Factors Influencing Inventory Management Performance In Public Health Sector: A Case Study Of Public Health Sector In Kisii County

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Abstract

Inventory management is the process of efficiently overseeing the constant flow of units into and out of an existing inventory. This process usually involves controlling the transfer of units and documenting the delivery of raw materials and movement of these materials into operational processes. A substantial proportion of the scarce resources are used in the procurement of drugs and medicine at public health facilities in order to deliver goods and services required to their customers. Due to the health sector consuming a large proportion of scarce resources there is need to be managed effectively. The purpose of the study was to establish factors influencing inventory management in Public Health Hospitals in Kisii County. The objectives of the study were: to find out the influence of stock replenishment on inventory management performance Public Health Sector; establish how information sharing influences effective inventory management performance of the Public Health Sector; find out the influence of inventory costs on inventory management performance of the Public Health Sector and establish influences of demand variability on inventory management performance of the Public Health Sector in Kisii County, Kenya. The study adopted a descriptive survey design. The study target population was 45 respondents selected from pharmaceuticals stores department, non-pharmaceuticals stores department and general stores department selected by census sampling technique. Descriptive and inferential statistics were used for data analysis. Findings of the study were overstocking and under stocking of inventory of the Public Health Sector in Kisii County was due to inadequate forecasting of requirements, Scheduled time for deliveries, insufficient staff, Scheduled time for receiving, issuing and unorganized storage facilities affect information sharing between the customer and supplier thus is affecting effective inventory management of the Public Health Sector; demand variability rating greatly influence inventory management.

Keywords: Inventory Management, Performance, Health Sector

1.1 Background to the Study

The Public Procurement and Asset Disposal (PPDA) act 2015 came into force on 7th January, 2016 repealing the previous public Procurement and Disposal act of 2005. The new act contains various controversial provisions including the requirements by a bidder who wishes to challenge the decision of a procuring entity to deposit 10% of the bid price before the review. The new act introduced new deadlines which are unlikely to work in practice. Therefore the Public Health sector has authority to carry out procurement activities in accordance to the legal framework as provided by Public Procurement and Asset Disposal Act (PPDA) Act of 2005, and has not been left behind in the reforms as the promulgation of the PPOA 2016. In Kenya, due to the health sector consuming a large proportion of the scarce resources. The Public procurement and Asset Disposal (PPDA) act 2015. 2012 in this public procurement and Disposal manual of November 2012 and public procurement and Asset Disposal (PPDA) of march 2009 under (chapter 11.7) has stipulated the administration of inventory management of stores, under this chapter the manual states that all stores must be recorded in the store ledger indicating the item description, quantity and name of the person making the requisition, receipt and issues to be recorded in the ledger on the day of issue and receipt and has to be closed and balanced yearly during a survey or handing over.

A substantial proportion of the scarce resources are used in the procurement of drugs and medicine at public health facilities in order to deliver goods and services required to their customers. Due to the health sector consuming a large proportion of scarce resources there is need to be managed effectively and this can only be done through proper inventory management. The process involves finding systems to track orders, shipping cost, stock and sales. It also involves the software that may be used to predict inventory status and track materials. Ineffective inventory management can contribute to losses or business failure since this crucial component is vital to the profits and costs of the business. This study therefore focused on identifying the relationships of

health facilities, inventory management systems and the challenges which contribute to affect the achievement of core functions of health function. The release of cash and reduced operating costs are essential concerns of inventory management. In Kenya's Public entities, procurement is decentralized to individual procuring entities. Public entities like Public Health offer essential services like healthcare therefore, there should be proper inventory of goods and services. In order to avoid shortages, minimize the costs, to provide continuity of goods and service disruptions. So that the Public health sector to be successful, there are a number of techniques designed to make inventory management effective and these are selective inventory control; ABC Analysis, forecasting methods, inventory models, advanced order processing systems and performance measurement systems.

1.2 Statement of the Problem

The overall problem of stocking levels of non-pharmaceuticals and drugs at public health sector of Kisii County in Kenya inadequately address the issues of concern in relation to law of storage facilities, cost incurred and provision of both internal and external customers service levels. Inventory management in public health institutions in Kenya is ineffective for the smooth running of the facilities and provision of health services to the general public.

1.3 Empirical Literature

Guns and Gunert (2007) inventory management is faced with various challenges like inventory costs, untrained personnel, in accurate record keeping and demand variability. However there are two main theories in inventory management and they are mathematical theory and deterministic model which depend on predictability of demand. According to Morgen and Stern (2007) when demand for future cannot be determined, deterministic model is used to set inventory management. Teylor and Francis (2004) in international journal of production: research highlighted the pressing need for clearly defined contract and conception framework to advance on supply chain management performance. Minifie and Davis (1986) stated that one area that has become a focal point since 1960's is inventories (materials) management. Inventories have become a vital part of business as they are necessary for production, efficiency and customer satisfaction. Stephenson (1996) further added that although the amount and dollars values of inventories carried by different types of firms varies widely, a typical firm probably has about 30 percent its current assets and perhaps as much as 90 percent of its working capital invested in inventory. However excess inventory diminishes a firm's ability to compete and particularly affects the competitive priorities of price quantity, flexibility and time (Chase and Aquilano 1995). It is because of this that Finch and Luebbe (1995) stated that the J.I.T philosophy describes excess inventory of one of the key waste elimination. Although the J.I.T philosophy has been considered as an effective mean of inventory management. Badur (1995) argued that as with the earliest proponents of J.I.T when they adopted the concept from Japan in the early 1980's J.I.T is not a perfect system. They did not expect it to work for everyone. The main idea was primarily to eliminate the interference caused by excess inventories.

Ellram (1995) noted that if all suppliers were perfectly dependable, if machines never broke and if demand could be forecasted with perfect accuracy inventory needs would diminish. Conceptually Noori and Redford (1996) defined inventory as the stock of any item and resource used in the in the of the Public Health. On the other hand inventory is system of policies and controls that monitors levels of inventory and determines what levels should be maintained when stock should be replenished and how large orders should be. Stephenson (1996) inventory serve the functions of maintaining independence of operations smooth production requirements to decouple operations to provide a safeguard of variation in raw materials delivery time, take advantage of economic purchase order size, and hedge against price increases. An effective inventory management is subject to lowering costs. Therefore according to Chase and Aquilano (1995) the following costs must be considered in making any decision that affects inventory holding (currying) cost, setup (production) cost, ordering costs and shortage costs. Schniedejan (1993) cites from Jordan(1998) that inventory management policy rules and procedure that are part of J.I.T which cut lot sizes and increase frequency of orders cut buffer in inventory cut purchasing costs, improve material handling seek zero inventory and seek reliable supplies.

Inventory management has been variously defined as an attempt to balance between costs of inventory and customer satisfaction. Wild (2002) can inventory management as an activity which organizes the availability of items to customers. Through coordination of purchasing, manufacturing and distribution function. Leenders and Flynn (2011) saw inventory management as involving managing the flow of information and establishing operational design of the physical flow of goods and services. Lysons and Farrington (2006) write that inventory control is an important element in supply chain optimization. Fisher (1997) too approaches for efficient supply chain and responsive supply chain strategies can be applied to inventory management. Baily et al (2005) underscored three principles that must be taken into consideration in order to achieve effective inventory management. The three principles include knowing the safety, stock levels to ensure continuity of business,

understanding when to reorder and knowing how much to order. For efficient and effective inventory management demand patterns must be understood. According to Chopre et al (2007) in order to achieve a strategic fit between supply chain and competitive strategies, a business must understand the customer. The characteristics which need to be understood include: time required, quality of the item required, quantity of the item required, and price of the item. Information sharing is a powerful tool in effective inventory management at all levels of supply chain network. Information must be accurate on stock levels, costs, decisions, shipment, customer preferences. According to Chopre et al (2007) customer forecast, sales history, print of sale, ordering costs, quality and quantity are some of the quality information required. Hamisi 2010, Chopra et al (2007) Timely and accurate information enhancing coordination which is intern aligns demand patterns, orders, inventory levels and price. Currently proper and accurate information sharing, flow reduces inventory costs. These are costs of holding goods in stock which are usually expressed in a percentage of the inventory value. It includes capital, warehousing, depreciation, insurance and shrinkage. Inventory management is associated with costs of procurement which are ordering costs, holding costs and shortage costs. According to Mandy (2015) ordering, holding and shortage costs make up three categories of inventory related costs.

Scope (2010) indicated that a lot of working capital is kept in inventory. Inventory costs come about from holding costs, stock out acquisition costs for example preliminary costs, for preparing requisitions, vendor selection, regulation cost order preparation, inspection costs. Holding costs may also be storage costs, cost of space, electricity, labour costs, handling costs clerical costs deterioration costs, obsolescence and pilferage. According to Tersire (1982) demand variations affect inventory levels, costs and profits. When demand forecast is low and demand is high then stock out arises therefore realized by customers' responsiveness (Hamisi 2010). High stock levels during low demand period may result high inventory costs. Therefore demand variability is due to inaccurate information on supplies inaccurate demand forecast, batch ordering price variation which stimulate formed buying (overstocking). Hamisi (2010) has indicated that inadequate information flow allows various partners to coordinate their long term and short term plan. Information sharing is key to supply chain coordination which maximizes supply chain profitability through cost containment and responsiveness.

1.4 Research Methodology

The study adopted a descriptive survey design. According to Saunders et el (2009) the survey design tend to help in collecting a large data from a sizeable population in a cost effective way. Kerlonger (1969) points out that descriptive surveys are not only restricted to fact finding but may often result in the formulation of important principles of knowledge and solution to significant problems. Descriptive survey design is used when collecting information about people's attitudes, opinions, habits or any of the varieties of education or social issues (Orodho and Kombo 2002). The design enables the researcher to establish the relationship between the variables in this study. The study target population was 45 respondents selected from pharmaceuticals stores department, non-pharmaceuticals stores department and general stores department. The study therefore adopted a census sampling technique to select respondents in this study. The questionnaire was used to collect primary data. The data obtained was edited and analyzed using descriptive statistics and inferential statistics to determine the relationship between the independent and dependent variables.

1.5 Results and Discussion

1.5.1 Stock replenishment on Inventory Management Performance Public Health Institutions

The study established the influence of stock replenishment on inventory management in the health sector in Kisii County. The response rate was as in table 1 below.

Table 1 Regularity of Replenishment of stock inventory in the Public Health Sector

Duration of Replenishment	Frequency	Percentage
Daily	4	8.89%
Weekly	7	15.6%
Quarterly	26	57.78%
Monthly	8	17.78%
TOTAL	45	100%

Table 1 shows that the regularity of replenishment of stocks on daily basis 8.89%, weekly basis its 15.6%; as 57.78 % of the respondents indicated quarterly while 17.78% indicated monthly as replenishment periodicity of inventory in the health facilities in Kisii County. The study results confirm that inventory management performance is affected by stock replenishment as shown in various periods. With the ever increasing

expenditure in healthcare sector, there is need to curb this challenge while ensuring that available resources are used to provide essentials medications to the ever increasing population. Pharmacy department is one of the most consumers of the hospital budget and one of the few areas where a large amount of money is spent on buying medicines and drugs. It is therefore important that hospitals ensure smooth supply of the required stock to ensure uninterrupted supply. This calls for the effective and efficient inventory management of pharmacy stock by keeping a close supervision on important drugs, prevention of pilferage, and priority setting in purchase and distribution of drugs. According to Miller (2010), inventory management involves all activities put in place to ensure that customer have the needed product or service. It coordinates the purchasing, manufacturing and distribution functions to meet the marketing needs and organizational needs of availing the product to the customers. Inventory management is primarily involved with specifying the size and placement of stocked goods. Inventory management is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials. The scope of inventory management also involves managing the replenishment lead time, replenishment of goods, returns and defective goods and demand forecasting, carrying costs of inventory, asset management, physical inventory, available physical space, demand forecasting, inventory valuation, inventory visibility, future inventory price forecasting and quality management. With a balanced of these requirements, it is possible to reach an optimal inventory level, which is an on-going process as the business needs shift and react to the wider environment. Ogbo et al, (2014).

The study further established the effect of stock replenishment on inventory performance of the Public Health

Sector in Kisii County. The response rate was as in table 2 below

Table 2 Effect of stock replenishment and inventory performance in the Public Health Sector

Statement	5.Very high Effect	4. High Effect	3. Fairly Effect	2. Low Effect	1. No Effect	Total Percentage
Inventory cost	17.65%	64.71%	17.65%	0.00%	0.00%	100%
Information Sharing	17.65%	29.41%	52.94%	0.00%	0.00%	100%
Demand variability	17.65%	23.53%	41.18%	11.76%	5.88%	100%
Lead time	11.76%	5.88%	35.29%	23.53%	23.53%	100%

According to results on table 2 the effect of stock replenishment on inventory performance in the in the of the Public Health Sector in Kisii County is that high on inventory cost 64.71% and fairly high on information sharing 52.94%, demand variability 41.18% and leads time 35.29% influence inventory performance. The study was to establish on how stock replenishment affects inventory management. The research results indicated that stock replenishment is one of the factors which influence inventory management performance of Public Health Sector in Kisii County at 64.71% according to the respondent's response. Inventory management is the process of efficiently overseeing the constant flow of units into and out of an existing inventory (Elliot 2007). This process usually involves controlling the transfer of units in order to prevent the inventory from becoming too high, or dwindling to levels that could put the operation of the company into jeopardy. Competent inventory management also seeks to control the costs associated with the inventory, both from the perspective of the total value of the goods included and the tax burden generated by the cumulative value of the inventory (Barcodesinc 2012). Balancing the various tasks of inventory management means paying attention to three key aspects of any inventory (Benton 2007). The first aspect has to do with time. In terms of materials acquired for inclusion in the total inventory, this means understanding how long it takes for a supplier to process an order and execute a delivery. Inventory management also demands that a solid understanding of how long it will take for those materials to transfer out of the inventory be established. Knowing these two important lead times makes it possible to understand when to place an order and how many units must be ordered to keep production running smoothly (Barcodesinc 2012). Calculating what is known as buffer stock is also key to effective inventory management. Essentially, buffer stock is additional units above and beyond the minimum number required to maintain service levels.

1.5.2 Information Sharing and Inventory Management Performance
The study established the extent to which information sharing influence inventory management performance in public health institutions in Kisii county Kenya. The response rate obtained from the field was recorded as in table 3 below

Table 3 Information Sharing and Inventory Management Performance

Response	5. Very great extent	4. Great Extent	3. Moderate extent	2. Less Extent	1. No Extent	Total Percentage
Order size	5.88%	41.18%	23.53%	17.65%	11.76%	100%
Demand forecast	23.53%	17.64%	29.42%	17.65%	11.76%	100%
Costs	17.65%	23.53%	29.42%	11.76%	17.65%	100%
Planning	29.42%	17.65%	23.53%	11.76%	17.65%	100%
Storage	23.53%	17.65%	29.41%	5.88%	23.53%	100%

Table 3 shows that the extent of information sharing indicators like order size influence to great extent at 41.18%, on demand forecast is moderate extent at 29.42%, costs is also on moderate extent at 29.42%, on planning it is very extent at 29.42% and on storage it is moderate extent at 29.41%. The procurement function in Kenya has been characterized by massive scandals and in dignity which have been attributed to poor handling of procurement information thus leading to excessive corruption (Thai, 2009). Therefore information sharing as a factor in inventory management performance is crucial. There is need to have a robust automated procurement system which is interlinked and this will lead to enhanced competitiveness and lowered costs as information can be accessed by relevant sections in the sector. This is in agreement with other studies like Ogot *et al* (2009).

Leung (2007) evaluated information sharing on e-procurement despites not giving emphasis on inventory management, the study revealed the importance of information sharing in procurement management, an aspect of inventory management performance in an organization. Procuring entities today are continuously facing external and internal problems when sourcing for their needs by the use of traditional procurement procedures. Problems such as poor information sharing between purchasers and suppliers, non-automated supplier appraisal systems, adversarial relationship and non-responsive supply chain integration exist in this electronic age as indicated by Chartered Institute of Purchasing and Supplies (2011). Inventory management systems represent an important development for the purchasing process (Neef, 2001). In order for organizations to be competitive and stay updated, there is need to have a paradigm shift in the way procurement is carried out so as to solve numerous procurement problems evident in the business world especially in developing economies which include increased corruption, high costs of doing businesses, a lot of non-value adding paper work procedures, long time elapse to respond to tenders and non-competitiveness (Chartered Institute of Purchasing and Supplies, 2011). Therefore the findings in the health sector in Kisii county are not far from what the problems at hand are which tend to interfere with level of service delivery in the public sector.

Table 4 Information Sharing Indicators and Inventory Management Performance

Response	Totally agree	Agree	Slightly agree	Slightly disagree	Not at all	Total %
Scheduled time for deliveries	23.53%	52.94%	5.88%	17.65%	0.00%	100%
Scheduled time for receiving/ issuing	11.76%	23.53%	52.94%	11.76%	0.00%	100%
Insufficient staff	0.00%	41.18%	5.88%	47.06%	5.88%	100%
Poor Communication	17.65%	23.53%	11.76%	41.18%	5.88%	100%
Unorganized storage facilities	11.76%	23.53%	29.41%	17.65%	17.65%	100%

The respondents agree that Scheduled time for deliveries 52.94% and for insufficient staff 41.18% of the respondents agree. Scheduled time for receiving or issuing 52.94% slightly agree that it influences inventory performance in public health institutions while for unorganized storage facilities 29.41% of the respondents indicated that it influenced inventory management performance. Research done by Wang John - 2010 Business and Economics he states that both information sharing and effective supply chain should be having accurate

information throughout the chain management system. This confirms the objective under research study that effective information sharing is one of the   factors influencing inventory management performance of Public Health Sector in Kisii County.

According to Susan and Michael, (2000) accuracy of inventory records is necessary to provide satisfactory customer service, determine replenishment of individual items; ensure that material availability meets repair or project demand, analyze inventory levels and dispose of excess inventory. Bailey and Farmer (1982) state that stock recording are expected to maintain particulars of receipt, issues and balances remaining in stock for each individual item held in the storehouse daily. According to Susan and Michael (2003), Stock records provide the management with the information which is used to ensure accountability through stocktaking and stock audit exercise. Jessop and Morrison (1994) states that records can be posted manually but, where the volume and complexity of the documents handled is of major proportion mechanical methods are often to be more effective.

1.5.3 Inventory Cost and Inventory Management performance

The study established the influence of inventory costs on the inventory management performance in the health sector in Kisii County. The response rate obtained from the field was recorded as in table 5 below

Table 5 Inventory Cost and Inventory Management performance

Elements of Inventory Costs	5. Very high influence	4. High influence	3. Moderate influence	2. Low influence	1. No influence	**Total**
Ordinary costs	29.41%	23.53%	23.53%	11.76%	11.76%	100%
Buying costs	35.30%	11.76%	29.41%	0.00%	17.65%	100%
Transport costs	11.76%	29.40%	23.53%	35.30%	0.00%	100%
Storage costs	23.50%	11.76%	41.18%	0.00%	17.65%	100%
Maintenance cost	5.90%	29.40%	35.30%	5.88%	23.53%	100%

According to the respondents as indicated in table 5 the impact of costs incurred on inventory management of the Public Health Sector in Kisii County is very high influence at 29.41% on ordinary cost, buying costs was at 35.30 % very high influence on inventory management performance and moderate influence at 41.18% on storage and maintenance cost at moderate influence at 35.30%.

Table 6 Ranking of Costs incurred in Inventory Management in the Public Health Sector

Category of Inventory Cost	Very High	High	Moderately High	Low	Too low	Total
Ordinary costs	17.65%	29.41%	41.18%	11.76%	0.00%	100%
Transport Costs	11.76%	35.29%	29.41%	23.53%	0.00%	100%
Storage Costs	17.65%	23.53%	41.18%	17.65%	0.00%	100%
Maintenance cost	29.41%	17.65%	23.53%	17.65%	11.76%	100%
Insurance cost	5.90%	19.41%	23.53%	17.64%	33.53%	100%

The respondents ranking of the costs incurred in inventory held of the Public Health Sector in Kisii County was very high on maintenance cost at 29.41% , high on transport cost at 35.29%, moderately high on ordinary cost of 41.18% and storage cost at 41.18% and too low on insurance cost 33.53% rating. Inventory Management plays a decisive role in the enhancement of efficiency and competitiveness of enterprises. Effective inventory management entails holding an appropriate amount of inventory. Too much inventory consumes physical space, creates a financial burden, and increases the possibility of damage, spoilage and loss. On the other hand, too little inventory often disrupts operations and increases the likelihood of poor customer service (Dimitrios, 2008). Further Rajeev (2008) argues, there is increased need for enterprises to embrace effective inventory management practices as a strategy to improve their competitiveness. Inventory systems are developed with the aim of reducing costs associated with inventory management. Inventory management systems are however described as complex systems to develop (Jones and Riley, 1985). This is attributed to the fact that inventory management spans through most of the departments within an institution each having its own heterogeneous functions. Moreover, institutions should integrate their inventory management systems with those of their suppliers (Power,

2005). By so doing, the efficiency of the supply chain process will be significantly enhanced.

According to Power (2005), developing integrated inventory systems is one of the challenges that organizations face as they develop inventory systems. In addition, complex systems are costly to develop and thus discourage organizations from developing them. According to Cagliano, DeMarco, Rafele and Volpe (2011), adoption of inventory management systems have huge initial cost implications for the firm but the firm stands to benefit in the long run. Some of the benefits include increased operational efficiency, lower institutional and operational costs, shorter lead-times and reduced inventory (Cagliano *et al.* 2011). Therefore on this dimension public health institutions are not an exception to this.

4.6 Demand Variability and Inventory Management Performance

The study sought to establish the influence of demand variability on inventory management performance. The response rate obtained from the field was recorded as in table 7 below

Table 7 Influence of Demand Variability on Inventory Management Performance

Demand Variability Indicators	Highly Great influence	Great influence	Moderate influence	No influence	Total
Overstocking	47.06%	41.18%	5.88%	5.88%	100%
Under stocking	23.53%	41.18%	11.76%	23.53%	100%
Costs	17.65%	52.94%	17.65%	11.76%	100%
Information Sharing	0.00%	23.53%	52.94%	23.53%	100%

According to the respondents as indicated in table 7overstocking has a highly great influence of 47.06%, under stocking and costs have a great influence of 41.18% and 52.94% while information sharing has moderate influence rated at 52.94 % on demand variability of inventory management performance of the Public Health Sector in Kisii County . In fact excess inventories were considered as indication of wealth; the management considered as over stocking is beneficial. But today firms have started to embrace effective inventory control (Susan and Michael, 2000). Managers, now more than ever before, need reliable and effective inventory control and management of inventory helps to reduce costs and remain competitive (Closs, 1989).According to Dobler and Burt (2006), inventory alone account for 30% of the organization invested capital. It's for this reason that the Government of Kenya through its Supplies manual (2007) have instituted procedures and techniques for the purpose of proper inventory control. According to Buffa and Salin (1987) there are several reasons for keeping inventory. Too much stock could result in funds being tied down, increase in holding cost, deterioration of materials, obsolescence and theft. On the other hand, shortage of materials can lead to interruption of products for sales; poor customer relations and underutilized machines and equipments. The problem or inventory control exists in the Ministries. Inventory control of goods is decentralized, where the ministry has deployed some Supplies Officers in each of the department to coordinate the inventory control activities on the behalf of Head of Procurement.

1.6 Conclusion

Based on the findings on objective one the study concludes that stock replacement on inventory management performance is high on cost at 64.71%. Based on the findings on the objective two the study concluded that the major cause of inventory management is on maintenance, transport, costs and storage. Based on the findings on objective three the study concluded that inventory costs are the main cause of inventory management performance in the public health sector of Kisii County. Based on objective number four the study concluded that the cause of demand variability on inventory management in the Public Health Sector in Kisii County are costs poor planning and co -ordination of activities during procurement.

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