisfaction is largely anchored on what the firm can offer and this leads to customers loyalty with the strategic view to rebuild and retain their commitment towards strengthening their relationship with the firm as this will go a long way in broadening the level of trust, mutual understanding, affinity as well as gregariousness toward an improved market performance.

Thus, Mbah et al (2019) noted that customers satisfaction is measured by manufacturing firm through the extent of repeat purchase of their products, introducing their product to other customers, the extent to which they express satisfaction on how their complaints are handled with high level of dispatch as well as their perception on the way and manner products are being offered to them in a convenient manner.

Operational Performance

Operational performance is seen as the output of firms manufacturing activities in terms of effectiveness, cycle time, waste reduction, efficiency and the extent in which the firms comply with regulatory business environment (Ontita, 2013). Again, operational performance covers the aspects through which such firms strive to improve its performance so as to strategically accomplish its objective. Thus, Ahmed (2018) and Ebikebena, Lebura (2019) revealed that measurement of firm operational performance in manufacturing companies entails speed, quality, cost, dependability and flexibility which are harnessed towards meeting the firms overall objectives. To this end, speed is ascertain by appraising how fast firm can deliver its products to the customer, quality measured with the extent to which products conform with the initial set benchmark. In addition, the cost variation is ascertain by looking at how unit cost of product changes with varieties of the product with the view to ensuring that economic of scale is not adversely affected. The extent to which firm can easily adept to operational changes is also significant in measuring operational performance because it is one of the best practices in business to adapt to uncontrollable entrepreneurial environment so as to retain customers and also meets the political, social, economic and legal business obligations.

Finally, Chemoiywo (2014) argued that to ensure operations performance it is important to note that product perceived performance do not deviate especially within the length of time stipulated in the product performance standard.

Theoretical Framework

Stock Diffusion Theory

The stock diffusion theory examines a dynamic technique of inventory management tools applied for non-stationary materials having a non-constant means and variance. The stock diffusion theory reveals how stock consumption is modeled as a maskov process exhibiting a slow diffusion items. Thus, Onchoke and Wanyoike (2016) noted that this theoretical postulation suggests than management of inventory guarantees safety of stock as well as smooth operational efficiency. Again, this theory examines the fluctuations associated with the marketing environment owing to environmental dynamics and customer preferences. To this end, to effectively control inventory in such a scenario the needfulness to develop an internal inventory control system become imperative. This theory is relevant to the study on inventory management and performance of manufacturing firms considering the fact that apart from manufacturing firms dealing consistently with inventory, the theory has practical application to the research owing to how its effective adoption could guarantee operational efficiency in the manufacturing sub-sector.

Conclusion and Recommendations

This research examined inventory management practices and its influence on performance of manufacturing firms in Kogi State. The study revealed that demand management specifically leads to customers' satisfaction while cost control guarantees operational efficiency. To this end, it can be

concluded that inventory management practices influences the performance of manufacturing firms in Kogi State.

The study therefore recommends that for an effective inventory management a computerized inventory management system should be instituted and integrated while the employees at the relevant units, who are directly or indirectly linked to inventory management, be engaged in periodic training. These measures will no doubt ensure that manufacturing firms meets their customers need satisfactorily.

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