



**EFFECTS OF INVENTORY MANAGEMENT PRACTICES ON
ORGANIZATIONS OPERATIONAL PERFORMANCES;
THE CASE OF ETHIOPIAN AIRLINES**

**A THESIS SUBMITTED TO GRADUATE SCHOOL OF ADDIS ABABA
UNIVERSITY,SCHOOL OF COMMERCE IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR MASTERS OF LOGISTICS AND
SUPPLY CHAIN MANAGEMENT (LSCM)**

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August, 2017

STUDENT'S DECLARATION

This is to declare that this research project is my original work that has not been presented to any other university or institution of Higher Learning for examination and no part of this project should be reproduced without prior permission of the author and/or Addis Ababa University

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SUPERVISOR'S DECLARATION

This is to certify that this thesis is prepared by **Daniel Baye** - a student of Master of Business Logistics and Supply chain management Program had been working under my supervision and guidance for his project entitled: Effect of inventory management practice on organization operational performance; the case of Ethiopian airlines. He is submitting his genuine and original work and complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
EAL	Ethiopian Airlines
EOQ	Economic Order Quantity
JIT	Just-in-time
SPSS	Statistical Package for Social Sciences
VMI	Vendor Managed Inventory
MRO	Maintenance Repair and overhaul
PSCM	Procurement and supply chain management

ABSTRACT

The purpose of this research study was to examine the effects of inventory management practices on organizations operational performances: the case of Ethiopian Airlines. The research objectives were to examine the effect of inventory management practice on, on time performance; to study the inventory management practice in Ethiopian Airlines; to examine the role of inventory planning and inventory control section in the Airlines and to examine the challenges in implementing inventory management practice in Ethiopian Airlines. The research study was conducted through a causal and descriptive research design. The research study adopted purposive sampling techniques in which all PSCM and MRO key users were selected. The data was analyzed based on descriptive statistics in which SPSS version 20 was used. The research study established that effective inventory management model, inventory record accuracy, stock out management and information technology usage is statistically significant with $P\text{-value} > 0.05$ and information technology usage has more impact on operational performance of Ethiopian Airlines relative to other inventory management practices studied. The research concluded that inventory management practices impact significantly the operational performances of Ethiopian airlines. The implementation of an effective inventory management practices leads to many benefits in the airline, including ensuring on time performance, optimal production, meeting the assembly targets and customer satisfaction, which are all associated with operational efficiency. While there are different inventory management practices, the findings of this research study establish that Ethiopian Airlines more likely to benefit from Economic Order Quantity model, Vendor Managed Inventory and Bar-coding Inventory management model. The research study establishes that Ethiopian Airlines should embrace effective inventory management practices this is because an effective management of inventories has an overall impact on enhancing operational performance of the organization, including a guarantee of on-time performance, ensuring optimal production levels are met, and making sure that assembly targets are met, which, consequently, leads to a customer satisfaction.

Key words: inventory management, inventory record accuracy, stock out, operational performance

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CHAPTER ONE: INTRODUCTION

1.1 Back Ground of the study

In airline industries, an operator has to deal with two types of issues: the aircraft operating costs and the customer satisfaction, which could be measured in terms of dispatch reliability or on time performance.

(Jingyao Gu; Guoqing ,2015)

The basic function of EAL procurement and supply chain management department (PSCM) is to support the airline's operational requirements for materials and services by obtaining the right material, the right quantity, delivered on time, at the right place from the right source. Buying and getting the material for the current requirement is one aspects of the section, the major and the most impacting one is on how to manage this material for current and future usage and this task is also handled under the PSCM division. Organizations depend on inventory to balance supply and demand, and to safeguard uncertainties in the supply chain. However, inventory can be one of the most expensive assets of an organization; hence it must be managed closely.

According to Leenders, Fearon, & England, 1989 the goals of inventory management include the following

1. To provide an uninterrupted flow of the materials, supplies, and services required to operate an organization. Stock outs of material and parts would be prohibitive in terms of operating cost because of fixed costs and inability to satisfy commitments to customers. This is especially true when we consider an airline operation, where an aircraft cannot depart when there is a shortage of spare parts.
2. To keep inventory investment and loss at a minimum. One way to ensure an uninterrupted material flow is to maintain a large inventory. But inventory assets require tying up capital which then cannot be invested elsewhere.

Dispatch Reliability is expressed as the percentage of flights that depart within a specified time of the scheduled departure time (Bill de Decker, 2016). The first step is to define the margin.

The airlines use a 15-minute margin between actual and scheduled departure time for a flight to be considered as having departed "on time" (Bill de Decker, 2016) .Line maintenance has the greatest potential to impact an airline's sensitive spots, schedule integrity and customer service. Competitive technical dispatch reliability is

obviously critical and is a measure used by every airline. Genuine accountability for technical dispatch reliability is often blurred, and only in reality only exists in those airlines where all maintenance is done either in-house or on a total turnkey, outsourced basis. This is because many other factors impact line maintenance performance such as spares flow to the stations, spares stock, maintenance control effectiveness, and technical services support to name but a few. (James House, LG, 2000)

On the other hand the inventory cost is the major cost for the airlines, so it is believed to have optimum level of inventory that could help to dispatch the aircrafts with acceptable time and cost. According to reports filed with the Department of Transportation in 1999, airline costs for Maintenance - both parts and labor - 13 percent, so it very important to keep this alarming cost to the minimal level so that the aircrafts stay on air and the airline can grow on profit.

Based on the goal of inventory management practice, EAL MRO is expected to benefit from uninterrupted spare parts flow to the maintenance area so as to meet the Aircraft dispatch time and this task is depends on availability of parts in stock, inventory record accuracy, the inventory management model used. In addition, inventory planning and controlling function is more helpful to keep optimum inventory balance in stock so as to not interrupt operation as well as not to affect the finance of the organization by tiding up cash. In this paper the researcher has tried to assess the Effects of inventory management practices and on Ethiopian Airlines operational performances. The researcher believes that in an organization that is investing huge amount of money to carry out its daily activity for executing its operations, efficient and effective inventory management have a great impact on the overall performance of the airline.

1.2 Back Ground of the organization

Ethiopian Airlines (Ethiopian) (ET) is a government owned company found in the capital city of Ethiopia, Addis Ababa, with its head office located at Bole International Airport (Ethiopian Fact Sheet 2011). The airline, which was established on 1945, is one of the worlds and Africa's oldest airlines, with over sixty years of existence (Iches et.al 2005). On April 08, 1946, the airline started operation by making its first domestic flight to Gondar and international flight to Cairo (Saunders 1971). This makes the airline to take the pioneer position in African air transport industry (Bahru 1988).

Ethiopian commands the lion share of the pan-African passenger and cargo network operating the youngest and most modern fleet to 92 international destinations across five continents. Ethiopian fleet includes ultra-modern and environmentally friendly aircraft such as the Boeing 787, Boeing 777-300ER, Boeing 777-200LR, Boeing 777-200LR Freighter and Bombardier Q-400 double cabin with an average fleet

age of five years. In fact, Ethiopian is the first airline in Africa to own and operate these aircraft.(Ethiopian Fact sheet,2016)

Ethiopian is currently implementing a 15-year strategic plan called Vision 2025 that will see it become the leading airline group in Africa with seven strategic business units: Ethiopian International Passenger Service; Ethiopian Regional Service; Ethiopian Cargo; Ethiopian MRO; Ethiopian Aviation Academy; Ethiopian In-flight Catering Service and Ethiopian Ground Service. (Ethiopian Fact sheet, 2016)

Ethiopian has advanced maintenance base that is capable of carrying out the following maintenance activities with efficiency and quality

- A. Complete Airframe and maintenance packages for aircraft models of Boeing, Bombardier and Fokker.
- B. Engine Maintenance (covers 8000 square meter) for Pratt and Whitney model engines:
 - Complete repair, modification, overhaul and testing.
 - Modular maintenance
 - Engine performance test
 - Special process shops; Machining, Electro-chemical Plating, Welding, Plasma Spraying and Vacuum Furnace Heat Treatment.
- C. Aircraft component overhaul/testing (equipped with state-of-the-art Automatic Test Equipment – ATEC 5000)
- D. Aircraft Interior reconditioning
- E. Aircraft stripping and painting

The maintenance base is approved by Ethiopian Civil Aviation Authority, Federal Aviation Administration, United Arab Emirates General Civil Aviation Authority, Egyptian Civil Aviation Authority, Kenya Civil Aviation Authority, Angola Civil Aviation Authority, Jordan Civil Aviation Authority, Nigeria Civil Aviation Authority, Gabon Civil Aviation Authority, Afghanistan Civil Aviation Authority, Kingdom of Saudi Arabia General Authority of Civil Aviation and Sudan Civil Aviation Authority. (Ethiopian Fact sheet, 2016)

1.3 Statement of the problem

In airline industries, an operator has to deal with two types of issues: the aircraft operating costs and the customer satisfaction,(Jingyao Gu; Guoqing ,2015). In airline industries, the aircraft maintenance cost takes up about 13% of the total operating cost. It can be reduced by a good planning. Spare parts inventories exist to serve the maintenance planning (Jingyao Gu ,2015)

Ethiopian Airlines has to deal with two types of issues: the aircraft operating cost and customer satisfaction. Spare parts inventories exist to serve the maintenance planning. An excess of spare parts inventory leads to a high holding cost and impedes cash flows, whereas inadequate spare parts can result in costly flight cancellations or delays with a negative impact on airline performance. Since the airline industry involves with a large number of parts and some of them are quite expensive, it is important to find an appropriate inventory model to achieve a right balance. (Jingyao Gu; Guoqing ,2015)

The goal of airline inventory management is to provide the highest possible level of service at the lowest total cost and it is a critical function performed by EAL planners to balance the inventory holding and carrying cost so as to ensure that optimum inventory levels are maintained. Ethiopian airlines has currently huge amount of inventories in stock. Ethiopian airlines yearly aircraft materials are ETB 2.1Billion in 2013/14, 2.9 Billion in 2014/2015 and 3.5 billion in 2015/2016 year (ET Financial statement, 2013/2014,2014/2015 and 2015/2016 (ET Annual report).Under inventory on the other hand can seriously hamper the market share of the airlines by delaying the turnaround time of the aircraft on maintenance and increased cost of logistics due to AOG /Critical orders to avoid temporary shortage. Therefore, the responsibility of striking a fine balance in holding lean inventory calls for smart planning and continuous monitoring of the inventory levels coupled with quick decision-making. Huge amount of inventory, stock out, huge surplus inventory and the lack of effective inventory management practices which includes stock out management, inventory record accuracy, effective inventory management model and use of a system approach to inventory management, especially as a means for addressing supply chain disruptions in EAL operational performances served as the motivation for this study.

Based on these, it has been aimed to analyze inventory Management practices and its challenges within Ethiopian airlines across the Ethiopian MRO. Moreover, this study aimed at investigating this phenomenon and establishes the assessments on performance of Ethiopian airlines towards Inventory management variables such as stock out effect, Inventory record accuracy and Inventory management model, transaction reduction; and strategic objectives variables such as profitability, financial stability, and competitive positioning.

1.4 Research Questions

- 1 What is the effect of inventory management practice on, on time performance of EAL?
- 2 How is inventory management practiced in Ethiopian Airlines?
- 3 What is the role of inventory planning and inventory control section on managing the inventory of the airline?
- 4 What are the challenges of implementing inventory management practice in EAL?

1.6 Objectives of the study

The objectives of this study are classified as general and specific objectives. The general objectives specify the general purpose of the study and then based on these general objectives; the specific objectives is be included in order to satisfy the research questions.

1.6.1 General objectives

The General Objectives of this research is to assess the effects of inventory management practices on Ethiopian Airlines operational performances.

1.6.2 Specific objectives

In line with the general objective, and in order to satisfy the research questions the specific objectives includes

1. To Examine the effect of inventory management practice on, on time performance of EAL
2. To study the inventory management practice in Ethiopian Airlines.
3. To examine the role of inventory planning and inventory control section
4. To examine the challenges in implementing inventory management practice in EAL

Addressing the above general and specific objectives was enable the researcher to get how inventory management is done and its impact on performance of the airline.

1.7 Scope of the study

1.7.1 Conceptual scope

Ethiopian airlines performance is relied on the maintenance reliability and turnaround time of the aircraft and it all dependent on the availability of spare part inventory. In this research an attempt was done to find out the effect

of inventory managements of Ethiopian Airlines based on availability, cost, stock management and inventory management model on aircraft materials only.

1.7.2 Study Area

This study was focused on the inventory management of Ethiopian airlines and its impact on the organization operational performance based on Geographic address Addis Ababa Ethiopia, Bole international Airport

1.8 Significance of the study

The goal of airline inventory management is to provide the highest possible level of services at the lowest total cost so as to avoid high operational cost and to avoid delay on maintenance which has direct relationship with customer satisfaction. Airline Maintenance cost about 13% of overall operational costs of the airline (ICAO 2001), and inventory availability and management was take the highest portion of this cost, unless it is managed in well-organized manner it was push airlines to bankruptcy, With this important aspect the researcher is positive that the findings of this research was be of a great help to inventory management professionals in all sectors especially for airline industry.

This study informs various inventory managers in understanding how inventory management if properly done can immeasurably reduce organizational costs and improves the overall organizational operational performance and help to achieve strategic objectives.

The study is also essential to provide additional findings on the issue and can also be used as groundwork to do other related research issues.

1.9 Limitations of the Study

Some of the restrictions that the researcher faced in an attempt to find out inventory management practices and performance of EAL is lack of sufficient literature directly related to the Airline industry. The time constraints of employees to respond to the questioner as fast as expected were another challenge in doing the research

1.10 Definition of terms

- Inventories are stockpiles of raw materials, suppliers, components, work in process, and finished goods that appear at numerous points throughout a firm's production and logistics channel”(Ballou, 2004).
- Inventory control; Inventory control is the activity which organizes the availability of items to the customers of the organization (AI Ogbo 2014).
- Inventory recording is undertaken by organizations to reduce the errors of stock management and to ensure accurate and reliable stock records. It involves spot checks/ surprise checks, stock taking, which is the physical counting and measuring of quantity of each item in stock and recording the results (Brooks et al 2007).
- Stock record is a formal set of records that contain information about the stock held within the store system . Carter et al (2005)
- Inventory management is the use of techniques in ensuring that stocks of raw materials or other supplies, work in progress, and finished goods are kept at a level which provides maximum service levels at minimum cost (Lysons (1993)
- Operational performance
- Stockout or out of stock: Situation in which a routinely available product is missing from a retailer's shelf and is not available to meet customer demands (Vasconcellos & Sampaio, 2009).
- Lean inventory: A process that focuses on improving flow with a heavy emphasis on reducing inventory (Zylstra, 2006).
- Safety stocks: Inventory held as a buffer against mismatch between forecasted and actual demand for a given period (Chopra & Meindl, 2007).

1.11 Organization of the Study

Considering the research objectives, the structure of the thesis is defined as follows

- Chapter one introduces the research Topic, Scope and Objectives;
- Chapter two offers a comprehensive review of related literature on Inventory management concept
- Chapter three illustrates the research Methodology design of the research methods;

- Chapter four concentrates on data presentation and analysis;
- Chapter five presents conclusion and recommendations on the overall study based on the analysis of data collected.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Theoretical Review

This chapter is focused on providing the theoretical and Empirical models that are related to the topic of the research study. The chapter also presents the findings of the past researches in regards to the effect of inventory management practices on performance of organizations.

2.2 Definition of Inventory

Inventory generally refers to the materials in stock. It is also called the idle resource of an enterprise. Inventories represent those items which are either stocked for sale or they are in the process of manufacturing or they are in the form of materials, which are yet to be utilized. S. Anil Kumar. N. Suresh (2009)

Inventories are stockpiles of raw materials, suppliers, components, work in process, and finished goods that appear at numerous points throughout a firm's production and logistics channel (Ballou, 2004).

Inventory refers to the value or quantity of raw materials, supplies, work in progress (WIP) and finished stock that are kept or stored for use as need arises (Lyons and Gillingham, 1981). Raw materials are commodities such as steel and lumber that go into the final product. Supplies include items such as Maintenance, Repair and Operating (MRO) inventory that do not go into the final product. Work in progress is materials that have been partly fabricated but are not yet completed. Finished goods are completed items ready for shipment (Kothari, 1992). Sharma (2003) defines inventory as the quantity of goods, raw materials, or other resources that are idle at any given point of time. From the definition above, inventories consist of raw materials, component parts, supplies or finished assemblies etc which are purchased from an outside source, and goods manufactured in the enterprise itself. In simple words, inventory refers to stocks held by a firm. An inventory system is the set 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, (Chase and Aquilano, 1995:546).

2.3 Goals of Inventory Management for an Airline

According IATA, 2015, the goal of airline inventory management is to provide the highest possible level of service at the lowest total cost. This tenet applies whether the inventory manager is tasked with maximizing aircraft and system availability for a scheduled service passenger or cargo airline, or charter operations.

It applies whether the operator has a few aircraft or hundreds and it applies whether the operator is flying charter operations at a moment's notice, point-to-point scheduled flights, or a complex network of domestic and international routes. While each inventory manager may face slightly different sets of operational characteristics, the goals of inventory management largely remain the same. At a high level, goals range from preventing delays and cancellations by ensuring part availability and access for maintenance personnel, to ensuring that fill rates are adequate to ensure that passenger convenience items have adequate stock so failures of items can be rapidly addressed by maintenance.

The paramount goal of airline inventory management is to prevent as many cancellations as possible by adopting a cost effective inventory provisioning, allocation and management system. Cancellations not only result in lack of service from the origination point, but also impact subsequent departures, perhaps with catastrophic consequences for the daily schedule. Cancellations due to parts shortage almost always occur on No-Go items as large as engines down to the smallest flight-critical part, (IATA 2015).

In addition to preventing cancellation of flights via the application of an inventory management system, an inventory manager seeks to prevent as many material related delays as possible. This second goal is almost implied in the first, however, passengers are sensitive to delays, even short delays, as many schedule their flights based on connecting from one airline to another, or even within the same airline with short layovers. For point-to-point carriers, preventing delays is essential in maximizing aircraft availability for latter day operations. A single short delay could cascade into a series of schedule havoc inducing delays and cancellations at subsequent stations. For charter operators, minimizing delays is essential so that aircraft availability is maximized during the day for sale to customers. For cargo operators, the considerations are the same as for passenger airlines. Although most freight (except perishable items) is generally not adversely affected by delays, the cargo operator's schedule and aircraft utilization suffer just the same as a passenger airline, and the cargo operator's shipping and receiving human customers are certainly sensitive to a disruption in the flow of their freight. Prevention of both delays and cancellations serves the airline by delivering aircraft into the schedule on a consistent basis. For almost all scheduled service, aircraft free of maintenance issues are essential for profitable operations, regardless of whether the airline carries passengers, cargo or both. In the case of charter operators, the goal remains the same, and maintaining a high state of readiness is a key to generating business when opportunities present themselves. A typical third goal of an airline inventory manager is to provide for a service level of parts availability to the maintenance function of the airline. Inventory service level or "Fill Rate" coupled with efficient maintenance Practices ensures the aircraft is delivered to the customer in a high state of readiness (FAA 2012).

2.4 Inventory Management Practice

Inventory is a very expensive asset that can be replaced with information which is a less expensive asset but to do this, the information has to be accurate, timely, reliable and consistent. When this happens, you carry fewer inventories, reduce cost and get products to customers faster (David, 1996). This therefore implies that inventory management is very important if a company wants to achieve a balance between efficiency and responsiveness. David, (1996) explains the following objectives of inventory management: maximizing customer service, maximizing the efficiency of purchasing and production, maximizing inventory investment and maximizing profit.

Inventory management is a critical management issue for most companies – large companies, medium-sized companies, and small companies. Effective inventory flow management in supply chains is one of the key factors for success. The challenge in managing inventory is to balance the supply of inventory with demand. A company would ideally want to have enough inventories to satisfy the demands of its customers- no lost sales due to inventory stock-outs. On the other hand, the company does not want to have too much inventory staying on hand because of the cost of carrying inventory. Enough but not too much is the ultimate objective (Coyle, Bardi, and Langley, 2003).

Inventory plays a significant role in the growth and survival of an organization in the sense that ineffective and inefficient management of inventory will mean that the organization loses customers and sales will decline. Prudent management of inventory reduces depreciation, pilferage, and wastages while ensuring availability of the materials as at when required (Ogbadu,2009). Inventory management is critical to an organization's success in today's competitive and dynamic market.

This entails a reduction in the cost of holding stocks by maintaining just enough inventories, in the right place and the right time and cost to make the right amount of needed products. High levels of inventory held in stock affect adversely the procurement performance out of the capital being held which affects cash flow leading to reduced efficiency, effectiveness and distorted functionality (Koin, Cheruiyot , and Mwangangi , 2014).In order to achieve the objectives of minimizing stock related costs, firms should maintain adequate levels of stock in order to enable smooth business operations. A number of practices have therefore been advanced to handle these costs.

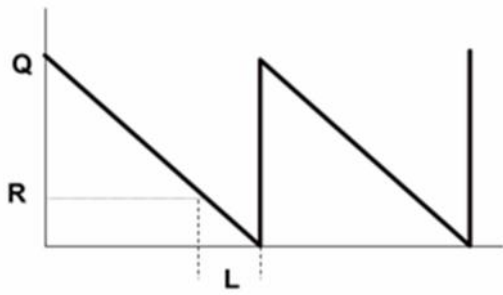
According to Agus and Noor (2006), the inventory management techniques that are universally adopted by firms include Economic Order Quantity (EOQ) model, ABC model, Vendor Managed Inventory (VMI) and Just-In-Time model. Economic Order Quantity (EOQ) model, Bar-coding, Just-In-Time model, ABC model and Vendor Managed Inventory (VMI) and Simulation.

2.4.1 Economic order Quantity Model

Inventory models deal with idle resources like men, machines, money and materials. These models are concerned with two decisions: how much to order (purchase or produce) and when to order so as to minimize the total cost. For the first decision—how much to order, there are two basic costs are considered namely, Inventory carrying costs and the ordering or acquisition costs. As the quantity ordered is increased, the inventory carrying cost increases while the ordering cost decreases. The ‘order quantity’ means the quantity produced or procured during one production cycle. Economic order quantity is calculated by balancing the two costs. Economic Order Quantity (EOQ) is that size of order which minimizes total costs of carrying and cost of ordering. i.e., Minimum Total Cost occurs when Inventory Carrying Cost = Ordering Cost . S. Anil Kumar • N. Suresh (2009).

The economic order quantity, which is also recognized as the Wilson EQQ model, is an inventory management technique that identified the most favorable quantity to order, which is in line with minimizing the total variable expenses that are needed to order as well as to hold inventories (Lee, 2002). Economic Order Quantity denotes the optimal ordering level of an inventory which helps in the minimization of expenses. This inventory management approach (EOQ) makes the assumption that the demand for an item is well-known, the lead time is well-known and constant, that the receipt of an order happens immediately, the discounts of quantity are not computed as part of the model and that inventory’s shortages do not happen. The EOQ graphs demonstrate the association between the costs of ordering, the expense of holding inventories and the economic order quantity (Nair, 1995).

According to Cecil Bozarth, Ph.D., 2011 What Would Holding and Ordering Costs Look Like for the Years?



A = Demand for the year

C_p = Cost to place a single order

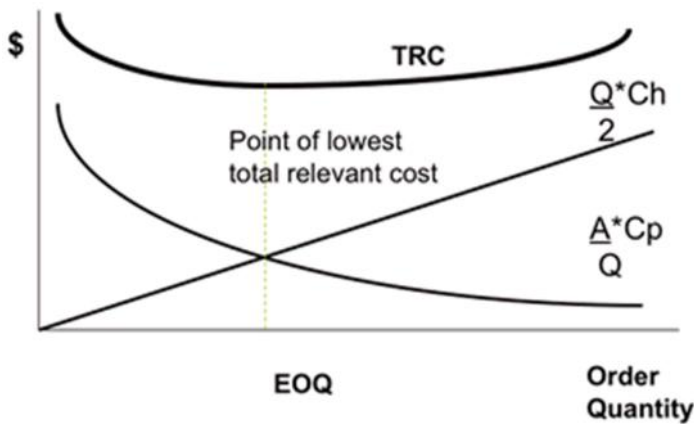
C_h = Cost to hold one unit inventory for a year

Total Relevant* Cost (TRC)
 Yearly Holding Cost + Yearly Ordering Cost

$$\frac{Q}{2} * C_h + \frac{A}{Q} * C_p$$

* “Relevant” because they are affected by the order quantity Q

Economic Order Quantity (EOQ)



EOQ Formula

$$\sqrt{\frac{2 * A * Cp}{Ch}}$$

2.4.2 ABC analysis

Inventory optimization 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). Joffrey Collignon, Joannes Vermorel, (2012)

ABC analysis is sound recognized categorization technique as far as the pareto principle is concerned, whose main purpose is for establishing the items that should be prioritized in the management of an inventory (Ramanathan 2006). Flores and Whyback (2007) is of the view that ABC analysis is a method for prioritizing inventories. Inventories are classified into 3 sub-classes, including A, B and C. A large portion of the efforts of management are utilized on administering A Items A, B in-between and C items get the least attention.

Brown (Bloomberg, Lemay and Hanna 2002) notes that the ABC analysis categorizes products based on importance. Importance may come from cash flows, lead time, stock outs, sales volume, or profitability. Once the ranking factors is chosen, break points are chosen for classes A, B, C and soon. The 80-20 concept is particularly useful in distribution planning when the products are grouped or classified by their sales activity. The top 20 percent might be called A times, the next 30 percent B items, and the remainder C items. Each category of items could be distributed differently. For example, A items might receive wide geographic distribution through many warehouses with high levels of stock availability , whereas C items might be distributed from a single, central stocking point(e.g. a plant) with lower total stocking level than for the A items. B items would have an intermediate distribution strategy where few regional warehouses are used (Ballou 2004).

Based on this principle, the pattern of control in ABC Analysis is shown in Table 2.1.

Table 2.1

Category A	Category B	Category C
------------	------------	------------

Tight Control on Stocks	Moderate Control	Loose Control
Centralised Procurement of exact quantities from multiple source.	Procurement of fairly exact quantities	Procurement based on estimated usage
Continuous check on schedule and revision wherever called for	Broad check on schedules	Hardly any check required
Very low or if possible, no buffer stock needed.	Exact requirement should be worked out	No restrictions
Regular follow up	Some follow up	No follow up
Very strict consumption	Control on consumption is highly desirable	Not required
Materials planning forecasts should be very accurate	Past consumption may be taken as the basis	Rough estimates are satisfactory.

Source: Kapoor & Kansal (2003)

2.4.3 Vendor Managed Inventory (VMI)

The American Production and Inventory Control Society defines Vendor Managed Inventory (VMI) as a means of optimizing supply chain performance in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. It is accomplished by a process in which re-supply is done by the vendor through regularly scheduled reviews of on-site inventory.

VMI, referred to as a program of supplier-managed inventory or direct replenishment, emerged in the late 1980's as a partnership to coordinate replenishment decisions in a supply chain while maintaining the independence of chain members. In this relationship between a vendor and customer, it is the *vendor* that decides when and in what quantity the customer's stock is replenished. VMI was successfully implemented by numerous firms including Wal-Mart and Procter & Gamble (Waller et al. 1999), Campbell Soup Company (Clark 1994), Barilla SpA (Hammond 1994), Intel (Kanellos 1998) and Shell Chemical (Hibbard 1998).

VMI has also been conceived as a means of enabling operational benefits. Through the "flexibility" that VMI offers, the supplier may combine routes from multiple origins (Campbell et al. 1998, Kleywegt et al. 2002) and delay stock assignments, consolidate shipments to two or more customers (Cheung and Lee 2002), or postpone a decision on the quantity destined for each of them (Cetinkaya and Lee 2000). VMI may also come up in a transportation-inventory problem whose tradeoffs are investment in inventory, delivery rates and shortages (Chaouch 2001), or in a simulation-study that analyzes the impacts of demand variability, limited manufacturing capacity, and partial channel coordination (Waller et al. 1999).

2.4.4 Just in Time (JIT) model

Beginning in the early 1980s, a number of US firms followed the pioneering efforts of Shigeo Shingo and Taichi Ohno and adopted just-in-time (JIT) manufacturing in an attempt to reshape their manufacturing environments (Bragg et al., 2005) and to become more agile (Helo, 2004). JIT requires that a company have a few reliable suppliers and is believed to enhance productivity and build a leaner manufacturing system which minimizes inventories (Helo, 2004) which, in turn, reduces risk and helps minimize the cost of manufacturing (Curry and Kenney, 1999; Rahman, 2004).

The Just in Time is an inventory management practices with the objective of maintaining just sufficient material at the right place and at the right time in order to make first the right quantities of inventories (Carlson, 2002).

According to Voss, JIT is viewed as a "*Production methodology which aims to improve Overall productivity through elimination of waste and which leads to improved quality*". JIT provides an efficient production in an organization and delivery of only the necessary parts in the right quantity, at the right time and place while using the minimum facilities".

Just in time inventory management system helps in reducing inventory costs by avoiding carriages of excess inventories and mishandling of raw materials. According to Kortz (2003), Just in time purchasing recognizes high costs associated with holding high inventory level and as such it has become important in most organizations to order inventory just in time of production so as to cut costs of holding inventory like storage lighting, heating, security, insurance and staffing (Dimitrios, 2008).

2.4.5 Barcode inventory system

A barcode is an optical machine readable representation of data about the object to which it attaches. Barcodes are used for identification, handling, retrieval and storage of goods in warehouses and stores. It is the most popular technology in many applications. Individual inventory items, cartons or unitized packages are affixed with a barcode that can be read by a barcode scanner attached to an online computer system. Barcode is assigned to a particular inventory item to show its identity during storage, retrieval and dispatch. Barcodes are further used for communication of dispatched items for the preparation of bills by accounts departments and making periodic reports on inventory status and sales. The barcodes facilitate the tracking of specific items in the warehouse during inventory audit or material pick up. They also help in tracking a consignment during transportation/ inspection at the customer end. The information that may be required generally relates to the country code, manufacturer's name, product details, date of manufacture, material content, and so on. The details are required at the users end for inventory management and are in machine readable codes in the form of bars and spaces (Sople, 2010).

2.4.6 Simulation inventory control system

Maria (1997) describes the simulation of a system as the operation of a model of the system that can be reconfigured and experimented with. The main reason to use simulation modeling is to reduce the cost associated with impractical implementation in the real system. In simulation, the system can be studied and properties of the actual system can be inferred. The use of simulation is to alter a system or test a new system and reduce the chance of failure before the system is implemented. Simulations are very useful to determine where the problem lies in an actual system or to determine the best design of a proposed system.

Andric et al. (2005) states in an article that modern inventory management approaches make use of mathematical models and informational systems.. A study by Gbolagade, et al (2012) is based on the role of

simulation modeling for conducting scientific experiments on inventory control.

Badri (1993) established a simulation based decision-support system for controlling and managing inventory by taking into consideration the impact of changes in demand, the point of reordering, the control of the stock level, period between the reviews, as well as the lead time. Nonetheless, the approach took into consideration just the case of one product inventory model.

2.4.7 Lean inventory system

Lean inventory management is all about cutting the fat out of your business and finding just the right balance between too much and too little inventory on hand. That means no more hoarding products just because you can get them cheaper by buying them in bulk, and no more guessing how many products to keep in stock.

Robert Lockard (2012)

A Lean inventory management system allows a distributor to meet or exceed customers' expectations of product availability with the amount of each item that will maximize the distributor's net profits. In a Lean system, inventory is regarded as a sign of a sick factory that is in desperate need of some type of treatment. The ideal goal for a company should be to have an inventory as close to zero as possible. Effective inventory management, allows a distributor to meet or beat their customers' expectations of product availability while maximizing their profits (Steve Krar 2008).

2.4.8 Information technology usage

Inventory is a very critical component in every organization and it requires serious managerial consideration since it ties up a lot of firms' capital. However, Inventories are essential for keeping the production continuous whereby moving inventories keep the market going and the distribution system intact. According to David and David (2002), these functions include providing a cushion to prevent against stock-outs and therefore if there is a constant and efficient supply of inventory, it will reduce the chances of uncertainties or lack of stocks and the costs that relate to stock-outs and if this is well achieved, it will enable any firm to attain a competitive advantage over competitors. Donald (2006), points out that there is failure in the firms' systems since most of them are not computerized and such firms tend to have huge inventories due to poor planning and also in anticipation that they will beat the competition from the jua kali sector. The failure leads to problems of daily sales accounting since there can be errors in the amounts received in relation to the amounts sold and numerous problems are also encountered in demand forecasting since

material managers are not able to predict the exact amount of inventory to maintain so as to meet the customer's demand. Automated inventory systems usage has had little application and this has resulted in problems that come as a result of stock shortages and it is for this reason that various researches have been carried out pertaining to Inventory Management Control Systems.

2.4.9 Inventory record accuracy

According to Jessop and Morrison (1994), a stock record system is the means of capturing and storing information and a facility for the analysis and use of this information so that the operation of the stores function and the control of stock can be performed in an efficient manner. The author further says that the system of stock recording and the mechanism for the use of recorded information must be very carefully selected. Records and techniques should be appropriate to the items in question and the cost implication taken into account. An organization should carefully choose the best system suitable to it to avoid a situation whereby a lot of money would be spent on maintaining a very expensive system for items of low value. A stock record system can be manual or computerized.

Carter and Price (1993), has highlighted the use of modern technology and argues that computers have the ability to store and retrieve information. The authors argue that many companies now use computers to hold and constantly update stock records. The computer can in the simplest applications merely replace a set of stock record cards by maintaining a set of information on stock levels and carrying adjustments as necessary when directly instructed.

Cole (1997), defines a stock record system as a formal set of records that contain information about stock held within the stores system. The range of this information will depend upon the system employed and the scope of the operation. However, there are basic functions which every stock record system should aim to cover the fundamental one being data held at any given time. It is because of the wide range of information held within a good record system that Carter and Price calls it the "clerical memory".

2.4.10 Stock out

Companies are exploring ways to deal with the costly problem of stockout and uncertainty of demand by staging inventory in containers ahead of customer demand (Comez & Kiessling, 2012). Matching the exact amount of inventory to meet customer uncertain demand has presented a problem for managers (Zinn & Liu,

2001). The need for frequent and timely restocking to support lean inventory has also created a challenge for retailers and suppliers sourcing products from overseas manufacturers (Bruce, Daly, & Towers, 2004). Disturbances in the supply chain can have severe effects on firms applying the lean principles (Svensson, 2001). Too little inventory could lead to stockouts; as a consequence, customers could become dissatisfied and take their business elsewhere (Koumanakos, 2008).

2.4.11 Inventory planning and control

Inventory planning and control are functions relating to inventory management. Business owners pay close attention to inventory as it usually represents the second largest expense in their businesses. Inventory planning includes creating forecasts to determine how much inventory should be on hand to meet consumer demand. Inventory control is the process by which managers count and maintain inventory items in the business. (Osmond Vitez, 2015)

Inventory control is a planned approach of determining what to order, when to order and how much to order and how much to stock so that costs associated with buying and storing are optimal without interrupting production and sales. Inventory control basically deals with two problems: (i) When should an order be placed? (Order level), and (ii) How much should be ordered? (Order quantity). These questions are answered by the use of inventory models. The scientific inventory control system strikes the balance between the loss due to non-availability of an item and cost of carrying the stock of an item.

Scientific inventory control aims at maintaining optimum level of stock of goods required by the company at minimum cost to the company (S. Anil Kumar • N. Suresh ,2009).

2.4.12 Inventory management and Airline operation

Service parts are a major expense for companies in all sectors, one that often exceeds annual profits. The commercial aviation industry, for instance, holds an estimated \$45 billion in spare parts worldwide. A conservative estimate for the cost of holding this inventory is \$6.1 billion dollars per year, more than four times the combined profits of the world's airlines between 1995 and 1997, and even this is probably understated. A reduction in inventory by operators could free up huge amounts of capital and reduce operating expenses. (Standard and poor's , 2009)

The nature of the overhaul of assemblies and subassemblies, dictates that 100% of all possibly required parts are available at the time the overhaul is started. This may result in a large number of parts being returned to stock later via technical inspection and credit to the inventory balance. Thus carriers that continue to manage their own spare-part inventories keep stocks as lean as possible to minimize carrying costs. Inventory costs and supply are critical elements for airlines seeking to minimize expenses while adhering to leasing conditions and local civil aviation authority rules. Many small airlines have responded by stocking only essential parts to meet minimum equipment list requirements, MEL.(Prof. Dr. Adel A Ghobbar, 2002)

2.4.13 Organizational Performance

The performance of an organization is evaluated by how it reduces cost or increases value. Firms' performance monitoring is important; in many businesses, the supply chain represents roughly 75 percent of the operating budget expense (Palevich, 1999). Three common measures of performance are used when appraising performance: efficiency, responsiveness and effectiveness (Chase et al., 2002). Efficiency implies minimization of total system wide costs from transportation and distribution to inventories of raw materials, WIP and finished goods. To be efficient, firms should use strategies aimed at creating highest cost efficiency and for such efficiencies to be achieved, non-value adding activities should be eliminated, economies of scale pursued and optimization techniques deployed so as to get the best utilization capacity. To be responsive means ensuring that customers' needs/demands are attended to at the right time without delays. In order to achieve responsiveness, the firms should be flexible to the changing and diverse needs of the customers and also build to order and mass customization processes as a means to meet the specific requirements of the customers. Effectiveness on the other hand means doing the right thing at the right time. Firms should ensure that they do enough research to know what their customers need and should also get the right resources so as to serve their customers satisfactorily (Janat, 2009). Organizational performance can therefore be best measured through operational cost reduction and customer service delivery levels. As more manufacturers fight with global marketplaces, competition from low cost countries and faltering home economies, the attention of many manufacturers and retailers have naturally turned to cost and waste reduction. It is therefore very important to understand the best cost reduction strategies, and identify the main cost drivers in a firm's operations. While an obvious need for cost reduction arises, the truth is that many firms do not know where most of the cost of a product occurs. It is also equally important to understand the overhead structure, as this can help to identify perverse incentives that may affect later decisions (Meeker and James, 2004).

2.5 Empirical Review

Relationship between Inventory Management and Operational Performance

Different authors have been doing various endeavors to clarify the relationship between inventory management practices and the efficiency of a firm. Rajeev (2010) contends that stock administration practices are a method for procuring intensity. Factors of his study were Inventory Management rehearses as an independent variable, and cost diminishment as a reliant variable. The discoveries of the survey showed a positive relationship between the factors. Koumanakos (2008) contemplated the impact of Inventory Management on the solid execution of assembling firms working in Greece. The theory that is inclined to the stock management stimulates variations in the business's budgetary implementation. The discoveries recommend that the higher the level of inventories protected by a firm, the lower the rate of return. Eckert (2007) analyzed Inventory Management and the part it plays in enhancing client benefit levels. He found a positive relationship between stock administration practices and consumer loyalty because of decreased number of stock-outs.

Juan & Mertinez (2002) in their study of 8872 small and medium-sized Spanish firms also demonstrated that managers of firms can create value by reducing the number of days of inventory. Effective inventory management processes helps increase operational efficiency of firms; improves customer service; reduces inventory and distribution costs; and enables businesses track items and their expiration dates consequently balance between availability and demand (Pandey, 2004).

Akelo (2011) focused on establishing the impact of inventory management practices on performance of Non-Governmental Organizations. By targeting ten Non-Governmental Organizations situated in Nairobi County, the research study focused on a total sample of seventy respondents. According to the analysis of the data via descriptive statistics, the study recognized that a unit in ABC Analysis would lead to an increase in operational performance of Non-Governmental Organizations by a factor of 0.683 whilst a unit increase in Economic Order Quantity leads to an increase in operational performance of Non-Governmental Organizations by a factor of 0.702. On the other hand, a unit increases in Demand focus inventory leads to an increase in operational performance of Non-Governmental Organizations by a factor of 0.699. Finally, Akelo (2011) argued that a unit increase in automatic replenishment leads to an increase in operational performance of Non-Governmental Organizations by a factor of 0.612. While this research study provides significant

information on the impact of inventory management practices on organizational performance, this research study only focused on Non-Governmental Organizations in Nairobi County. As such, it does not provide answer to the impact of inventory management on the performance of consumer goods manufacturing firms in Nairobi County.

Kitheka (2010) focused on evaluating the extent of inventory management automation and to determine the impact of inventory management automation with respect to the performance of supermarkets in Western and Nyanza provinces, Kenya. Based on a survey design, in which the researcher targeted all supermarkets (eleven operational supermarkets) in Kakamega, Bungoma and Kisumu, Kitheka (2010) established that inventory management automation impacts positively on the performance of supermarkets. However, instead of focusing on consumer goods manufacturing firms in Kenya, Kitheka (2010) focused on consumer services firms in Kenya.

Sandeep et al. (2007) postulate that inventory management can bring unwarranted losses if the organization always has stock outs, lack of proper warehousing plans, delivering the wrong goods to the customers as well as the lack of proper documentation for goods procured. The staff needs to understand and apply the Inventory Management techniques to ensure that the organization gets value for its money. James (2008) highlights that wholesalers convey Ten to Thirty percent (10-30%) of extra stock that is superfluous. These cause unnecessary conveying cost, loss of clients, loss of offers, and loss of benefit because of messy and wasteful stock administration. He encourages up that there is the need to set out methods to control physical stock, to decide the substantial cost of overseeing stock. Chopra and Meindl (2013), clarified that stock exists in a reliable operation as a result of the jumble amongst free market activity. Along these lines, stock's part is to grow the measure of interest that can be accomplished by having the thing, or organization prepared and available when the customer needs it.

2.6 Conceptual Framework

2.6.1 Importance relationship between inventory management and organization's performance

Inventory plays an important role in the growth and survival of an organization in the sense that failure to an effective and efficient management of inventory, will mean that the organization will lose customers leading to poor services delivery and sale will decline. Emphasizing on the importance of inventory on the balance

sheet of companies. Coyle, Bardi and Langley (2003:188) state that “inventory as an asset on the balance sheet of companies has taken an increased significance because of the strategy of many firms to reduce their investment in fixed assets, that is plants, ware houses, office buildings, equipment and machinery , and soon.

Virtually every enterprise finds it necessary to hold stocks (or inventory) of various items and materials. That is because it would be practically impossible to operate with only one of each item to be sold or used in manufacture or used in office work. A reserve or a fund or inventory of each item or material used or sold frequently is therefore maintained, so that as items or materials are sold or used they can be replaced or replenished from the stocks held in reserve. Due to uncertainty in future demand, and because of the unguaranteed availability of supplies, stock is therefore held to ensure an availability of goods to minimize the overall costs associated with the management of stock (Drury, 2000).

Gittinger (1995) argues that precautionary motive is one of the central roles of inventory management. Accordingly, precautionary motive means that stock held to guard against risk of unpredictable changes in demand and supply. In most cases, the level of demand of goods and the time required for supply cannot be known with certainty. Therefore, to ensure product availability, the organization maintains additional amount of safety stock to meet regular production and market needs. Firms should invest in stock control for precautionary motive to act as a buffer or link between demand and supply so that production can be geared to a more constant output. Precautionary motive necessitates holding of inventories to guard against the risk of unpredictable changes in demand and supply forces and other factors (Pandey, 2002)

According to Kenneth and Brian (2006es) includes keeping inventory includes the following reason:- Reduce the risk of supplier failure or uncertainty- safety and butter stocks are held to provide some protection against such as strikes, transport breakdowns due to floods or snow, crop failures, wars and similar factors. Protect against lead time uncertainties, such as where supplier’s replenishment and lead time are not known with certainty – in such case an investment in safety stocks is necessary if customer services is to maintain at acceptable levels. Meet unexpected demands or demands for customization of products as with agile production and smooth seasonal or cyclical demand.

Balloon (1987) illuminates that inventories should be held to improve customer service and therefore goods should be spotted at a place where customers can get them in the quantities they wish. The transaction motive is aimed at facilitating smooth operations on daily basis. According to Pandey (2002) Transaction motive

emphasizes the need to maintain inventories to facilitate smooth production and sales operation. Firms should maintain back up inventory either in excess or low levels to take advantage of current and future demands or price fluctuations. They should therefore purchase goods and stock them in advance when they anticipate price increase in future and also prepare for contingencies that may befall a company, for instance, strikes, prices, goods among others (Kakuru, 2000).

According to West et.al (1990), organizational performance refers to a function of an organization's ability to meet its goals and objectives. How successful an organization achieves its objectives, satisfies social responsibilities or both depends upon how well an organization carries out its activities. Organizational function is an important factor in the performance of a society or nation. How well the organizations of the society do their job-organizational performance, gives rise to debate (Stoner et. al, 1989). Organizational performance is evaluated regardless of the system being used, either formal or informal. Systematic ways of appraising organizational performance throughout the company are however desirable so that each manager can help to improve current performance and identify individuals who show the greatest potential for higher management positions (Pigers et. al, 1989)

2.7 Research Hypothesis

Based on the literature review and conceptual framework, the following hypothesis was established in this research study. The hypotheses were tested.

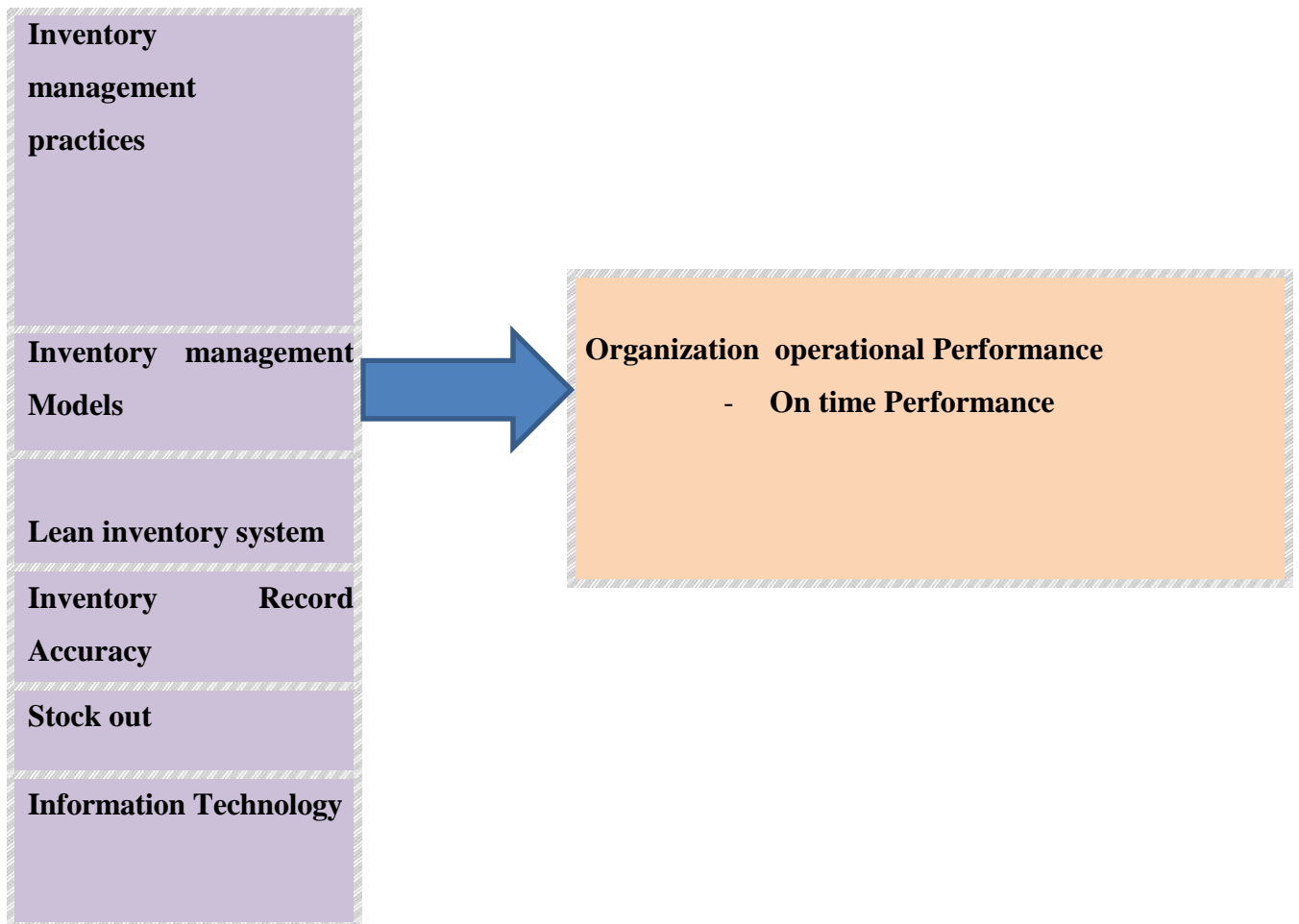
H0: Inventory management practices have no significant impact on the performance of Ethiopian Airlines organization operational performance

H1: Inventory management practices have significant impact on the performance of Ethiopian Airlines organization operational performance

Fig 2.1 Conceptual framework dependent and independent variables

Independent Variables

Dependent Variable



Source: Author (2017)

Figure 2.1: Conceptual Model

CHAPTER THREE: METHODOLOGY OF THE STUDY

3 Introduction

This chapter presents the methodology that was used in the study; it gives a description of the study area and the methods that used to collect data from the field. It gives summary of the research design, sample population and size, data collection instruments, data type, data processing and presentation and the problems encountered during the process of data collection analysis. This part of the research explains the research design and methodology deployed in order to undertake this specific research work. It has included some very important sub topics in it.

3.1 Research Approach

There are two basic approaches in social sciences research; qualitative and quantitative orientation. However, the literature suggests a growing interest in a mixed approach (triangulation) following on from the argument that 'one is used to strengthen the other. Often, combining qualitative and quantitative methods, also known as the triangulation of methods, can capture a more holistic, complete and contextual view of a phenomenon (lick, 1979).

The research is based on both the qualitative and quantitative research designs. A case study was chosen as the most appropriate research strategy. Saunders et al (2003) define a case study as “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence”. This fitted well with the author’s intention to investigate a real life issue through a variety of data collecting methods. Jankowicz (2000) suggests the appropriateness of a case study when the thesis focuses on a set of issues in a single organization.

The qualitative research design was descriptive in nature and this enabled the researcher to meet the objectives of the study. A statement was used to assign variables that are not adequately measured using numbers and statistics. The quantitative research design was used in form of mathematical numbers and statistics assigned to variables that may not be easily measured using statements or theme.

3.2 Research Design

According to Klopper (2008), “The research design is the plan or blueprint that the researcher will use in conducting the research” (p. 68). This research is basically descriptive. Descriptive and Causal Research design was used. Causal research falls under the category of conclusive research, because of its attempt to reveal a cause and effect relationship between two variables and this research study the effects of inventory management practices on operational performance of EAL.

Under this topic inventory management practice was described in a brief way and information was collected, analyzed and interpreted. The research methodology includes the collection of data both from primary and secondary sources. This source was from questioner, the review of reference materials, brochures, annual reports, Ethiopian airlines system generated data and policy and procedures.

Descriptive survey was preferred in this study since this research design is effectively used to obtain information concerning the current status of inventory management practice in EAL and its effect on the operational performance. The purpose of the descriptive survey methods was to describe” what exists” at present with respect to situational variables (Cooper & Schindler, 2006). This research design was useful because it allowed for comparative analysis.

3.3 Population and sample

The subjects comprised of Ethiopian Airlines staffs, Ethiopian MRO users, stores department, purchasing department, top management, other staff from various departments and the respondents were 170 in total. Due to the nature of their positions in the various departments, the Researcher was able to get reliable information necessary for the research.

3.3.1 Study Population

The study involved people from the staff of Ethiopian Airline. All this helped the researcher to generate critical data important for the study. The total population was around 170 staff Ethiopian Airline and the sample population was 90.

3.3.2 Sample Frame and sample size

Key participants of the study comprised of respondents from the Ethiopian Airlines staff, MRO users, stores department, purchasing department and top management, inventory control departments .This was selected

using purposive sampling techniques. Using the purposive sampling technique, the researcher has selected 90 key informants who included Ethiopian Airlines middle managements.

Table 3.1: Sample Size

Category	Population	Sample Size	Percentage
Top Management	14	7	53%
Stores Management	30	16	53%
Purchasing Department	60	32	53%
Inventory departments	20	11	53%
MRO users (planners)	46	24	53%
Total	170	90	53%

Source Researcher (2017)

3.3.3 Sampling Technique

The study participants were chosen using a purposive sampling technique because of the nature of the research where the respondents were identified before the researcher went for data collection.

3.4 Data Source and Type

3.4.1 Primary Data

Primary data was gathered from respondents From Ethiopian Airlines who were assumed to give firsthand information on the subject under study.

3.4.2 Secondary Source

Secondary data was found from sources like; Annual reports of year of the company, Journal articles, internet, magazines, newspapers and books related to the subject of the study and these were consulted at length to extract the information required to support the findings from the study respondents.

3.5 Data Collection Methods / Procedures

This research study used primary data to meet the objectives that are established at chapter one. For the

purpose of collecting primary data, the researcher uses a semi- structured questionnaire. The questions were structured in such a way as to draw the opinions of the respondents in the most effective way.

In particular, the questionnaires were structured in terms of likert scale measurements, which provided the respondents an opportunity to provide their varied views on diverse aspects of inventory management practices and organizational performance. A self-administered questionnaire was delivered to each respondent after which it was picked within a period of one week. Once the questionnaires were received, they were coded and edited for completeness and consistency.

3.6 Interviewing

The researcher used formal interviewing as a method of data collection and the interviews offered a chance to discover topics in depth and allowed interaction between the researcher and the respondents in a way that any misunderstanding of the questions and answers provided could easily be corrected. The researcher interviewed the top level management and employees of the organization. This was used to hit the vital information that couldn't be collected using the questionnaires from the low level and employees.

3.7 Research Instruments

Research instrument used in data collection included among others; questionnaires and interview. These multiply research instruments that were used to ensure that all the data necessary for the study was completely collected.

3.7.1 Questionnaires

Questionnaires were closed besides being simple but logically set in consideration of the study. They were treated with maximum, confidentiality, prepared with maximum bias to ensure comprehensive data collection. Questionnaires were tested on a few respondents to access their acceptability and study elements coverage. They were then reserve and distributed to the intended respondents.

Questionnaires titled “Inventory management practices and organizational performance” was used in the process of collecting data. The researcher administered questionnaires to selected employees and management officials of Ethiopian Airlines. The relevance of this is that the questionnaires are convenient and less time consuming.

3.7.2 Observation

The observation instruction brought closer the researcher to the respondents in discussion. While the researcher observed actions of the respondents, his closeness made them lives and gave their hidden perception and reactions unconsciously.

3.8 Reliability

Reliability is a concern every time a single observer is the source of data, because we have no certain guard against the impact of that observer's subjectivity" (Babbie, 2010, p.158). According to Wilson (2010) reliability issues are most of the time closely associated with subjectivity and once a researcher adopts a subjective approach towards the study, then the level of reliability of the work is going to be compromised.

Reliability, according to Miles and Huberman (1994), has to do with the extent to which the items in an instrument generate consistent responses over several trials with different audiences in the same setting or circumstances". The reliability of the instruments and data was established following a pre-test procedure of the instruments before their use with actual research respondents.

3.9 Research Procedure

The study observed all those procedures followed in research. The researcher introduced to every respondent reached at, fully explaining the purpose of the research. After getting their consent, he conducted the research. The researchers also built the confidence of the respondents by assuring them that their opinion were confidential and were used only for academic purposes.

3.10 Data Analysis and Management

After collecting all the necessary data, the data was coded and edited, analyzed and rephrased to eliminate errors and ensure consistency. It involves categorizing, discussing, classifying and summarizing of the responses to each question in coding frames, basing on the various responses. This was intended to ease the tabulation work. It also helps to remove unwanted responses which would be considered insignificant. Data collected from the field with the use of study instruments was classified into meaningful categories. This enabled the researcher to bring out essential patterns from the data that would organize the presentation.

Data was entered into a computer and analyzed with the use of Statistical Package for Social Sciences (SPSS) version 20. The study employed the regression analysis to demonstrate the correlation between inventory management practices and operational performance in EAL. Finally, a research report was written from the analyzed data in which conclusions and recommendations were made.

3.11 Ethical Consideration

In determining the participants of a study, it is ethical to ensure that the research is beneficial for the participants in alleviating a given problem (Cresswell, 2003). Accordingly, this study is aimed at identifying the challenges in targeting and acquiring the right applicant pool and majority of the participants are employees who are directly attached to Inventory management activity of the company. Therefore, they are the ones to be benefited from the findings and recommendations of the study.

The researcher briefly explained the purpose of the study to the employees and then participants were included in the research after they gave full consent of their willingness to participate in the study. The researcher assured that confidentiality of the recordings of the interview and no record to be kept about the identity of the participants.

The correct reporting of the final study is another ethical issue. The researcher has analyzed the data based on the explicit response of the participants, the notes from observation and findings from the secondary data. Therefore, it is minimal to report a finding that is not supported by the analysis.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND ANALYSIS OF FINDINGS

4.0 Introduction

This chapter has focused on presenting the findings of the study, as well as analyzing such findings so as to enable the user of the study to understand at an in-depth level of the results regarding the research topic, that is, Effect of Inventory Management Practices on organization operational performance in Ethiopian airlines. In the first section, the chapter focuses on providing the demographic data regarding the respondents while the second section provides the findings of the specific objectives of the research study. Based on SPSS version 20, the data was analyzed based on descriptive statistics, including graphic presentation methods, such as pie charts, as well as tables, frequencies, mean, standard deviation.

The research objectives established at chapter one and which are to be met in this chapter, include:

- I. To Examine the effect of inventory management practice on, on time performance of EAL
- II. To study the inventory management practice in Ethiopian Airlines.
- III. To examine the role of inventory planning and inventory control section
- IV. To examine the challenges in implementing inventory management practice in EAL

4.1 The Response Rate of the Study

While a total of 90 respondents were targeted in study, which included procurement managers and procurement officers, material planners, and inventory controllers only 82 respondents were able to return complete questionnaires, which were deemed sufficient to carry out an analysis on the data. This resulted in a response rate of 91%. This response rate was considered sufficient to establish conclusions regarding the research study. Based on the research by Cooper and Schindler (2006), a response rate of fifty percent is sufficient to carry out an analysis and report the results, however, a rate of sixty percent is considered good while that of seventy percent or more is deemed exceptional. In this regard, the response rate of this study was outstanding.

4.2 Demographic Data

The demographic data is crucial in understanding whether the given sample of the respondents in a specific research study represents sufficiently the target population. The demographic data also enables the researcher to find out the suitability of the respondents in providing answers to the research questions for the purpose of generalizing the results of the study. In this research, the demographic data consisted of gender, age, level of education and work experience.

4.2.1 Respondent Gender

Table 4.1 Gender

Respondents Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid male	65	79.3	79.3	79.3
Valid Female	17	20.7	20.7	100.0
Total	82	100.0	100.0	

Source: Research data (2017)

The respondents were asked to indicate their gender in the questionnaire. According to Table 4.1, there were more male (79.3%) than female (20.7%) respondents in the study.

Table 4.1 emphasizes the fact that the procurement and supply chain department of Ethiopian Airlines are highly dominated by male employees. However, given that both genders were involved in the study, it is arguable that the results of the research study did not experience gender biasness.

4.2.2 Age of the respondent

Table 4.2: Age

Respondents Age

	Statistics			
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid below 25	28	34.1	34.1	34.1

26-35 years	41	50.0	50.0	84.1
36-45 years	7	8.5	8.5	92.7
above 46 years	6	7.3	7.3	100.0
Total	82	100.0	100.0	

Source: Research data (2017)

Based on Table 4.2, most of the respondents were aged between 26-35 (50%) and below 25 years (34.1%). The number of employees for Age 36-45 and age above 46 is 8.5% and 7.3% respectively this can be an indication that a majority of personnel working in the procurement department in Ethiopian airlines are concentrated in the age group of between 26-35 years. And employees under 25 age are the next in numbers. It can be an indication that EAL are currently embracing a relatively young age group as this age group seems to be well equipped with up-to-date knowledge with respect to the aspect of managing inventories, especially inventory management techniques associated with the latest technology in the market. However, given the fact that all age categories were represented in this study, the results of the study are considered to be significant for generalization purposes as individuals who were recently educated in the field of inventory management and those with a high level of experience were able to participate in the study.

4.2.3 Level of Education

Table 4.3: Level of Education

Respondents Educational background

	Frequency	Percent	Valid Percent	Cumulative Percent
certificate level	2	2.4	2.4	2.4
Diploma	16	19.5	19.5	22.0
Valid Degree	61	74.4	74.4	96.3
MA and above	3	3.7	3.7	100.0
Total	82	100.0	100.0	

Source: Research Data 2017

Table 4.3 indicates that a majority of the respondents have first Degree (74.4%) followed by college diploma and 3.4 % certificate level and 3.7% Master and above. Considering the fact those respondents with Degree represented 74.4% of the total respondents, it is apparent that a majority of the respondents were well educated and able to respond to the questionnaires without difficulties.

4.2.4 Work Experience

Table 4.4: Work Experience

Respondents Experience

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 3 years	43	52.4	52.4	52.4
3-6 years	16	19.5	19.5	72.0
Valid 7-9 years	4	4.9	4.9	76.8
More than 9 years	19	23.2	23.2	100.0
Total	82	100.0	100.0	

Source: Research data (2017)

As provided by Table 4.4, a majority of the respondents in the population had worked less than three years (52.4%). They were followed by those who have worked for a period of above nine years (23.2%). Those with working experience of three to six years (19.5%) while respondents who have worked for a period of between seven and nine years in company is 4.9 %. This leads to the conclusion that at least more than 52.4 % of the respondents had a working experience of one to three in the organization and it shows that they are less experienced , and 47.6 5 shows that most of the respondents had adequate knowledge regarding the inventory management practices practiced in the organization ; it is arguable that this level of knowledge enabled them to respond to the research questions in a more sufficient way. The graphical data regarding the working experience of the respondents is displayed in Figure 4.4

4.3 Effect of inventory management on Ethiopian airlines on time performance

This part of the research aimed at answering the first objective of the research. The first objective was to examine the effect of the inventory management practice on EAL on time performance.

The respondents were needed to state the degree (based on a scale of one to five) of the effect of inventory management on the organizational performance from various perspectives including , their overall view : Inventory management practice enables to meet on time performance , Flight dispatch reliability of the organization ,Maintenance shop productivity , aircraft ground time ,Additional cost incurred due to aircraft ground (AOG) situation ,and how good inventory planning can reduce the total aircraft material costs. The findings of the research in relation to research objective one are provided in Table 4.5 based on descriptive statistics.

Table 4.5; the effect of inventory management practice on EAL on time performance

Statistics

The effect of inventory management practice on EAL on time performance	N		M	Me	Mo	SD
	Valid	Missing				
Inventory management practice enables to meet on time performance	82	0	4.62	5.00	5	.696
Flight dispatch reliability of Ethiopian airlines is frequently affected by the unavailability of inventory (flights are delayed and cancelled)	82	0	4.22	4.00	5	.930
Maintenance shops (engine shop, components shops and repair shops) productivity is frequently affected by unavailability of the inventory	82	0	4.27	4.00	5	.876
Aircrafts are grounded due to unavailability of inventory in stock frequently (stock out effect)	82	0	3.89	4.00	5	1.122
Parts are procured on AOG basis and additional costs are incurred to protect the AOG situation / Critical situation and that is additional ordering costs to the Airlines	82	0	4.50	5.00	5	.633
Good inventory planning and control can reduce the total aircraft material cost of the airlines and it significantly affects the profitability of the airlines	82	0	4.38	5.00	5	1.026

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data 2017

With Respect to the research finding the respondents strongly agree that Inventory management practice enables to meet on time performance of the airline (M=4.62, SD=.694).The respondent agree that Flight dispatch reliability of Ethiopian airlines is frequently affected by the unavailability of inventory (flights are delayed and cancelled) (M =4.22, SD= .930).

Similarly the respondent agrees that Maintenance shops (engine shop, components shops and repair shops) productivity is frequently affected by unavailability of the inventory (M =4.27 , SD =.876) and the respondent also agree that Aircrafts are grounded due to unavailability of inventory in stock frequently (stock out effect) (M= 389 ,SD= 1.122) .The responded agrees on that Parts are procured on AOG basis and additional costs are incurred to protect the AOG situation / Critical situation and that is additional ordering costs to the Airlines (M= 4.38, SD= .633) , Lastly the respondents agrees that Good inventory planning and control can reduce the total aircraft material cost of the airlines and it significantly affects the profitability of the airlines (M=4.38, SD= 1.026)

4.3.1 Inventory management Practice in Ethiopian airlines

This section aims at meeting the second objective of the research study. In particular, this section aims at establishing the extent to which inventory management practices are implemented by Ethiopian Airlines. It is categorized to four major areas namely inventory management model used in the organization, lean inventory system ,inventory record accuracy and stock out and information technology usage

In the first phase the respondents were requested to state the extent to which they agreed to the inventory management model implementation in the organization testing provided in the questionnaire within a scale of one to five. The results in terms of descriptive statistics in relation to the extent in which diverse inventory management models are implemented among Ethiopian Airlines departments are shown in Table 4.6.

Table 4.6.1 Inventory management model used in Ethiopian airlines

Statistics

Inventory management model used	N		M	Me	Mo	SD
	Valid	Missing				
Ethiopian airlines uses ABC Model	82	0	3.95	4.00	4	.859
EAL uses EOQ Model	82	0	4.61	5.00	5	.698
EAL uses Vendor Managed Inventory (VMI)	82	0	2.34	2.50	3	.773
EAL uses Just in time Model	82	0	2.56	2.00	2	1.067
Ethiopian airlines uses Bar codes to manage its inventory and it helped the company to monitor the inventory	82	0	3.74	4.00	4	.966
Ethiopian Airlines uses simulation model	82	0	2.49	2.00	2	1.045

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data

Based on the result of Table 4.6 the respondent agreed that Ethiopian airline uses ABC inventory management model (M= 3.95, SD =.859) . The respondent also agree that economic order quantity (EOQ) model is used in the organization (M=4.61, SD =.698).On the other hand the respondent disagree that EAL uses Vendor Managed Inventory (VMI) model , simulation model and Just in time Model (M= 2.34 ,SD = .773) and (M=2.56, SD=1.067) (M=2.49 , SD =1.045) respectively. Lastly they are agreed that the Ethiopian airlines uses Bar codes to manage its inventory and it helped the company to monitor the inventory of the airline (M=3.74, SD= .966). Based this data the organization is using ABC model, EOQ model and Bar code system where as Vendor management inventory, just in time model, and simulation model are not used in the organization.

4.3.2 Lean Inventory system

Under the second research objective lean inventory system implementation was also tested to check whether the organization is familiar and using this method to stream line its inventory management system and the respondents were requested to indicate the level of their agreement to five questions on the questionnaire within a scale of one to five which are the indication to the implantation of lean inventory management practice.

Table 4.6.2 Lean inventory system

Statistics

	N		M	Me	Mo	SD
	Valid	Missing				
Lean inventory system						
There is minimal waste ,less overstock and under stock, very minimal surplus inventory and absolute inventory	82	0	2.41	2.00	2	1.054
Accurate and up-to- date stores records is an Inventory management practices and it is standardized practice of EAL	82	0	2.73	3.00	2	1.007
Operation of JIT purchasing system –where no safety stocks are kept is the practice	82	0	3.04	3.00	2	1.170
EAL stores is Providing inventory when requested by the user for effective demand management, EAL proactively plan its operations,	82	0	2.56	2.00	2	1.156
EAL has strategic agreement with suppliers to reduce its lead time, and inventory holding cost	82	0	3.51	4.00	4	1.209

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data

According to the above table the respondents disagreed that there is minimal waste, less overstock and under stock, very minimal surplus inventory and absolute inventory (M=2.41,SD =1.054).and the also disagreed that Accurate and up-to- date stores records is an Inventory management practices and it is standardized practice of EAL (M=2.73, SD1.007) and they are neutral to that Operation of JIT purchasing system –where no safety stocks are kept is the practice with (M=3.04, SD =1.170). in addition, they are disagreed with EAL stores is Providing inventory when requested by the user for effective demand management, EAL proactively plan its operations, (M=2.56,SD=1.156). Lastly they agreed that EAL has strategic agreement with suppliers to reduce its lead time, and inventory holding cost (M=3.51, SD=1.209)

4.3.3 Inventory record accuracy and stock out

Under the title inventory management practice inventory record accuracy and the stock out trend was tested. The respondents were requested four questions which have relation with inventory record accuracy and stock out were presented to the respondents.

These questions test out that if Stock parts system balance is same with the physical inventory and no operation interruption due to this effect is happened, Accurate and up-to- date stores records is an Inventory management practices and it is standardized practice of EAL, Inventory part number on the release certificate is same with the part number on the physically inventory and whether user performance is frequently affected due to stock out or not. Table 4.6.3 shows the details finding

Table 4.6.3 Inventory record accuracy and stock out

Statistics

Inventory record accuracy and stock out	N		M	Me	Mo	SD
	Valid	Missing				
Stock parts system balance is same with the physical inventory and no operation interruption due to this effect	82	0	2.38	2.00	2	.796
Accurate and up-to- date stores records is an Inventory management practices and it is standardized practice of EAL	82	0	2.70	2.00	2	.856
Inventory part number on the release certificate is same with the part number on the physically inventory	82	0	3.99	4	5	1.160
User performance is frequently affected due to stock out	82	0	4.50	5.00	5	.689

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data 2017

Table 4.6.3 revealed that the respondent were disagree that Stock parts system balance is same with the physical inventory and no operation interruption due to this effect (M=2.38, SD =.796) ,also disagreed that Accurate and up-to- date stores records is an Inventory management practices and it is standardized practice of EAL (M=2.7, SD=.856),and agreed that Inventory part number on the release certificate is same with the part number on the physically inventory (M=3.99,SD=1.160).On the other hand the respondent were requested if user performance is frequently affected due to stock out and strongly agreed that stock out is affecting the user section performance (M=4.5,SD=.689).

The results of this study are aligned with the research finding of Mugwe Eric Mwangi (2013) who found that stock record practice was not strictly adhered to, item movement documentation was not regularly conducted, stock record facilities were not available and staff skills were inadequate. Thus it was concluded that successful stock records system has a significant positive relationship with regulating the flow of items in such a way that the right quantity is available when required to meet operational needs, access information to assist in making future decisions. The result of the finding also aligned with research finding Lilian Tundura, Daniel Wanyoike (2016), which found that the study investigated the influence of Computerized Inventory Management System on Inventory Records Accuracy. From analysis, finding revealed that Computerized Inventory Management System has significant positive influence on Inventory Records Accuracy. From these findings, the study concluded that Computerized Inventory Management System is significant determinant of Inventory Records Accuracy.

4.3.4 Information technology usage (information sharing)

Similarly under inventory management practice used in the organization, information technology usage was tested, the results of the research study are provided in Table 4.6.4

Table 4.6.4 Information technology (information sharing)

Statistics

Information technology usage (information sharing)	N		M	Me	Mo	SD
	Valid	Missing				
EAL uses computer system to calculate EOQ, reorder level, and safety stock to determine when , and how many inventory to add to its system	82	0	1.91	2.00	2	.804
EAL uses Electronic Data interchangeable technology (EDI)	82	0	2.27	2.00	1	1.277
EAL computers are interlinked with user	82	0	2.15	2.00	2	1.198
EAL systems alerts inventory planners when inventory is issued and depleted to zero	82	0	4.13	4.00	4	.813

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data (2017)

Based on the research finding on table 4.6.4 the respondents strongly disagree that EAL uses computer system to calculate EOQ, reorder level, and safety stock to determine when , and how many inventory to add to its system (M=1.91,SD=0.804) , similarly the respondents are disagreed with EAL uses Electronic Data interchangeable technology (EDI) (M=2.27,SD=1.277) , similarly the respondent disagreed with the point that test EAL computers are interlinked with user (M=2.15, SD 1.198) . On the other hand they agreed that EAL systems alerts inventory planners when inventory is issued and depleted to zero (M=4.13, SD=.813)

The findings were supported by Fasanghari, Roudsari and Kamal, (2008) who said that for better inventory management, chain partners were required to share information among them. High levels of information sharing were enhanced by high levels of information technology and customer collaboration (Shore and Venkatachalam, 2003).the research find also aligned with the finding of Namagembe Sheila (2010) whose findings revealed that a significant positive relationship between information sharing and inventory management meant that if chain partners implement information technologies and collaborate among each other, then inventory management could improve.

4.4 The role of inventory control section in managing the inventory of the airline

This section aims at meeting the third objective of the research study. In particular, this section aims at evaluating the role of inventory planning and control section in managing the inventory of the organization The respondents were requested to state the extent to which they agree with parameters testing provided in the questionnaire within a scale of one to five. The results in terms of descriptive statistics in relation to the extent in which diverse inventory management practices are implemented among Ethiopian Airlines departments are shown in Table 4.7.

Statistics

The role of inventory control section in managing the inventory of the airline	N		M	Me	Mo	SD
	Valid	Missing				
The items received are indeed those ordered, when compared to the packing slips against the original purchase orders	82	0	4.61	5.00	5	.698
EAL has procedures for recording the movement of inventory	82	0	4.46	5.00	5	.878
Material planning section has the leading role in EAL inventory management	82	0	2.40	2.00	2	.967
Inventory are removed from the inventory system only when used/issued	82	0	2.28	2.00	3	1.034
Policy on cyclical and periodic counts, and follow up the results of those counts are in place and utilized correctly	82	0	2.32	2.00	1 ^a	1.099
All necessary adjustments to reflect changes (obsolete items, returns) is done before the fiscal year-end count	82	0	2.34	2.00	2	1.091
EAL has a procedure to handle customer support on inventory and same is charged properly to the	82	0	2.56	2.50	2	1.166
The organizational structure of the section allows to have a saying on the inventory discrepancy, reporting and adjustment	82	0	2.61	2.00	2	1.015

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data (2017)

Based on the research finding on Table 4. 7 the respondent strongly agreed that the items received are indeed those ordered, when compared to the packing slips against the original purchase orders (M= 4.61, SD= .698).The respondents were requested whether EAL has procedures for recording the movement of inventory and they agree that EAL has procedure to record the movement of inventory (M= 4.46 , SD= .878). The respondents were also requested to answer if Material planning section has the leading role in EAL inventory management systems and they dis agreed with this point (M= 2.4 , SD= .967).

The other point was to check if Inventory are removed from the inventory system only when used/issued or not and the respondents are disagreed to this appoint that inventory are removed from system when issued or used in operation (M 2.28, SD= 1.034) On the other hand respond was asked if the organization has Policy on cyclical and periodic counts, and follow up the results of those counts are in place and being utilized correctly and the responded were disagreed (M= 2.32, SD =1.099) .The respondents were also disagreed with a point that all necessary adjustments to reflect changes (obsolete items, returns) is done before the fiscal year-end count (M=2.34, S=D 1.091) The respondents were requested Whether EAL has a procedure to handle customer support on inventory and same is charged properly to the customer’s account in a good time and disagreed with this point by (M= 2.56, SD= . 1.166), Finally under this title the respondents were asked if the organizational structure of the section allows to have a saying on the inventory discrepancy, reporting and adjustment and answered they disagree with this point (M= 2.61 ,SD =1.015)

4.5 The challenges in implementing inventory management practice in EAL

This section of the study was designed to examine the challenges of applying inventory management practice in the organization and designed to meet the fourth research objectives. The respondents were requested to state the extent to which they agree with parameters testing provided in the questionnaire within a scale of one to five. The results in terms of descriptive statistics in relation to the extent in the listed items are hindrance to inventory management practices in Ethiopian airlines and it is shown in Table 4.6

Table 4.8 The challenges in implementing inventory management practice in EAL

Statistics

The challenges in implementing inventory management practice in EAL	N		M	Me	M o	SD
	Valid	Mis sing				
Demand uncertainty is the challenge in EAL inventory management practice	82	0	4.57	5.00	5	.770
Inefficient internal process is the hindrance to inventory management practice in EAL	82	0	4.15	5.00	5	1.124
Lack of awareness on the benefits of inventory management is the challenge	82	0	4.12	5.00	5	1.190

Lack of good infrastructure like IT equipment are the challenge	82	0	2.56	2.00	2	.995
Lack of Management support on inventory management is the challenge	82	0	2.21	2.00	3	.828

Input: M- Mean; Me-Median, Mo-Mode, SD-Standard deviation

Source: Research Data (2017)

Based on the study carried out the respondents are strongly agreed Demand uncertainty is the challenge in EAL inventory management practice (M=4.57, SD =0.770) and agreed that Inefficient internal process is the hindrance to inventory management practice in EAL (M=4.15,SD=1.124) similarly they agreed on Lack of awareness on benefits of inventory management practice is the challenge in the organization (M= 4.12, SD= .1.19) and this result is supported by demographic data that revealed that about 52.4 % of the employees have worked in the organization for less than three years. On the other hand the respondents was requested if Lack of good infrastructure like IT equipment are the challenge to implement inventory management practice in the organization and they disagreed to this question (M= 2.65 , SD= .995). The respondents were also asked if there is lack of Management support on inventory management in the organization and they dis agreed to this question (M =42.21, SD= .828) .

4.6 The Statistical Relationship between Inventory Management Practices and Operational Performance

A regression analysis was used to find out the statistical relationship between inventory management practices and operational performance. The regression analysis, as provided by Cooper and Schindler (2006), is a technique for establishing the statistical relationship between the independent and dependent variables. This relationship is established by the model, $OP = 0 + 1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5 + 6X_6 + \dots$, which shows the relationship between dependent variable (organizational operational performance) and independent variables (inventory management practices), Inventory accuracy , lean inventory system, information technology (information sharing and stock out . This research study embraced / to assess the relationship existing between the independent variables and dependent variable.

Table 4.7

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.743 ^a	.552	.523	.685

a. Predictors: (Constant), information technology (information sharing) , Effective Inventory management Model , Stock out , Inventory record Accuracy , Lean inventory system

b. Dependent Variable: Organizational performance

Source: Research data (2017)

The adjusted R square, which is the coefficient of determination, shows the degree of variation of the dependent variables as a result of change in the predictable variable. The coefficient of determination is a measure used in statistical analysis that examines how well a model explains and predicts the future outcomes or the accuracy of the model. Based on the results of Table 4.8, of Adjusted R Square of 0.523, at least 52.3% of the variation in operational performance is explained by the model. In other words, 52.3% change in operational performance of Ethiopian airline is attributable to Effectiveness in inventory management model , information technology (information sharing) , stock out , inventory record accuracy and lean inventory system.

R stands for correlation coefficient indicates the relationship between the independent and dependent variables. Based on the results of Table 4.8, there is a strong and positive relationship between operational performance and inventory management practices as illustrated by a correlation coefficient of 0.743.

Based on the results of this study, there are 47.7% of other factors that impact operational performance, and such factors should be established by the future researches.

Table 4.8 Results for ANOVA with Operational Performance as Dependent Variable

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.

1	Regression	43.932	5	8.786	18.742	.000 ^b
	Residual	35.629	76	.469		
	Total	79.561	81			

a. Dependent Variable: Organizational performance

b. Predictors: (Constant), information technology (information sharing) , Effective Inventory management Model , Stock out , Inventory record Accuracy , Lean inventory system

Source: Research data (2017)

Based on Table 4.9, the ANOVA test shows that the regression model has a significant impact on operational performance since the p-value (0.000) is less than 0.05 ($0.000 < 0.05$). This shows that the regression model is statistically significant. Since, the regression model, which explains the relationship between the operational performance (dependent variable) and the inventory management practices, (independent variables), is statistically significant, the research study accepts the alternative hypotheses and rejects the null hypotheses.

Table 4.9 Coefficients of Regression Model with Operational Performance as Dependent Variable

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.860	.388		15.111	.000
	Effective Inventory management Model	.071	.060	.095	1.194	.021
	Inventory record Accuracy	.258	.111	-.265	-2.318	.023
	Lean inventory system	.215	.161	.207	1.341	.184
	Stock out management	.382	.120	.397	3.186	.002

information technology (information sharing)	.858	.134	-.836	-6.383	.000
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Dependent Variable: Organizational performance

Source: Research data (2017)

Based on the results of Table 4.10, The relationship between Effective inventory management model and operational performance is statistically significant having been measured at a p-value of 0.021, which is less than 0.05. The relationship between inventory record accuracy and operational performance is statistically significant since p-value is $0.023 < 0.05$. On the other hand, the relationship between Stock out management and operational performance is statistically significant at p-value of $0.002 < 0.05$. The relationship information technology (information sharing) and operational performance is statistically significant since the p-value is lower than the significance level of .5%, $p (0.000 < 0.05)$.

The findings of this research is aligned with research finding of DERRICK MWENDA KINYUA (2014) who find out that inventory management practices impact significantly the operational performances of consumer goods manufacturing companies in Kenya. The implementation of an effective inventory management leads to many benefits in firm, including ensuring optimal production, meeting the assembly targets and on-time delivery, which are all associated with operational efficiency. While there are different inventory management practices, the findings of this research study establish that consumer goods manufacturing companies are more likely to benefit from Economic Order Quantity model, Vendor Managed Inventory and Bar-coding.

The finding is similar with the research finding of Agu Okoro Agu`,(2016) The findings indicated that inventory control significantly affects productivity of selected manufacturing firms ($r = 0.849$; $t = 27.726$; $F = 768.754$; $p < 0.05$) .There is a positive relationship between demand management and customer satisfaction of selected manufacturing firms ($r = .799$, $P < .05$).Just – in – time has a significant effects on growth of the selected manufacturing firms ($r = .885$; $t = 32.865$; $F = 1080.094$; $p < 0.05$).The study concluded that inventory management is very essential in the operation of Ethiopian airlines .

4.7 Reliability

According to Mohsen Tavakol and Reg Dennick (2011) Cronbach’s alpha of less than 0.5 is unacceptable

, less than or equal to 0.6 is poor , less than 0.7 is questionable , less than 0.8 and greater than or equal to 0.7 is acceptable , less than 0.9 and greater than or equal to 0.8 is good and finally greater than or equal to 0.9 is excellent. Accordingly, the pretest made for eight sample questioner was found that of 0.756 which is acceptable range.

Case Processing Summary

		N	%
Cases	Valid	8	100.0
	Excluded ^a	0	.0
	Total	8	100.0

a. Listwise deletion based on all variables in the procedure.

Source: Research data (2017)

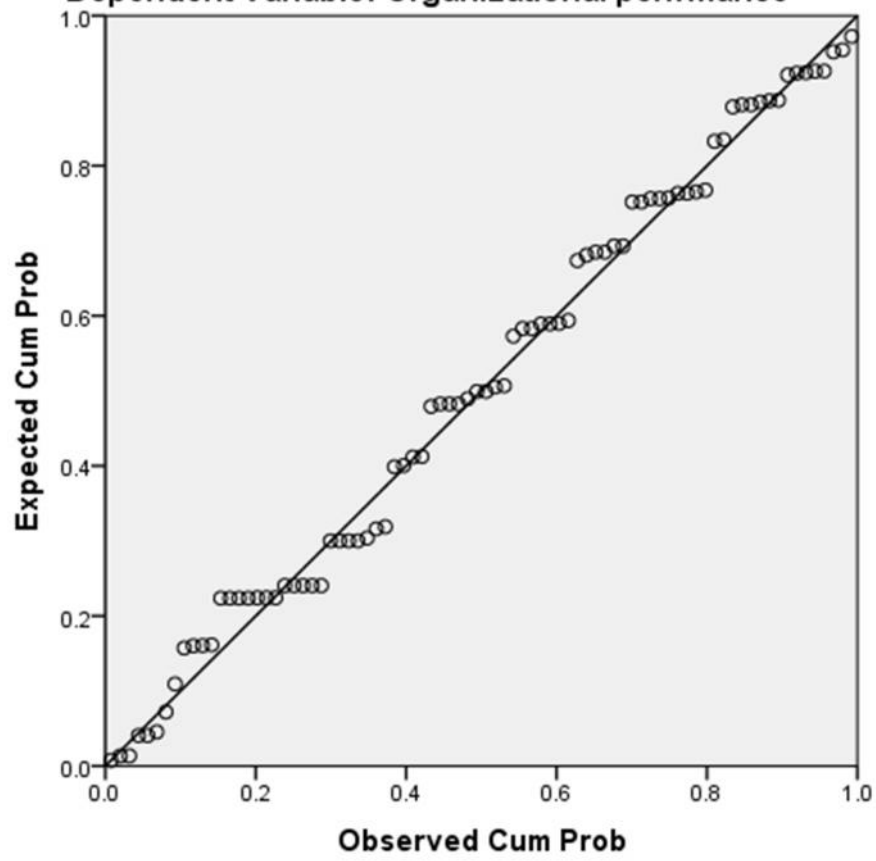
Reliability Statistics

Cronbach's Alpha	N of Items
.756	38

Source: Research data (2017)

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: Organizational performance



Source: Research data (2017)

APTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter presents the summary of the study findings, conclusions and recommendations drawn from the study findings based on the research objectives.

5.1 Summary of the Research Results

The research study found out that on time performance, flight dispatch reliability and shop productivity is affected by the inventory management Practice, Aircrafts are grounded due to unavailability of inventory and additional costs are incurred to recover from the AOG situations. In addition to this the finding from the secondary data revealed that the on time performance of Ethiopian airlines is not improving from year to year 76.76%,76.47% and 74.62% for years 2013/2014,2014/2015 and 2015/2016 budget years respectively (Global air lines arrival performance)

Based on the Findings of the research on inventory management model , Ethiopian airlines uses ABC inventory management model, Economic order Quantity model and Bar coding systems to manage its inventory , however Vendor management inventory, just in time model, and simulation model are not used in the organization.

As per the research finding on lean inventory system, the organization has wastage of inventory through its internal process, over stocks and under stocks are the practice on inventory management, and inventory records are not accurate and up to date .JIT inventory practice is not used and the organization have strategic agreement with suppliers to reduce its lead time, and inventory holding cost which is a vendor managed inventory concept

According to the research finding, Ethiopian Airlines inventory system balance and physical part availability is not the same, this affects the on time performance and maintenance shops productivity. In addition, stock out is also observed and operation interruption due to stock out is the case in inventory management and additional costs are incurred due to this effect

Based the research finding EAL system alerts the material planner when inventory is depleted to reorder level and this the best practice to be shared. On the contrary while determining the EOQ , reorder level and safety stock the material planners do not have system support they rather calculate it manually and it all depended on the skill of the material planner. In addition, EAL are not using EDI and EAL computers are interlinked with the user section but the discipline to feed all relevant data to the computer is not in place. As a result there is a huge communication gap among Inventory control, procurement and the user section.

The research finding shows that the section has positive contribution to the inventory management of the airline but the role of material planning officers are not respected, they are not leading the planning of inventory. Inventories are removed from inventory record without issued/ used, yearly inventory count is done but the inventory adjustment is not handled this is hindrance to the record accuracy of inventory , EAL supports third part airline by providing them its own inventory however charging for the number of items issued to them is not done on time or properly , Furthermore the section is not strong enough to have a saying on the inventory discrepancies of the organization except just reporting due to its organization structure , the procurement director control both the purchasing managers and manager inventory controls so ,both managers works for same Director and the check and balance is not functional. As a result of this the organization on time performance is affected and the cost control function is not functional.

The last objectives of the research were to find out the challenges in implementing inventory management practice in EAL. The research finding revealed that the organization has good infrastructure, IT technology and have support from the management. However, Demand uncertainty, Inefficient internal process and Lack of awareness are the challenges in implementing the inventory management practice in EAL.as a result of this Inventory is not well managed in way that it improves the operational performance of the organization.

5.2 Conclusion

The study concludes that that inventory management is a process that is continuous in the organization and therefore there is always need for managing inventory throughout using a certain technique good inventory management can lead to good performance in an organization.

With respect to the findings of the research study, it is conclusive that inventory management practices impact significantly the operational performances of Ethiopian Airlines. The implementation of an effective

inventory management leads to many benefits in the organization including ensuring on time performance, meeting the production targets maintenance shop productivity which is associated with operational efficiency. While there are different inventory management practices, the findings of this research study establish that Ethiopian Airlines likely to benefit from Economic Order Quantity model, Vendor Managed Inventory and Bar-coding inventory models. And information technology (information sharing) will help to have accurate and up to date inventory record across the organization, which has direct relationship with the operational performance of the organization.

In addition, Disciple to use the available information technology will enhance the operational performance of the airline specifically the on time performance and assembly target . Furthermore, Engaging the Inventory control and planning section, enabling them to have the control function through proper organizational structure will help to manage the inventory of the airline very well.

5.3 Recommendation

From the finding originating from this study, the followings are researcher recommendations that Ethiopian Airlines has to adhere in order to maximize the benefits of inventory management practices .

- EAL should use inventory management practice as they contribute a lot to the operational performance of the organization. This is because an effective inventory management has an overall impact on enhancing operational performance of the airline including the maintenance shop productivity.
- Among the Inventory management practice used in EAL EOQ is the one but it needs to be more systemized and supported by computers instead of calculating them manually by the material planners.
- Vendor Managed Inventory should be adopted by EAL to be more effective in the management of inventories especially to reduce cost of holding inventory, to reduce the last time rush logistics cost and to improve the on time performance of the airline.
- The research study highly recommend to improve the inventory record accuracy by using system based inventory management practices and engage all its staff to use the current available system properly.
- To improve the stock out , EAL should work to fully use system based inventory management practice (Bare code system)
- Inventory control section should be restructured so that the section can help the organization to control its

inventory and do all adjustment on time with all professional manner, physical count and adjustment has to be done on time and the inventory planning should be done solely by inventory planning without having influenced from any other section.

- The research recommends that staff skills should be developed continually since the current employees of the airline is young professional with less experiences, continuous training and coaching program has to be developed and made standardized and implemented.
- EAL has to work to improve internal process inefficiencies in managing the inventory especially should adopt modern technological systems in the managements of inventories.
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5.4 Suggestion for Further Studies

This study is mainly focused on Inventory management practice, Inventory control and the challenges of implementing the inventory management practice in organization operational performance. From the research findings, it was noted that there are other aspects affecting organization operational performance and this study can be improved by considering other factors.

Future researchers can investigate on other variables that affecting organization operational performances like uncertain demand management, Inventory turnover and cost reduction.

Also, this research should be tested replicating in other airlines and the results can be compared so as to establish whether there is consistency among the airlines on the effect of inventory management on organization operational performance. Then new comparisons can be generated in the future. In this manner, new concepts can be generated by analyzing the different airlines and this also provides a big picture for the subject to observe similarities and diversities on the implications. This is because different airlines have different practices in inventory management.

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