

**ANALYSIS OF RELATIONSHIP BETWEEN INVENTORY  
MANAGEMENT AND PERFORMANCE OF PUBLIC HOSPITALS IN  
KENYA**

**BY  
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**DECLARATION**

This research project report is my original work and has not been presented to any other institution for academic or other purpose.

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PG/MBA/ 00073/13

**Declaration by the Supervisor:**

This research project report has been submitted for examination with my approval as University Supervisor.

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## **DEDICATION**

I dedicate this work to my family.

## **ACKNOWLEDGEMENT**

I thank the Almighty God for bringing me this far; His grace has been sufficient. I express my deepest appreciation to all those who have supported me in one way or the other especially Dr. Johnmark Obura, for the close guidance.

## ABSTRACT

Performance in public hospitals has been in downward trend with top management of such facilities being blamed for mismanagement. Services in such facilities has been hampered with lack of critical items as drugs which has been attributed to poor inventory management. Inventory management is considered one of the main components of organizations supply chain management which creates customer value-performance. The concept attests to this argument by emphasizing inbound logistics which acts as a pointer to organization performance. Further, knowledge on customers' satisfaction is important in developing countries like Kenya, where public hospitals are struggling with access to services by the growing population. It is not clear, in these organizations, what role inventory management plays in creating customer value, which today is the most important source of sustained performance. Moreover, inventory planning and inventory control relationship with organization performance has left the academia has given mixed results creating more confusion. The purpose of the study was therefore to analyze the relationship between inventory management and performance of public hospitals, a case of Siaya District Hospital. Specifically the study sought to investigate the relationship between inventory planning and performance, establish the relationship between inventory control and performance and establish the relationship between inventory operations and performance of Siaya District Hospital, Kenya. The study was guided by a conceptual framework in which the independent variable is inventory management practices and dependent variable is performance. The design adopted for the study was correlational design. The population comprised of 163 employees of the hospital. A saturated sample of the 163 employees was interviewed. Data was collected from primary sources. Primary data were collected using semi structured questionnaires. A structured questionnaire was used to collect data. Inferential analysis revealed that performance had a weak positive but not significant correlation with inventory planning ( $r=0.012$ ,  $p>0.01$ ), a weak positive but significant correlation with inventory control ( $r=0.323$ ,  $r<0.01$ ) and a weak negative but significant correlation with inventory operations ( $r=-0.283$ ,  $r<0.01$ ) furthermore, it was established that Inventory planning ( $\beta_1= 0.044$ ,  $p>0.01$ ) was positive but insignificant predictor of performance of district hospital. Inventory control ( $\beta_2=0.291$ ,  $p<0.01$ ) as positive and significant predictor of performance of district while inventory operations ( $\beta_3= -0.252$ ,  $p<0.01$ ) was negative but significant predictor of performance of district hospitals. The study concluded that there was no significant relationship between inventory planning and performance while there was significant relationship between inventory control and inventory operations and performance. It was recommended that stakeholders invest much in inventory control and inventory operations. The finding is useful to industry players in monitoring their performance in relation to their inventory management practices.

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## **ABBREVIATIONS AND ACRONYMS**

<b>CSCMP</b>	Council of Supply Chain Management Professionals
<b>EOQ</b>	Economic Order Quantity
<b>GDPs</b>	Gross Domestic Products
<b>JIT</b>	Just-in-Time
<b>MRP</b>	Material Resource Planning
<b>SCP</b>	Structure-Conduct-Performance Framework
<b>TMDM</b>	Total Measurement Development Method
<b>TPM</b>	Total Performance Measurement
<b>TPG</b>	Tarkenton Productivity Group
<b>U.K</b>	United Kingdom
<b>USA</b>	United States of America
<b>KEMSA</b>	Kenya Medical Supplies Agency

## OPERATIONAL DEFINITION OF TERMS

<b>Productivity</b>	This is the amount of output per unit input in a production process
<b>Profitability</b>	This refers to the ability of business operations to generate revenues over and above costs
<b>Quality</b>	This is the degree to which a product or service meets customer requirements and expectations
<b>Organization Growth</b>	This represents increase in organization's physical facilities and Operations
<b>ABC Analysis</b>	ABC analysis is an inventory categorization method which consists in dividing items into three categories, A, B and C: A being the most valuable items, C being the least valuable ones. This method aims to draw managers' attention on the critical few (A-items) and not on the trivial many (C-items)
<b>Inbound Logistics</b>	These are all activities, processes and assets that deliver inputs from various sources to an organization. They include inputs, order placement through to inputs warehousing
<b>Performance</b>	This is an entity's ability to prevail

## **CHAPTER ONE: INTRODUCTION**

This chapter highlights the background of the study, the statement of the problem, study objectives, significance and the conceptual framework guiding the study.

### **1.1 Background of The Study**

It is argued that today competition is not among the individual firms but among the supply chains. Distribution, procurement, logistics management and inventory management can be considered as the main components of any supply chain (Ballou and Strivastava, 2007). It is argued that the final resort for any supply chain is the proper management of the inventory among the players within the chain. In the case of consumer goods supply chain, speed of delivery, availability, management of stock keeping units, proper information flow act as critical success factors in achieving competitive advantage. One way to maintain these critical success factors favourably, is proper management of the inventory within the organization and among the all players of the supply chain (Croxtton 2007). In today's Kenyan economy, the importance of consumer goods is increasing especially among public service organizations such as public hospitals. Reports on hospitals in Kenya, particularly public hospitals reveal that they are facing numerous challenges ranging from inadequate physical facilities, lack of enough pharmaceuticals and non-pharmaceuticals and shortage of personnel especially nurses and doctors. Siaya District Hospital is one such hospital which has reported poor performance. Some of these challenges could be linked to supplies inventory management by the hospital. Inventory management and relationship with performance in public hospitals in Kenya, particularly Siaya District Hospital, can be considered as a less researched area. For this reason, it is unclear how the hospital practices its inventory management with the relationship between inventory planning and performance still clouded. The relationship inventory control has with performance is also not clear.

### **1.2 Problem Statement**

Performance in public hospitals has been in downward trend with top management of such facilities being blamed for mismanagement. Services in such facilities has been hampered with lack of critical items as drugs which has been attributed to poor inventory management. Inventory management is considered one of the main components of organizations supply chain management which play a significant role in the creation of customer value-performance. The value chain concept further attests to this argument by emphasizing inbound logistics which include inventory operations management as a

pointer to organization performance. Further, in-depth knowledge of how to satisfy customers is particularly important in developing countries such as Kenya, where public hospitals are struggling to increase access to services by a growing population. It is not clear, in these organizations, what role inventory management plays in creating customer value, which today is the most important source of sustained performance. Further, inventory planning and inventory control relationship with organization performance has left the academia with mixed results making the situation unclear. Subsequently, it was not clear on what relationship inventory planning and inventory control have with performance of organizations in Kenya, particularly public hospitals such as Siaya District Hospital.

### **1.3 Objectives of the Study**

The main objective of the study was to analyze inventory management and performance of Siaya District Hospital, Kenya.

Specifically, the study sought to;

- i. Investigate the relationship between inventory planning and performance of Siaya District Hospital, Kenya
- ii. Establish the relationship between inventory control and performance of Siaya District Hospital, Kenya
- iii. Establish the relationship between inventory operations and performance of Siaya District Hospital, Kenya

### **1.4 Research Hypotheses:**

- HO<sub>1</sub>: There is no relationship between inventory planning and performance of Siaya District Hospital, Kenya
- HO<sub>2</sub>: There is no relationship between inventory control and performance of Siaya District Hospital, Kenya
- HO<sub>3</sub>: There is no relationship between inventory operations and performance of Siaya District Hospital, Kenya

### **1.5 Scope of the Study**

The study was carried out in Siaya District Hospital in Siaya County, located in western part of Kenya. Siaya District Hospital is a government level 4 facilities run by the Ministry of Health. It is situated in Siaya Township. The facility is approximately 65

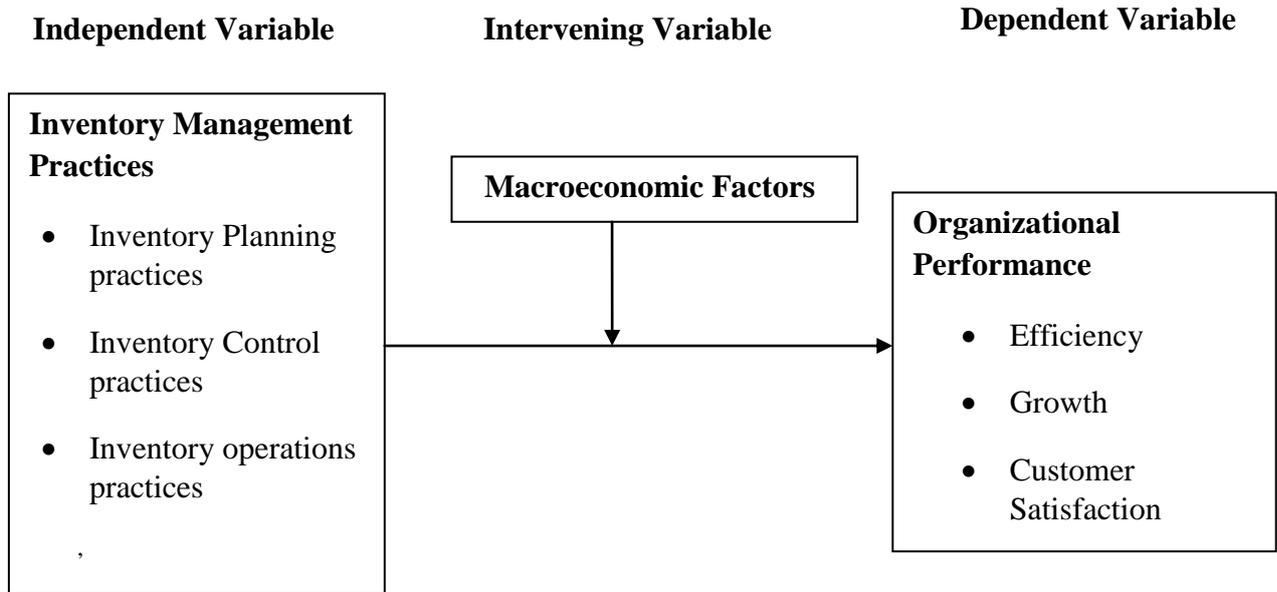
kilometers East of Kisumu town in Nyanza province. The study will mainly focus on establishing inventory management practices of Siaya District Hospital, investigating relationship between inventory planning and performance and establishing relationship between inventory planning and their performance.

### **1.6 Significance of Study**

The findings of the study may benefit the management of public hospitals by shedding light into better ways of practicing their inventory operations through better policies and adopting more rewarding inventory management practices. The information will create a better understanding of the contribution of sound inventory management practices to the overall performance of organizations, especially Siaya District Hospital and other public hospitals in Kenya. Entities with research interests may also find a basis for further research in this study.

### **1.7 Conceptual Framework**

Efficient or inefficient management of inventories is only one factor that may influence firm performance. Key among inventory management practices is inventory planning and inventory control. A range of other macroeconomic, industry and firm-level factors are also important. In this study however, in an attempt to isolate role of inventory management practices, other potential predictors are not considered. The structure depicts an interaction between inventory management practices and performance of organizations with a number of intervening variables existing in the relationship



**Figure 1:** Relationship Between Inventory Management Practices And Organizational Performance

Source: Adapted from Croxton (2007)

## CHAPTER TWO: LITERATURE REVIEW

This chapter focused on theoretical empirical literature review regarding the concepts under study. It discussed the variables under study giving insight into independent and dependent variables.

### 2.1 Theoretical Literature Review

#### 2.1.1 Just in Time

Just in time (JIT) is a production strategy that strives to improve a business' return on investment. In supply chain, *ABC analysis* is an inventory categorization method which consists in dividing items into three categories, A, B and C: A being the most valuable items, C being the least valuable ones. This method aims to draw managers' attention on the critical few (A-items) and not on the trivial many (C-items) by reducing in-process inventory and associated carrying costs. Just in time is a type of operations management approach which originated in Japan in the 1950s. It was adopted by Toyota and other Japanese manufacturing firms, with excellent results: Toyota and other companies that adopted the approach ended up raising productivity (through the elimination of waste) significantly (Mazanai, 2012). To meet JIT objectives, the process relies on signals or Kanban between different points, which are involved in the process, which tell production when to make the next part. Kanban are usually 'tickets' but can be simple visual signals, such as the presence or absence of a part on a shelf. Implemented correctly, JIT focuses on continuous improvement and can improve a manufacturing organization's return on investment, quality, and efficiency. To achieve continuous improvement key areas of focus could be flow, employee involvement and quality.

JIT relies on other elements in the inventory chain as well. For instance, its effective application cannot be independent of other key components of a lean manufacturing system or it can "end up with the opposite of the desired result (Ruffa, 2008)." In recent years manufacturers have continued to try to hone forecasting methods such as applying a trailing 13-week average as a better predictor for JIT planning; however, some research demonstrates that basing JIT on the presumption of stability is inherently flawed.

### **2.1.2 Inventory Management Practices**

Inventory to many business owners is one of the more visible and tangible aspects of doing business (Croxtton, 2007). Raw materials, goods in process and finished goods all represent various forms of inventory. Each type represents money tied up until the inventory leaves the organization as purchased products. Likewise, merchandise stocks in a retail store contribute to profits only when their sale puts money into the cash register. In a literal sense, inventory refers to stocks of anything necessary to do business. These stocks represent a large portion of the business investment and must be well managed in order to maximize profits. Successful inventory management involves balancing the costs of inventory with the benefits of inventory. This fine line between keeping too much inventory and not enough is not the manager's only concern. Others include: Maintaining a wide assortment of stock but not spreading the rapidly moving ones too thin, increasing inventory turnover but not sacrificing the service level, keeping stock low but not sacrificing service or performance, obtaining lower prices by making volume purchases but not ending up with slow-moving inventory and having an adequate inventory on hand but not getting caught with obsolete items. The degree of success in addressing these concerns is easier to gauge for some than for others. This has presented confusion on inventory management approaches organizations should adopt. Wilhans and Toker (2008) argue that in previous research studies it was found that most of the inventory managers tend to take inventory management decisions based on intuition due to lack of the professional expertise in the field, no proper analysis of inventory data, human bias of the senior managers that result with use of rule of thumb, no user involvement in inventory management systems, inventory decisions are not integrated with strategic needs of the organizations, and ultimately result with no proper inventory management practices with an organization. It is not clear how organizations, particularly public entities practice their inventory management.

### **2.1.3 Inventory Planning and Organization Performance**

One of the most important aspects of inventory management is to have the items in stock at the moment they are needed. This infers inventory planning is essential (Demeter (2003). This includes going into the market to buy the goods early enough to ensure delivery at the proper time. Thus, buying requires advance planning to determine

inventory needs for each time period and then making the commitments without procrastination (Herer *et al.*, 2002). For fast moving inventories, planning ahead is very crucial. Restocking plans be formulated early enough to allow for intelligent procurement without last minute panic. Before a decision can be made as to the level of inventory to order, one must determine how long the inventory they have in stock will last. For instance, a retail firm must formulate a plan to ensure the sale of the greatest number of units. Likewise, a service organization must formulate a plan to ensure enough inventories is on hand for provision of services (Wickramatillake *et al.*, 2006). In summary, the inventory purchasing plan details include when commitments should be placed, when the first delivery should be received, when the inventory should be peaked, when reorders should no longer be placed and when the item should no longer be in stock. Well planned purchases affect the delivery and availability of products for use (*ibid*, 2006).

Croxton (2002) argues that inventory planning acts as a major component of any supply chain irrespective of whether it is product or service supply chain. Inventory management plays an important role in matching demand and supply within each and every partner in the entire supply chain, ultimately providing flexibility in coping up with external and internal events of the today's uncertain, globalized business environment. The 17th report of the Council of Supply Chain Management Professionals on logistics stated that huge amount of cost is recorded as the cost of holding inventory in United States economy (Wilson, 2006). It is evident that this truth is applicable to many other countries of the world. In situations where all the partners in a supply chain manage inventory effectively and efficiently, this will result in less interruptions in production process, reduction in storage cost, product availability and many other organization specific quantitative and qualitative benefits leading to the organizational performance. World has moved towards integrated and collaborative approach to inventory planning within the supply chain rather than isolated approach to manage inventory (Wilhans and Toker, 2008). In the context, the lean production by Womack *et al.* (1990) plans for reduced level of inventories for better performance. On the contrary, Wickramatillake *et al.* (2006), show that little inventory often disrupts manufacturing operations, and increases the likelihood of poor customer service. In many cases good customers may become irate and take their business elsewhere if the desired product is not immediately available. Dudley and

Lasserre (1989) indicated that timely and informative customer demand data can result in improved firm performance through reduced inventories. These two studies reveal that reduced inventories yield better organizational performance. Shah and Shin (2007) examined the empirical associations among three constructs – inventory, IT investments and financial performance – using longitudinal data that span four decades. They concluded that reducing inventories had a significant and direct relationship with financial performance. Bouteet *al.* (2006), echoed the sentiments above concluding that companies with very high inventory ratios have more possibilities to be bad financial performers. In the context of confusing outcomes as above, it is not clear the contribution of inventory planning to performance of organizations.

#### **2.1.4 Inventory Control and Performance of Organizations**

To maintain an in-stock position of wanted items and to dispose of unwanted items, it is necessary to establish adequate controls over inventory on order and inventory in stock (Dudley and Lasserre, 1989). Wilhans and Toker (2008) propose several methods for inventory control. First is Visual control. This enables the manager to examine the inventory visually to determine if additional inventory is required. In very small businesses where this method is used, records may not be needed at all or only for slow moving or expensive items. Second is Tickler control which enables the manager to physically count a small portion of the inventory each day so that each segment of the inventory is counted every so many days on a regular basis. Third is Click sheet control. This enables the manager to record the item as it is used on a sheet of paper. Such information is then used for reorder purposes. Next is Stub control which is mostly used by retailers. This control enables the manager to retain a portion of the price ticket when the item is sold. The manager can then use the stub to record the item that was sold. As a business grows, it may find a need for a more sophisticated and technical form of inventory control. Unless inventories are controlled, they are unreliable, inefficient and costly. Today, the use of computer systems to control inventory is far more feasible for small business than ever before, both through the widespread existence of computer service organizations and the decreasing cost of small-sized computers. Often the justification for such a computer-based system is enhanced by the fact that company accounting and billing procedures can also be handled on the computer. Fifth is Point-of-

sale terminals which relay information on each item used or sold. The manager receives information printouts at regular intervals for review and action. Another inventory control technique is an Off-line point-of-sale terminal. This relays information directly to the supplier's computer who uses the information to ship additional items automatically to the buyer/inventory manager.

The final method for inventory control is done by an outside agency. A manufacturer's representative visits the large retailer on a scheduled basis, takes the stock count and writes the reorder. Unwanted merchandise is removed from stock and returned to the manufacturer through a predetermined, authorized procedure. A principal goal for many of the methods described above is to determine the minimum possible annual cost of ordering and stocking each item. Two major control values are used. One is the order quantity, that is, the size and frequency of orders; and two, the reorder point, that is, the minimum stock level at which additional quantities are ordered.

## **2.2 Empirical Literature Review**

### **2.2.1 Inventory Planning and Performance**

Rotemberg and Saloner (1989), it was reported that a positive association between corporate inventories and sales is greater for more concentrated industries. Blazenko and Vandezande (2003) found a significant positive coefficient on gross margin regressed as a determinant of finished goods inventories argue that their results are consistent with the fact that profitability is deterrent to stock outs.

Evers (2002) showed that MRP was used to a significantly greater extent than re-order point methods in controlling material flows in raw material inventories, work in progress and finished goods inventories. The differences in adoption patterns between the studies may to some extent be explained by when they were conducted. Jonsson and Mattsson (2006), for example, conducted a longitudinal study of the use of material planning methods in 1993, 1999 and 2005. They showed that MRP has strengthened its position as the most important material planning method and that the re-order point method decreased in importance between 1993 and 1999. The re-order point method is still the

secondly most used method in industry. The study also showed that kanban has increased in use during the last decade

Lwiki *et al* (2013) examined the impact of inventory management practices on the financial performance of sugar manufacturing firms in Kenya, by analyzing the extent to which lean inventory system, strategic supplier partnership and technology are being applied in these firms. The research survey was conducted in all the eight operating sugar manufacturing firms from the period 2002-2007. The primary data was collected using structured and semi-structured questionnaires administered to key informants in the organizations. Secondary data was obtained from annual financial performance statements available in the year Book sugar statistics. Descriptive statistics was used to test the impact of inventory management practices and Correlation analysis was used to determine the nature and magnitude of the relationship among inventory management variables. The results indicate that there exists a positive correlation between inventory management and Return on Sales ( $r=0.740$ ) and also with Return on Equity ( $r=0.653$ ) which were found to be statistically significant at 5% level

### **2.2.2 Inventory Control and Performance**

Chen *et al.* (2005) by examining how the market values of firms with respect to their various inventories control policies reported that firms with abnormally high inventory control have abnormally poor stock returns, firms with abnormally low controls on inventories have ordinary stock returns while firms with slightly lower than average inventory control perform best over time.

Huson and Nanda (1995) examined 55 firms and revealed that the improvement of inventory turnover led to an increase in earnings per share. Deloof (2003) documents a significant negative relation between gross operating income and the number of inventories days in a study involving Belgian firms. Studies from Belgium by Boute *et al.* (2004), found no overall decrease of inventory ratios despite increased focus on inventory reduction.

Vastag and Whybark (2005) studying international manufacturing companies found no significant relationship between inventory turnover measures and performance. Balakrishnan *et al.* (1996) results concur. While studying 46 firms, they reported that the accounting performance of JIT adopters decline slightly compared to a matched sample of non adopters.

Demeter (2003) added controversy to inventory control studies by concurring with Vastag and Whybark in showing that inventory turnover did not affect return on sales and level of sales respectively. These studies have left a state of confusion in the relationship between inventory control and performance of organizations. It is unclear how inventory control relates with performance among organizations especially public organizations which as evidenced above, lack research studies in the area of inventory control.

### **2.2.3 Inventory Operations and Performance**

Syed *et al* (2016) in their study on inventory management at a textile chain store in Malaysia. It specifically examined the relationship between inventory management and company's performance. Interviews with the company management were conducted to identify the inventory management issues and system used by the company. The relationship between the inventory management and company performance was determined based on inventory days and return on asset (ROA) analysis. The research found that company X had a few inventory problems such as unorganized inventory arrangement, large amount of inventory days / no cycle counting and no accurate records balance due to unskilled workers. The study also proved that there was a significant relationship between return on asset (ROA) and inventory days. This paper also provides recommendation to the company and for further research.

Kiplagat and Ochiri (2014) examined the role of inventory management on performance of manufacturing firms in Kenya. The study population was 500 respondents. The sample size of the study was 83 respondents. A descriptive research design was used in this study. Quantitative data was analyzed by employing descriptive statistics and inferential analysis using statistical package for social science (SPSS). The data was then presented using frequency distribution tables, bar charts and pie charts for easier understanding. The study concluded that holding stocks and ordering costs may increase the performance of

an organization, cost reduction helps in preparing employees towards managing the inventory ideology, that cost reduction equips organization with sufficient resources and that inventory cost reduction helps in achieving profitability objective. Inventory control system, organizational development, information sharing and channels relationships affect the performance of the manufacturing firms. The study recommended that improved anticipation of future developments in manufacturing firms in Kenya will improve their performance. The study further recommended that unified data gives firms the information integrity and should be used. IT is a competitive tool in organizations for realizing its corporate competitive strategy.

Oballah *et al* (2015) investigated the effect of inventory management practices on organizational performance in public health institutions in Kenya. The specific objectives were to establish: the effect of inventory shrinkage, inventory investment, inventory turnover, and inventory records accuracy on organizational performance of Kenyatta National hospital: A descriptive case study design was used. Statistical analysis was carried out using SPSS. The study revealed that inventory investment and inventory records accuracy have a positive influence on organizational performance while inventory shrinkage have a negative effect on organizational performance of Kenyatta National hospital thus this study recommends that the hospital should ensure that losses resulting to inventory shrinkage related to medicines are reduced. This can be done by ensuring that inventory records are accurately kept. The hospital need to manage its inventory investment by ensuring that the right amount of stock is kept at all times.

## CHAPTER THREE: RESEARCH METHODOLOGY

This chapter provides the methodology the study adopted. It highlights the steps taken to actualize the study. It presents the research design, area of study, population, sample and sampling design, data and data collection procedure and; data analysis and presentation.

### 3.1 Research Design

This study was guided by quantitative approach to undertaking a study, since it is an inquiry into a problem requiring testing of theory, is composed of variables, measured with numbers, and analyzed with statistical procedures, in order to determine whether the predictive generalizations of the theory hold true (Cresswell, 2003).

This study adopted a correlational case study design. The design is expected to meet the objectives of the study. According to Nachmias and Nachmias (2008), a case study design is most suitable in a research aimed at establishing a problem and reaching in depth insights. Co-relational approach helps determine whether and to what degree a relationship exists between the quantifiable variables (Mugenda and Mugenda, 2003).

### 3.2 Area of Study

The study was carried out in Siaya District Hospital in Siaya County, located in western part of Kenya. Siaya District Hospital is a government level 4 facilities run by the Ministry of Health. It is situated in Siaya Township. The facility is approximately 65 kilometers East of Kisumu town in Nyanza province. The hospital was put up by the government in the year 1975 to be a referral hospital for the larger Siaya District. The district has since been divided and now comprises of Alego Usonga, Bondo, Rarieda, Gem, Ugunja and Ugenya districts respectively. These have since been named as sub counties. The projected facility catchment population in 2012/2013 was 42,278 people.

### 3.3 Target Population

The population of this study comprised 163 medical and non medical staff distributed as shown in Table 3.1 and Table 3.2 below.

**Table 3. 1:** Medical employees at Siaya District Hospital

No.	Cadre	Number available
1	Consultants	4

2	Medical officers	4
3	Dentist	1
4	Dental Technologist	1
5	Clinical Officer (Spec)	5
6	Clinical Officers (Gen.)	7
7	Nursing officers (KRCHNs)	20
8	KECHNs	40
9	BSC. Nursing	3
10	Pharmacists	2
11	Pharm. Technologist	2
12	Lab. Technologist	4
13	Lab. Technician	2
14	Orthopedic technologists	2
15	Nutritionist	1
16	Radiographers	2
17	Physiotherapists	3
18	Occupational Therapists	2
19	Plaster Technicians	2
20	Health Records & Information Officer	1
21	Health Records & Information Technician	1
22	Social health worker	1
23	Medical engineering technologist	2
24	Medical engineering technician	1
<b>Total</b>		<b>113</b>

**Source:** Siaya District Hospital Profile (2014)

**Table 3. 2:** Non medical staff/supportive staff at Siaya District Hospital

	<b>Description</b>	<b>Number available</b>
<b>1</b>	Mortuary Attendants	1
<b>2</b>	Drivers	3
<b>3</b>	Clerks	3
<b>4</b>	Cleaners	27
<b>5</b>	Procurement officers	1
<b>6</b>	Accountants	2
<b>7</b>	Administrators	1
<b>8</b>	Cooks	1
<b>9</b>	Store keepers	1
	<b>Total</b>	<b>50</b>

**Source:** Siaya District Hospital Profile (2014)

### **3.4 Sample Size and Sampling Technique**

A census approach was adopted since the units of study are not many and they are concentrated thereby favouring costs, time and other resources (Sekaran, 2000; Saunders *et al.*, 2007). According to Kothari (2004) census enhances validity of the study providing a true measure of the population with no sampling error, availing detailed information about small subgroups within the population and providing benchmark data for future studies. Owing to the superiority of a census survey as evidenced above, the method will be adopted for study.

### **3.5 Data Collection Methods**

Data type and collection method entails the following;

#### **3.5.1 Sources of Data**

Both primary data were used.

#### **3.5.2 Data Collection Procedure**

The researcher proceeded to obtain a letter of introduction from the university. A reconnaissance visit was made to hospital in order to identify any significant challenges and ways to handle the study. The purpose of this reconnaissance visit was to declare intention to serve the research instrument and secure the related appointments and also conduct pilot study.

### 3.5.3 Data Collection Instrument

A semi structured questionnaire was used to obtain primary data from the respondents. The items tapping the theoretical constructs was developed based on the literature review. In order to ensure high statistical variability among the survey responses seven (7) items for each construct was scored along a five (5) point Likert scale.

### 3.5.4 Reliability Test

Reliability refers to the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials. Reliability test is aimed at determining consistency and stability. Pilot test was conducted on 10 of the 163 respondents. Consequently, Cronbach's Alpha Coefficient was computed and gave an alpha result of 0.75, hence making the questionnaire suitable for data collection.

### 3.5.5 Validity Test

Validity was tested through supervisor's and lecturer's opinion. They were asked to assess the extent to which the indicators sufficiently address the subject area based on theoretical and practical considerations (Dillman, 1978). Based on feedback received from these researchers, the instrument was modified to enhance clarity and appropriateness of the measures that are intended to tap the constructs.

## 3.6 Data Analysis

Data collected through interview instruments were synthesized and coded, attaching scores to qualitative descriptions. Data were analysed using inferential statistics like Pearson r correlation and regression analysis.

### Correlation Analysis Model

The following formula (Equation 3.1) was used to calculate Pearson r correlation.

$$\text{Correlation } (r) = \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{([N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \dots 3.1$$

Source: Adapted from Bonett (2008) and Cohen *et al.* (2003).

Where:

- r = Pearson r correlation coefficient
- N = number of values in each data set
- XY = product of paired scores X and Y
- X = X scores

- Y = Y scores
- X<sup>2</sup> = squared X scores
- Y<sup>2</sup> = sum of squared Y scores

Regression Analysis Model

The regression model adopted for the study was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon \quad \dots\dots\dots 3.2$$

Where:

- Y - Performance of the district hospital
- $\beta_0, \beta_1, \beta_2, \beta_3$  - constants to be determined
- X<sub>1</sub> - Inventory Planning
- X<sub>2</sub> - Inventory Control
- X<sub>3</sub> - Inventory Operations

## CHAPTER FOUR: RESULTS AND DISCUSSIONS

This chapter starts by examining the data sources and descriptions. The chapter then reports on the results of the relationship inventory planning and inventory control have with performance of public hospitals in Kenya

### 4.1 Data Sources and Description

This study used primary data collected from 163 staff members of procurement department sources.

### 4.2 Descriptive Statistics

**Table 4. 1:** Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VAR00001	163	2	5	3.61	.602
VAR00002	163	1	4	3.31	.697
VAR00003	163	1	3	2.55	.535
VAR00004	163	2	4	3.75	.446
Valid N (listwise)	163				

The mean of all the variables were positive with the highest being 3.75 and lowest being 2.55 The variables were not very highly dispersed from the mean as seen from the standard deviations with the highest standard deviation being 0.697 and lowest being 0.446. This implied that the data was consistent and good for predictions.

From the correlation statistics presented in Table 4.2, performance of Siaya District Hospital, Kenya was found to have a weak positive but not significant correlation with inventory planning ( $r=0.012$ ,  $p>0.01$ ), a weak positive but significant correlation with inventory control ( $r=0.323$ ,  $p<0.01$ ) and a weak negative but significant correlation with inventory operations ( $r=-0.283$ ,  $p<0.01$ )

**Table 4. 2: Correlations**

		Inv. Plan	Inv. Cont	Inv. Oper	Perf
Inv. Plan	Pearson Correlation	1	.005	.130	.012
	Sig. (2-tailed)		.952	.098	.875
	N	163	163	163	163
Inv. Cont	Pearson Correlation	.005	1	-.126	.323**
	Sig. (2-tailed)	.952		.109	.000
	N	163	163	163	163
Inv. Oper	Pearson Correlation	.130	-.126	1	-.283**
	Sig. (2-tailed)	.098	.109		.000
	N	163	163	163	163
Perf	Pearson Correlation	.012	.323**	-.283**	1
	Sig. (2-tailed)	.875	.000	.000	
	N	163	163	163	163

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### 4.3 Results of Regression Analysis

To establish the relationship inventory planning and inventory control have with performance of district hospitals in Kenya, linear regression analysis was conducted. As shown from the ANOVA table presented in Table 4.3, the observed  $R^2$  was slightly different from zero and the linear regression equation could predict performance of the procurement function.

Results presented in Table 4.3 which displays the model summary show that inventory planning, inventory control and inventory operations together explained 15% of the variance in performance of the district hospital (Adj.  $R^2=.15$ ).

**Table 4. 3:** Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.407 <sup>a</sup>	.166	.150	.411

a. Predictors: (Constant), inventory planning, inventory control, inventory operation

Source: Research data, 2016

As shown from the ANOVA table presented in Table 4.4, the F-test was highly insignificant ( $F_{0.01; 3, 162}=10.544$ ,  $p<0.01$ ). This indicates that the hypothesized linear regression model was statistically adequate but there are some variables which may contribute to the performance of the district hospitals.

**Table 4. 4:** Anova Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.340	3	1.780	10.544	.000 <sup>a</sup>
	Residual	26.844	159	.169		
	Total	32.184	162			

Predictors: (Constant), inventory planning, inventory control, inventory operations

Dependent Variable: Performance of district hospitals

Table 4.5 presents results of the regression analysis in which performance of the district hospitals was regressed on inventory planning, inventory control and inventory operations.

**Table 4. 5:** Regression Results

Model	Unstandardized		Standardized		t	Sig.
	Coefficients		oefficients			
	B	Std. Error	Beta			
1 (Constant)	3.556	.291			12.234	.000
Inv. Plan	-.032	.054	.044		.599	.550
Inv. Cont	.186	.047	.291		3.991	.000
Inv. Oper	-.210	.061	-.252		-3.417	.001

a. Dependent Variable: Performance of district hospitals

Source: Research data, 2016

Table 4.5 indicates that Inventory planning ( $\beta_1 = 0.044$ ,  $p=0.550$ ) was positive but insignificant predictor of performance of district hospital. Inventory control ( $\beta_2=0.291$ ,  $p=0.000$ ) as positive and significant predictor of performance of district while inventory operations ( $\beta_3= -0.252$ ,  $p=0.01$ ) was negative and significant predictor of performance of public hospitals.

#### 4.4 Relationship between Inventory Planning and Performance

Objective one sought to investigate the relationship between inventory planning and performance of Siaya District Hospital, Kenya. The results revealed that performance of Siaya District Hospital, Kenya was found to have a weak positive but not significant correlation with inventory planning ( $r=0.012$ ,  $p=0.875$ ). Furthermore the results indicated that Inventory planning ( $\beta_1 = 0.044$ ,  $p=0.550$ ) was positive but insignificant predictor of performance of district hospital.

The results that performance of Siaya District Hospital, Kenya was found to have a weak positive but not significant correlation with inventory planning is in concurrence with the regressions results that inventory planning had a slight positive influence on performance. The findings concur with those of Rotemberg and Saloner (1989), who reported that a positive association between corporate inventories and sales is greater for more concentrated industries. And those of Blazenko and Vandezande (2003) who found a significant positive coefficient on gross margin regressed as a determinant of finished

goods inventories argue that their results are consistent with the fact that profitability is deterrent to stock outs.

The findings further agrees with those of Lwiki *et al* (2013) who examined the impact of inventory management practices on the financial performance of sugar manufacturing firms in Kenya, by analyzing the extent to which lean inventory system, strategic supplier partnership and technology are being applied in these firms and found that there exists a positive correlation between inventory management and Return on Sales

#### **4.5 Relationship between Inventory Control and Performance**

Objective two sought to investigate the relationship between inventory planning and performance of Siaya District Hospital, Kenya. The results revealed that performance of Siaya District Hospital, Kenya was found to have a weak positive but significant correlation with inventory control ( $r=0.323$ ,  $r=0.000$ ). Furthermore the results indicated that Inventory control ( $\beta_2=0.291$ ,  $p=0.000$ ) as positive and significant predictor of performance of district. There was consistency in the results of both correlation and regression results. The findings concur with those of Huson and Nanda (1995) examined 55 firms and revealed that the improvement of inventory turnover led to an increase in earnings per share. The findings contradicts those of Deloof (2003) who documented a significant negative relation between gross operating income and the number of inventories days in a study involving Belgian firms. It further contradicts the study by Boute *et al.* (2004) who found no overall decrease of inventory ratios despite increased focus on inventory reduction. To add the findings disagrees with Vastag and Whybark (2005) studying international manufacturing companies who found no significant relationship between inventory turnover measures and performance. Finally the study disagrees with Balakrishnan *et al.* (1996) results concur who reported that the accounting performance of JIT adopters declines slightly compared to a matched sample of non-adopters. Demeter (2003) added controversy to inventory control studies by concurring that inventory turnover did not affect return on sales and level of sales respectively. The results contradicted those of Chen *et al.* (2005) by examining how the market values of firms with respect to their various inventories control policies reported that firms with abnormally high inventory control have abnormally poor stock returns, firms with

abnormally low controls on inventories have ordinary stock returns while firms with slightly lower than average inventory control perform best over time.

#### **4.6 Relationship between Inventory Operations and Performance**

Objective three sought to investigate the relationship between inventory planning and performance of Siaya District Hospital, Kenya. The results revealed that performance of Siaya District Hospital, Kenya was found to have a weak negative but significant correlation with inventory operations ( $r=-0.283$ ,  $r<0.000$ ). Furthermore the results indicated inventory operations ( $\beta_3= -0.252$ ,  $p=0.001$ ) was negative and significant predictors of performance of district hospitals. The findings concur with those of Syed *et al* (2016) in their study on inventory management at a textile chain store in Malaysia and specifically examined the relationship between inventory management and company's performance. The study found that there was a significant relationship between return on asset (ROA) and inventory days. The result further agrees with those of Kiplagat and Ochiri (2014) who examined the role of inventory management on performance of manufacturing firms in Kenya. They found that inventory control system, organizational development, information sharing and channels relationships affect the performance of the manufacturing firms. The results finally concur with Oballah *et al* (2015) who investigated the effect of inventory management practices on organizational performance in public health institutions in Kenya revealed that inventory investment and inventory records accuracy have a positive influence on organizational performance.

## **CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION**

This chapter summarizes the results of the study, reports the conclusions drawn and provide recommendations

### **5.1 Summary of Findings**

The purpose of this study was to determine the relationship inventory planning and inventory control have with performance of district hospitals in Kenya. The summary of findings therefore focuses on the following objectives of the study.

Objective one sought to investigate the relationship between inventory planning and performance of Siaya District Hospital, Kenya. The study revealed that performance of Siaya District Hospital, Kenya was found to have a weak positive but not significant correlation with inventory planning. Furthermore the results indicated that Inventory planning was positive but insignificant predictor of performance of district hospitals.

Objective two sought to establish the relationship between inventory control and performance of Siaya District Hospital, Kenya. The results revealed that performance of Siaya District Hospital, Kenya was found to have a weak positive but significant correlation with inventory control. Furthermore the results indicated that Inventory control as positive and significant predictor of performance of district hospitals.

Objective three sought to establish the relationship between inventory operations and performance of Siaya District Hospital, Kenya. The results revealed that performance of Siaya District Hospital, Kenya was found to have a weak negative but significant correlation with inventory operations. Furthermore the results indicated inventory operations was negative but significant predictor of performance of district hospitals.

### **5.2 Conclusions**

Objective one sought to investigate the relationship between inventory planning and performance of Siaya District Hospital, Kenya. Based on the finding that performance of Siaya District Hospital, Kenya was found to have a weak positive but not significant correlation with inventory planning. Furthermore the results indicated that Inventory planning was positive but insignificant predictor of performance of district hospitals, it

was concluded that there was no significant relationship between inventory planning and performance of Siaya District Hospital, Kenya

Objective two sought to establish the relationship between inventory control and performance of Siaya District Hospital, Kenya. Based on the finding that performance of Siaya District Hospital, Kenya was found to have a weak positive but significant correlation with inventory control. Furthermore the results indicated that Inventory control as positive and significant predictor of performance of district hospitals, it was concluded that there was a significant relationship between inventory control and performance of Siaya District Hospital, Kenya

Objective three sought to establish the relationship between inventory operations and performance of Siaya District Hospital, Kenya. Based on the finding that performance of Siaya District Hospital, Kenya was found to have a weak negative but significant correlation with inventory operations. Furthermore the results indicated inventory operations was negative but significant predictors of performance of district hospitals, it was concluded that there was no significant relationship between inventory operations and performance of Siaya District Hospital, Kenya

### **5.3 Recommendations of the Study**

In the light of the findings which are informative, the following recommendations from the study were made:

Based on the conclusion of objective one that there was no significant relationship between inventory planning and performance of Siaya District Hospital, Kenya, it was recommended that stakeholders in district hospital should consider reorganize its inventory planning as it does not contribute much influence to the overall performance.

Based on the conclusion of objective two that there was a significant relationship between inventory control and performance of Siaya District Hospital, Kenya, the stakeholders should invest much in inventory control as it has significant effect on the overall performance.

Based on the conclusion of objective three that there was significant relationship between inventory operations and performance of Siaya District Hospital, Kenya, the stakeholder should invest much on inventory operations as it has significant effect on the overall performance.

### **5.3 Suggestions for Further Studies**

The study gives the following suggestions for further research:

- i. Future researchers should consider investigating why inventory planning has insignificant relationship with performance.
- ii. Future researchers should use other methodologies to conducting similar studies.
- iii. Future researchers should conduct similar studies in different context.

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## APPENDICES

### Appendix I: Questionnaire

#### 1. Inventory Management Practices

A) Tick one box for each, to indicate how you would rate the following **Inventory management** activities in the organization

		Very high 5	high 4	average 3	low 2	Very low 1
1	Monitoring of levels of stock of medical and non medical items					
2	Projecting future medical and non medical items requirements					
3	Storing medical and non medical items for high consumption periods					
4	Registering Medical and non medical items when received					
5	Categorizing Medical and non medical items stored					
6	Taking stock of Medical and non medical items stored from time to time					

#### ii. Inventory planning

A) Tick one box for each, to indicate how you would rate the following **inventory planning** activities in the organization

		Very high 5	high 4	Average 3	Low 2	Very Low 1
1	Maintenance of records of medical and non medical items					
2	Projecting demand for medical and non medical items in future					
3	Setting of clear inventory goals					
4	Setting of clear supplies reorder levels					
5	Proper procedures for making orders for stocks					
6	Responsibility for placing orders very clear					

**iii. Inventory Control**

A) Tick one box for each, to indicate how would rate the following **inventory** control activities in the organization

		Very high 5	High 4	Average 3	Low 2	Very low 1
1	Checking right use of supplies					
2	Monitoring supplies operations in the organization					
3	Comparing levels of supplies and supplies plan from time to time					
4	Preparing reports on supplies					
5	Inspecting supplies on arrival					
6	Accountability for use of supplies					

**iv. Organization performance**

A) Tick one box for each, to indicate how would rate the following **performance of the organization**

		Strongly decreased 1	decreased 2	neutral 3	increased 4	Strongly increased 5
1	Reduction in Number of complaints from our customers in the last one year					
2	Fall in Number of services and bookings scheduled but not attended to in the last one year					
3	Hospital bed capacity					
4	Hospital facilities					
5	Number of people treated and discharged					
6	Level of referrals					