



**FACTORS AFFECTING MATERIALS MANAGEMENT: A SURVEY OF SMALL AND MEDIUM-SIZED  
MANUFACTURING FIRMS IN INDUSTRIAL AREA NAIROBI, KENYA**

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**ABSTRACT**

Materials Management is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources. This study sought to determine factors affecting materials management in manufacturing firms in Nairobi, Kenya. The study was guided by the following objective: to analyze the effect of inventory control and information communication technology; on materials management in small and medium-sized manufacturing firms. The research involved a cross-sectional survey of small and medium manufacturing firms in Nairobi. The study adopted descriptive research design to determine factors affecting materials management. A sample size of 46 respondents was selected from a list of 455 manufacturing firms. The data was collected from the respondents (material managers) through a questionnaire which was self-administered and analyzed using SPSS. The data was then presented in form of tables and charts. Regression model was used to show the relationship between independent and dependent variables. The study found that good inventory control is important in materials management because it reduces stock levels and hence increases profitability. Also ICT helps firms in planning, controlling and processing of materials. The study recommends that firms should embrace good inventory control systems in order to minimize cost associated with materials management and maximize profit through employing effective and efficient methods of controlling materials management. Also, firms should employ qualified staffs who are competent and skilled to help firms to achieve its goals in materials management. Manufacturing firms should adopt new information and technology for planning, controlling and processing of materials management.

**Key Words:** *Materials Management*

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## INTRODUCTION

Material management is a concept which brings together under one management responsibility for determining the manufacturing requirement, scheduling the manufacturing processes and procuring, storing and dispensing materials. As such it is concerned with and controls all activities involved in the acquisition and use of all materials employed in the production of finished goods (Wild, 1995; Ondiek & Odera, 2012). Thus, Materials Requirements Planning (MRP), purchasing, procurement of materials, inventory management, storage, materials supply, transportation and materials handling are the activities of Materials Management. Materials Management came to limelight at the advent of liberalization and globalization which posed intense competition on the business environment. Before that time, the concept was treated as a Cost Centre since Purchasing Department was spending money on materials while Store was holding huge inventory of materials, blocking money and space (Ramakrishna, 2005; Taiwo *et al.*, 2012).

An integrated approach to materials management defines it as “the functions responsible for the coordination of planning, sourcing, purchasing, moving, storing and controlling materials in an optimum manner so as to provide a predetermined service to the customer at a minimum cost” (Ramakrishna, 2005; Gopalakrishnan & Sundaresan, 2006). International Federation of Purchasing and Materials Management (IFPMM) defined it as a total concept having its definite organization to plan and control all types of materials, its supply, and its flow from raw stage to finished stage so as to deliver the product to customer as per his requirements in time. These definitions provide the scope of materials management which includes Materials Requirements Planning (MRP), decision on purchasing, procurement of materials, inventory management, staffing, stores and

warehouse management, production, and distribution of finished goods at minimum cost at due time (Osotimehin, 2006; Monday, 2008; Ogbadu, 2009; Inyang *et al.*, 2013).

### Statement of the problem

Materials Management is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources. The basic objective of Materials Management as explained Banjoko (2000): Jacobs *et al.*, (2009), is to ensure that the right item is bought and made available to the manufacturing operations at the right time, at the right place and at the lowest possible cost. Majority of the companies attain significant savings from effective materials management, which amounts between 50%-60% of total costs (Song *et al.*, 2006). Effective management of materials can lead to a reduction in cost, resulting in a significant saving. A potential 6% saving on total cost through effective material management is achievable (Keitany *et al.*, 2014).

However, in recent times manufacturing firms in Kenya has suffered from inefficient and imprudent management of resources and product scarcity, which has resulted in invaluable economic and social losses to the society. On the surface, this scarcity has been attributed to shutdowns and break-down of manufacturing firms. This is due to lack of smooth maintenance activities in the plant, which is brought about by the unavailability to replacement of parts, which should have been provided by the materials management department (Ondiek & Odera, 2012: Keitany *et al.*, 2014). Sindani (2011) also asserts that in Kenya many public organizations have not put in place systems to undertake lean and efficient materials management tasks. This has led to 50 percent of the company’s working capital held-up in materials stock, while 15-20 percent worth of

materials has been rejected due to quality concerns.

Ondiek, (2009); Ondiek & Odera (2012) in their studies "Assessment of material management in the Kenyan manufacturing firms" the research revealed that not much attention was given to materials management as only about 23 percent of the firms had in charge of materials reporting directly to the chief executive officer. The studies recommend that a lot of emphasize need to be directed towards material management and should be recognized as a top management function. The study proposes that inventory control, information technology, coordination, vendor relationships, training in material management and professionalism as factors promoting management of materials and suggested further study to be conducted on these factors to ascertain the findings. Hence, this study is aimed at addressing factors affecting materials management in small and medium manufacturing firms in industrial area Nairobi manufacturing firms in Kenya.

### **Objective of the Study**

The purpose of this study was to analyze factors affecting materials management in small and medium manufacturing firms in industrial area Nairobi, Kenya. The specific objectives were: To analyze the effect of inventory control and information communication technology on materials management in small and medium-sized manufacturing firms in industrial area Nairobi, Kenya.

### **Research Questions**

- i. What is the effect of inventory control on materials management in small and medium-sized manufacturing firms?
- ii. What is the effect of information communication technology on materials management in small and medium-sized manufacturing firms?

### **Scope of the Study**

The study focused on 46 small and medium-sized manufacturing firms in industrial area Nairobi which are registered members of KAM 2014 directory, and distributed across the 12 key industrial subsectors of the manufacturing sector in Kenya as indicated in the KAM directory.

## **LITERATURE REVIEW**

### **Theoretical Framework**

Cooper and Schindler (2008) view a theory as a set of systematic interrelated concepts, definitions, and propositions that are advanced to explain and predict phenomena (facts). In this section, theories of materials management are discussed.

#### **a) Resource-Based View**

The resource-based view (RBV), also referred to by some researchers as the resource based theory (RBT) of the firm (Barney 1991, 1996; Conner 1991; Kogut and Zander 1992; Barratt and Oke 2007), was originally developed as a complement to the industrial organization (IO) view established by the works of Bain (1968) and Porter (1979, 1985). Focusing on the structure-conduct-performance paradigm, the IO researchers searched for determinants of firm performance outside the firm, specifically in its industry structure. In contrast, the RBV explicitly looks for the internal sources of sustainable competitive advantage (SCA) and aims to explain why firms in the same industry might differ in terms of performance (Kraaijenbrink *et al.* 2010).

In his original work Barney (1991) argued that sustained competitive advantage could be derived from the resources and capabilities the firm controls. These resources have been characterized as rare, valuable, not substitutable, and difficult to imitate. In addition, such resources and

capabilities can be viewed as bundles of tangible and intangible assets that include a firm's management skills, its organizational processes and routines, and the information and knowledge it controls (Barney *et al.* 2001). This theory is useful to this study because qualified staff that is competent and skilled will help the organization to achieve its goals and objectives by being efficient and effective when carrying out their various functions. Professionalism is considered very important for efficient materials management (Ondiek, 2009; Oniwon, 2011). Also, Material manager needs information technology in order to succeed in his work. Computers can assist stock control in calculating the optimum amount of stocks to hold and dispatch in order to satisfy the users requirements.

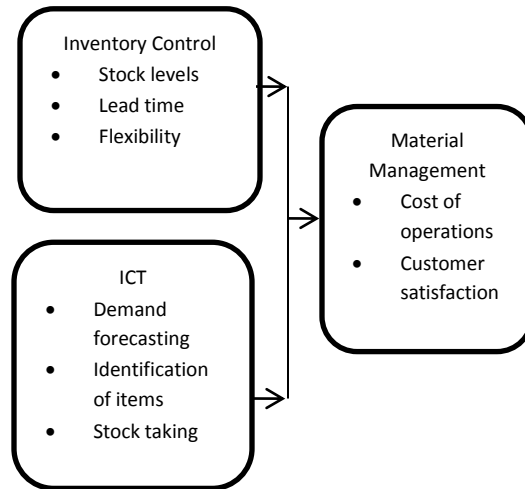
**b) Resource Dependence Theory**

Resource dependence theory (RDT) presents inter-firm governance as a strategic response to conditions of uncertainty and dependence between exchange partners (Pfeffer & Salanchik 1978; Heide, 1994), building on social exchange theoretical perspective (Emerson 1962; Thibaut & Kelly 1959), RDT focuses on how some firms become reliant on others for needed resources such as goods and materials, and how firms can effectively manage such relationships (Pfeffer & Salanchik 1978). The asymmetric interdependence that is present in such relationships is often considered critical for reduction of environmental uncertainty (Ketchen & Hult 2007). In the materials management context, organizations should ensure that there is an adequate material for continued production of goods and services to stock outs. Therefore, firms, suppliers and consumers are becoming increasingly dependent on each other, thus, RBT offers a strong explanatory power in this context.

Several authors discuss implications of this theory for key aspects of materials management (Crook and Combs 2007; Ireland and Webb 2007). In summary, RDT complements the RBV in that it

views the organization as seeking to exploit and recombine unique and inimitable resources that may be outside the realm of the organization and where strategic orientation towards the relationships could lead to the appropriation of these resources (Fynes *et al.* 2004).

**Conceptual Framework**



Independent variables      Dependent variable

**Figure 1: Conceptual framework**

**a) Inventory Control and Material Management**

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 & 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; Lwika *et al* 2013).

Inventory management is the art and science of maintaining stock levels of a given group of items incurring the least cost consistent with other relevant targets and objectives set by management (Jessop, 1999). It is important that

managers organizations that deals with inventory, to have in mind, the objective of satisfying customer needs and keeping inventory costs at a minimum level. Drury (2004) asserts that inventory costs include holding costs, ordering costs and shortage costs. Holding costs relate to costs of having physical items in stock. These include insurance, obsolescence and opportunity costs associated with having funds which could be elsewhere but are tied up in inventory.

Lysons and Farrington (2006) posits that inventory control enhance profitability by reducing costs associated with storage and handling of materials. Inventory control is means by which materials of the right quality and quantity are made available as when required with due regards to the economy of shortages, ordering cost, purchase price and working capital. Ordering costs are costs of placing an order and receiving inventory. These include determining how much is needed, preparing invoices, transport costs and the cost of inspecting goods. Shortage costs result when demand exceeds the supply of inventory on hand. The costs include opportunity costs of making a sale, loss of customer goodwill, late charges and similar costs.

Inventory management is primarily about specifying the size and placement of stocked goods. Inventory management is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials or goods. The scope of inventory management also concerns the fine lines between replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space for inventory, quality management, replenishment, returns and defective goods and demand

forecasting. Balancing these competing requirements leads to optimal inventory levels, which is an on-going process as the business needs shift and react to the wider environment (Ghosh & Kumar, 2003).

Rosenblatt (1977) says: "The cost of maintaining inventory is included in the final price paid by the customer. Goods in inventory represent a cost to their owner; the manufacturer has the expense of materials and labour. The wholesaler also has funds tied up." Therefore, the basic goal of the manufacturers is to maintain a level of inventory that will provide optimum stock at lowest cost. Morris (1995) stressed that inventory management in its broadest perspective is to keep the most economical amount of one kind of asset in order to facilitate an increase in the total value of all assets of the organization human and material resources. Ogbo (2011); Ogbo *et al.*, (2014) posits that the major objective of inventory management and control is to inform managers how much of a good to re-order, when to reorder the good, how frequently orders should be placed and what the appropriate safety stock is, for minimizing stock-outs. Thus, the overall goal on inventory is to have what is needed, and to minimize the number of times one is out of stock.

Inventory control determines the extent of stock holding of materials. It equally makes it possible for material manager to carryout accurate and efficient operation of the manufacturing organization through decoupling of individual segment of the total operation and it entails the process of assessing of stock into the storehouse and the issue stock.

Materials control has to do with standard control on the ordering size, ordering time, and the quantities of raw materials left in the store at a time, for profitability and cost reduction, manager must therefore, maintain an optimum level of stock at all time. Too much stock and too little

stock must be avoided. According to Buffa & Salim (1987); Lysons, (2006) there are several reasons for keeping inventory. These include protection against variations in demand, maintaining smooth flow of production by providing a decoupling function between stages of production and lowering total material cost by taking advantage of quantity discounts. On the other hand, shortage of material can lead to interruption of products for sales; customer relations are hurt, while machine and equipment becomes underutilized. Therefore, a company can only realize substantial savings by using a rational procedure for inventory control.

### **b) Information Communication & Technology and Material Management**

Materials managers needs direct access to the organization's information system to properly administer materials flow into and within the organization. The type of information required include demand forecasts for production, names of suppliers and supplier characteristics, pricing data, inventory levels, production schedules, transportation routing and scheduling data, and other financial and marketing facts (Lambert *et al.*; 2008). Thus, modern information technology will offer opportunities for the fast and safe transmission and processing of extensive amounts of data, both internally for users within the company and externally for suppliers and customers. Paperless communication is coming to the forefront whereby routine tasks in order processing and scheduling will be decisively facilitated. As result, new information technology offers greater opportunities for linking the planning, controlling and processing functions of material management.

Carter and Price (1995) assert that information is the life blood of all organizations. Material manager needs information technology in order to succeed in his work. Computers can assist stock control in calculating the optimum amount of

stocks to hold and dispatch in order to satisfy the users requirements. The computer can do this by comparing inventory variables (stock levels, demand and delivery dates).The Electronic Data interchange (EDI) is a system which enables direct communication between organizations without there being any human intervention. This technology has revolutionized inventory management.

The Electronic Data interchange (EDI) is the name given to the transmission and receipt of structured data by the computer systems of trading partners, often without human intervention. The international Data interchange association defines EDI as "the transfer of structured data, by agreed message standards from one computer system to another, by electronic means (Jessop, 1999: Quesada, *et al* 2012). With the EDI system linking the buying organization with its suppliers the replenishment can be triggered at the instant the need arises and the message is transferred from the original destination without further possibility of corruption en route. An EDI link also enables the computers of suppliers and customers to interrogate each other about stock levels, production plans and similar information so that activities are appropriately synchronized. This brings potential benefits in form of reduced paper work, greater accuracy of information, reduced staff costs and shorter lead times arising from instantaneous communication.

Electronic point of sale (EPOS) is another technology used in material management. The purpose of EPOS is to scan and capture information relating to goods sold. An EPOS system verifies checks and provides instant sales reports, charges transactions and sends out intra- and inter- stores messages. The EPOS technology allows substantial cost savings and gives "real time" information on sale of goods patterns of stores traffic, and popularity and profitability of

every line carried. It enables stock to be limited to demand, reduces the risk of obsolescence and deterioration of stocks, reduced chances of theft and provides information to buyers. This leads to improved customer service and hence improved financial performance (Lysons, 2006)

Bar coding is a technology that is employed in counting raw materials and finished goods inventory. It gives the level of inventories, facilities faster data entry with greater accuracy. Its benefits include reduced labour costs through time saving and productivity. It also enables greater responsiveness to customers and supplies.

Material management planning tools are intended to integrate the resource planning activities in a firm or organization. Some of the most common planning tools are: material requirement planning (MRP), manufacturing resources planning (MRP II), and Enterprise Resource Planning (ERP). A MRP is a tool that allows an organization to schedule production activities to meet specific deadlines based on the bill of materials, inventory levels, and master production schedule. An improvement of MRP tools is MRP II which integrates manufacturing capabilities and capacities with the benefits of MRP. An ERP tool allows the organization to integrate all processing information tasks related to all processes in the value chain. This is usually a single system that might include order management, inventory fulfillment, production planning, financial planning, and customer service in a company. It is the backbone of the logistic systems for a variety of firms (Bowersox *et al.*, 2007).

### **c) Material Management**

Banjoko (2004) describes materials management as a set of integrated functions whose focus is the effective coordination of activities relating to the planning, requisitioning, storage of input, materials and work-in-progress, their conversion

until they are delivered to the consumers. Also Fearon (2001) opined that material management is an integrated organizational arrangement establishing a single manager with authority and responsibility for policies and actions related determining the amount of material requirements, acquiring needed materials, verifying, storing and issuing materials, maintaining inventory records, scheduling materials and disposing of materials which are in excess to the organization.

Zenz (2003) defines materials management as a concept which brings together under one management the responsibility for determining the manufacturing requirement, scheduling the manufacturing process and procuring, storing and dispensing materials. As that, it is concerned with the control activities involved in the acquisition and use of material employed in the production of the finished project.

Ondiek, (2009) postulates that materials management provides an integrated system approach to the coordination of materials activities and the total material costs. They view it as something that advocates assigning to a single operating department all major activities, which contribute to the cost of materials. The objective is to optimize performance of materials systems, as opposed to sub-optimizing the performance of individual operating units that are part of the material system. Chase *et al.* (2009) contend that the objective of materials management is to ensure that the right item is at the right place, at the right time and at a reasonable cost. The intention of having materials management system in place is for solving materials problems from a total company view point (optimize) by coordinating performance of the various materials flow. Fearon *et al.* (1989) suggested that the introduction of computers was a great boost to the adoption of materials management, as materials function has many common databases.



Waters (2006); Ondiek, (2009) observed that the traditional approaches to materials management uses planned operations where managers design a detailed schedule for each distinct activity within the chain. By coordinating these schedules, managers control the flow of materials. The problem with the traditional approach is that it is based on a paper system and even when firms move to automation, they often automate the same procedures. This has fundamental weaknesses of taking too long, being expensive, relying on paperwork, and physically moving paperwork between locations, having many people doing the administration, being unreliable, introducing errors, having more people supervising and controlling administration. These problems can be overcome when firms move electronic purchasing and hence adopting materials management approach.

Finally, Ammer (2004) posit his chronological view of material management as a line of responsibility, which begins with the selection of suppliers and ends when the materials are delivered to their point of use. The above concept of material management have common objectives, the material organization which is most appropriate for one company may not be the best form for another company.

The basis of material management is centered on the management of the flow of materials from the supply market into the company. Wamuo (1996) defined it as the concept concerned with the management of the flow of material into an organization to the point where those materials are converted into company's out product.

However, it is a general belief that the responsibilities of the material manager should include collaboration with designers on materials component specification, purchasing the right materials which search to aid location of variable economic source of supply, incoming traffic,

receiving and inspection, supplier quality control, inventory control and material control. According to Ericsson (1975) the philosophical argument for adopting materials management envisages an organization as a service of elements. This idea sees materials management as an instrument that promotes the economic management for profit making. Therefore it means that, all departments can effectively work together as a system towards achieving a commonly stated corporate goal. It indicates that problems' caused by attempting to optimize at the element level rather than on respect of the enterprises as a whole implying that problem in organization occur in elements rather than on whole. Another school of thought has it that material administration; physical distribution management and material management are one and are defined as a process that-involves the total flow of materials from the suppliers to the customers for an end use. The wider system approach aims at achieving a successful application of the modern principle of materials management in organizations.

Materials Management is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources. The basic objective of Materials Management as explained by Banjoko (2000) and Jacobs *et al.* (2009) is to ensure that the right item is bought and made available to the manufacturing operations at the right time, at the right place and at the lowest possible cost. They stressed that without adequate planning for materials resources, the overall performance of an organization may be crippled. Barker(1989) articulated that improvement in continuity of supplies with reduced lead times, reduction in inventories with reduced obsolescence and surplus, improvement in cooperation and communications with reduced duplication of effort, reduction in material costs, improvement in quality control, improvement in

status control, and quicker identification of problems are the main benefits of Materials Management in organizations.

### **Empirical Literature Review and Critique**

Dobler & Burt (1996); Ondiek, (2009) postulates that materials management provides an integrated system approach to the coordination of materials activities and the total material costs. They view it as something that advocates assigning to a single operating department all major activities, which contribute to the cost of materials. The objective was to optimize performance of materials systems, as opposed to sub-optimizing the performance of individual operating units that are part of the material system. Waters (2006); Ondiek, (2009) observed that the traditional approaches to materials management uses planned operations where managers design a detailed schedule for each distinct activity within the chain. By coordinating these schedules, managers control the flow of materials. The problem with the traditional approach is that it is based on a paper system and even when firms move to automation, they often automate the same procedures. These studies have not linked information technology with material management and how information technology affects material management.

Chase *et al.* (2009) contend that the objective of materials management is to ensure that the right item is at the right place, at the right time and at a reasonable cost. The intention of having materials management system in place is for solving materials problems from a total company view point (optimize) by coordinating performance of the various materials flow. Fearon *et al.* (1989) suggested that the introduction of computers was a great boost to the adoption of materials management, as materials function has many common databases. Fearon (2001) opined that material management is an integrated

organizational arrangement establishing a single manager with authority and responsibility for policies and actions related determining the amount of material requirements acquiring needed materials, verifying, storing and issuing materials, maintaining inventory records, scheduling materials into use and disposing of materials which excess to the organization.

Taiwo *et al.*, (2012); Ogbadu, (2009) asserted that through efficient management of materials, an organization can achieve significant cost saving, improvement in production efficiency, and increase in profitability. Among the factors that positively influence Materials Management, effective inventory management, interdepartmental coordination, staff training, good relationship with vendors, R&D in Materials Management, state-of-the-art facilities/ICT and Professionalism were found to be the key factors. These studies have only mentioned these factors that affect material management but the studies have not discussed on how these factors affects material management.

### **Research Gaps**

From the afore going literature review shows that several comprehensive studies have been conducted in the world regarding material management. Taiwo *et al.*, (2012) in their study of “material management: An effective tool for optimizing profitability in the Nigerian food and Beverages manufacturing industry” it was found that there was significant increase in the company’s profitability as a result of efficient material management.

Ondiek, (2009) in his study of “Assessment of material management in the Kenyan manufacturing firms” it was revealed that not much attention was given to materials management as only about 23 percent of the firms had in charge of materials reporting directly to the chief executive officer. This study also

focused only large manufacturing firms in Kenya ignoring small and medium manufacturing firms. To my best of knowledge the reviewed above literatures mention that inventory control, vendor relationships, information technology and competence are factors influencing material management like the studies of Ondiek,& (2009)Taiwo *et al.*, (2012), but these studies do not show in details on how these factors influence material management. Therefore this study seeks to determine factors affecting material management in small and medium manufacturing firms in Kenya.

## METHODOLOGY

### Research design

The study adopted a descriptive approach in trying to establish the factors that affect material management in small and medium manufacturing firms in industrial area Nairobi, Kenya. Descriptive approach was used by Arani and Kabare, (2013) in their studies. The research design enabled the researcher to find out the relationship between variables of interest.

### Target Population

The population of the study in this research was all small and medium-sized manufacturing firms that are based industrial area in Nairobi. According to the Kenya Association of Manufacturers (2012) there are a total of 455 small and medium-sized manufacturing firms operating in Nairobi. There are various sectors under which these firms operate. The 455 firms represented the study population.

### Sample and Sampling technique

Stratified random sampling method as described in Cooper and Schindler (2006) was applied to come up with the sample size, since the population in small and medium-sized

manufacturing firms was considered to be heterogeneous, implying that a simple random sample was to be unrepresentative. Stratified random sampling ensured that each manufacturing sector was represented. According to Cooper and Schindler (2006) every sample must have a non-zero probability of selection. Taking a non-zero probability of selection of 0.101 the sample size was:  $0.101 = \frac{\text{Sample size}}{455}$ . Arani and Kabare, (2013) used stratified random sampling in their research “Factors influencing outsourcing decisions of logistics activities in large manufacturing firms in Nairobi, Kenya” This gave a sample size of 46 respondents. The study therefore involved 46 small and medium-sized manufacturing firms in industrial area Nairobi, Kenya. The study picked heads of department of Material Management of each of the manufacturing firms who took part in the study. The researcher calculated the percentage of each sector represented among the total number of companies and used the same percentage to calculate the number of respondents. The researcher selected Material Management manager from each company who participated in the study. Table 1 shows how the sample size was arrived at.

SECTOR	NO. OF FIRMS	RESPONDENTS	PERCENTAGE IN SECTOR
BUILDING	6	1.3	1
FOOD, BEVERAGES	100	22	10
CHEMICAL	62	13.6	6
ENERGY	42	9.2	4
PLASTICS	54	11.9	5
TEXTILES	38	8.4	4
WOOD PRODUCTS	22	4.8	3
PHARMACEUTICAL	20	4.4	2

METAL AND ALLIED	38	8.4	4
LEATHER	8	1.8	1
MOTOR	17	3.7	2
PAPER	48	10.0	4
TOTAL	455	100	46

**Table 1 Source Arani and Kabare, (2013)**

### Data collection instrument

The researcher used questionnaire for all the respondents. Questionnaire studies are generally much less expensive and they do not consume a lot of time in their administration. The response choices were nominal while the closed questions were on interval scale. The nominal question required that respondents answer was either Yes or No have no preferential. The interval scale was used to measure on a 5-point likert scale ranging from not at all, Small extent, moderate, large extent and Very large extent.

### Data collection procedures

The researcher visited manufacturing firms with an introduction letter from Jomo Kenyatta University of Agriculture and Technology (JKUAT). Thereafter the researcher met Material Management Managers and explained them the research study he was undertaking and sort permission to collect information from them. The primary data was gathered using semi structured questionnaire which was self-administered.

### Data processing and analysis

Statistical package for social sciences (SPSS) version 20 was used as to analyze the data. SPSS version 20 provides better reporting capabilities through improvement to the presentations graphics system (Pallant, 2010).

The study employed descriptive statistics in form of percentages, means and measures of dispersion which allowed for presentation of data in a more meaningful way and thus simpler interpretation of data. In addition, to further determining the relationship between independent and dependent, the study used linear regression analysis as shown below.

### Linear regression model

$$\text{Equation 3.2 } Y = a + bX_1 + cX_2 + e_i$$

Where:

- y Is material management
- a Is the constant
- b Is inventory control
- c Is information communication and technology

## RESEARCH FINDINGS AND DISCUSSION

### Response Rate

Out of the 46 manufacturing firms that were studied, 28 which represents 60.85% responded by completing and returning the questionnaires.

### Organizational Data

#### Ownership of manufacturing firms

Respondents were asked to indicate the ownership of their manufacturing firms. The results indicated that 53% are foreign owned, 36% are locally owned and 11% are both locally and foreign owned.

From the findings it was noted that majority of the manufacturing firms are owned by foreigners at 53%, followed by locally owned at 36% and 11% both locally and foreign owned. This means that

foreign investors are key stakeholders in propelling the country's economy. This agrees with the survey of manufacturing in Kenya (2012) that the majority of ownership of manufacturing companies in Kenya is privately owned and by foreigners.

### **Markets served by manufacturing firms**

Respondents were asked to indicate the markets served by their manufacturing firms. It was noted that majority of the manufacturing firms serve the domestic market (75%), followed both domestic and foreign markets at 25%. It was noted that 0% manufacturing firms serve foreign market.

This generally indicates that the population of a country constitutes large portion of market for firm's outputs. Therefore manufacturing firms should care the interests of consumers and the general public in order to build their images positively.

### **Number of years of operation**

Majority of the manufacturing firms have been operating for 20 years. A further 21.4% have been operating 16 to 20 years. The rest 24.5% have been operating in the market for less than 15 years.

This generally indicates that those manufacturing firms which have been operating more than 20 years all of them operates material management. This is probably because they have well established and have known the benefits of material management.

### **Descriptive statistics**

#### **a) Effect of inventory control and materials management**

The study sought to determine the effect of inventory control on material management in the

manufacturing firms. The respondents were asked to indicate the effect of inventory control on material management. This was on a scale of not at all, small extent, moderate, large extent and very large extent. The score very large extent represents very high effect of inventory control and has been taken to be equivalent to mean score of 4.1 to 5.0 on the likert scale. The scores large extent represents high effect of inventory control and is equivalent to a mean score of 3.1 to 4.0. The score moderate represent moderate influence and taken to be equivalent to mean score of 2.1 to 3.0. The small extent scores represent low effect of inventory control and taken to be equivalent to mean score of 1.1 to 2.0. And the score not at all have been taken to be equivalent to mean score of 0.1 to 1.0. A standard deviation of more than one implies a significant difference in respondents.

A result of the analysis is presented in table 2. According to the results of the study, the respondents indicated high effect of inventory control with a mean score ranged 3.1 to 4.0, except for increased system flexibility whose mean score was 2.68 (moderate influence). There were no significant differences in the respondents' responses.

The study determined the effect of inventory control on material management and the result indicated that from the respondents out of seven items given, reduction in production costs, reduced stock levels received the highest mean ratings of 4.04, and 3.79 respectively. These results concur with Lysons and Farrington (2006); Ghosh and Kumar, (2003) that inventory control if well executed it bring the following benefits to the organization: reduction in production costs reduced stock levels hence freeing resources, increase profitability, reduction in wastes and among others.

**Table 2: Effect of inventory control and material management**

	N	MEAN	STD. DEVIATION	RATING
REDUCTION IN PRODUCT COSTS	28	4.04	0.637	High
REDUCED STOCK LEVELS	28	3.79	0.738	High
INCREASE PROFITABILITY	28	3.68	0.905	High
REDUCTION IN WASTES	28	3.64	0.911	High
INCREASED PRODUCT QUALITY	28	3.5	0.923	High
TIMELY DELIVERIES	28	3.29	0.937	High
INCREASE SYSTEM FLEXIBILITY	28	2.68	0.905	Moderate
VALID N(LIST WISE)	28			

**b) Effect of ICT and material management**

The study sought to determine the effect of ICT on material management. The respondents were asked to indicate the effect of ICT on material management. This was on a scale of not at all, small extent, moderate, large extent and very large extent. The score very large extent represents very high effect of ICT and has been taken to be equivalent to mean score of 4.1 to 5.0 on the likert scale. The scores large extent represents high effect of ICT and is equivalent to a mean score of 3.1 to 4.0. The score moderate represent moderate effect and taken to be equivalent to mean score of 2.1 to 3.0. The small

extent scores represent low effect of ICT and taken to be equivalent to mean score of 1.1 to 2.0. And the score not at all have been taken to be equivalent to mean score of 0.1 to 1.0. A result of the analysis is presented in table 3. According to the results of the study, the respondents indicated very high effect of using ICT determine the inventory level required with a mean score ranged 4.1 to 5.0, identification of inventory during storage, retrieval and pick up, locating of new suppliers and determining demand forecasts in products. The respondents also indicated high effect of ICT in determining information required in production schedule with a mean score ranged 3.1 to 4.0, in the remaining items in the table 3. There were no significant differences in the respondents' responses. These results agrees with Bowersox *et al.*, (2007); Lambert *et al.*; (2008) that information required include demand forecasts for production, names of suppliers and supplier characteristics, pricing data, inventory levels, production schedules, transportation routing and scheduling data, and other financial and marketing facts in order to control materials management.

**Table 3: Effect of ICT and materials management**

	N	MEAN	STD. DEV.	RATING
DETERMINE INVENTORY LEVEL REQUIRED	28	4.21	.738	Very high
IDENTIFICATION OF INVENTORY DURING STORAGE & PICK UP	28	4.11	.737	Very high
LOCATE REQUIRED SUPPLIERS	28	4.07	.813	Very high
DETERMINE DEMAND FORECASTING IN PRODUCTION	28	3.93	.813	High
DETERMINE THE	28	3.86	.803	High

INFORMATION REQUIRED IN PRODUCTION SCHEDULE				
DETERMINE THE INFORMATION REQUIRED IN TRANSPORTING TO ROUTING & SCHEDULE DEMAND	28	3.75	.701	High
VALID N (LIST WISE)	28			

**c) Perceived benefits of materials management**

The study sought to seek the perceived benefits of materials management. The respondents were asked to indicate the perceived benefits on material management. This was on a scale of not at all, small extent, moderate, large extent and very large extent. The score very large extent represents very high perceived benefits and has been taken to be equivalent to mean score of 4.1 to 5.0 on the likert scale. The scores large extent represents high perceived benefits and is equivalent to a mean score of 3.1 to 4.0. The score moderate represent moderate perceived benefits and taken to be equivalent to mean score of 2.1 to 3.0. The small extent scores represent low perceived benefits and taken to be equivalent to mean score of 1.1 to 2.0. And the score not at all have been taken to be equivalent to mean score of 0.1 to 1.0. A standard deviation of more than one implies a significant difference in respondents.

A result of the analysis is presented in table 4. According to the results of the study; all the respondents indicated high perceived benefits with a mean score ranged 3.1 to 4.0. There were no significant differences in the respondents' responses. The study indicated that reduced material costs and reduced inventories with reduced obsolescence received the highest mean rating of respondents at 3.83 and 3.80 respectively. Followed by reduced lead time,

improved quality control, improved continuity of supplies, improved operations and commitment and quicker identification of problems. These findings concur with Barker (1989) articulated that improvement in continuity of supplies with reduced lead times, reduction in inventories with reduced obsolescence and surplus, improvement in cooperation and communications with reduced duplication of effort, reduction in material costs, improvement in quality control, improvement in status control, and quicker identification of problems are the main benefits of Materials Management in organizations.

**Table 4: Perceived benefits of materials management**

	N	MEAN	STD. DEV.	RATING
REDUCE MATERIAL COSTS	28	3.83	.868	High
REDUCE INVENTORIES WITH REDUCED OBSOLESCENCE	28	3.80	.807	High
REDUCE LEAD TIME	28	3.72	.661	High
IMPROVEMENT OF QUALITY CONTROL	28	3.63	.717	High
REDUCE DUPLICATION EFFORTS	28	3.53	.793	High
IMPROVEMENT OF CONTINUITY OF SUPPLIES	28	3.29	.897	High
IMPROVEMENT OF OPERATIONS AND COMMITMENT	28	3.17	.821	High
QUICKER IDENTIFICATION OF THE PROBLEMS	28	3.09	.900	High
VALID N (LIST WISE)	28			

**Table 5: Model Summary-Coefficient determination**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.970 <sup>a</sup>	.940	.930	.250

a. Predictors: (Constant), Inventory control, Information communication and technology.

### Summary of Regression Results

The results of the study indicate that value R squared is 0.94; this implies that 94% of the variation in materials management data is explained by inventory control and information communication. The predictions since the value of  $r^2$  (94%) explain a significant portion of materials management.

**Table 6: Regression results**

FACTORS	BETA	T-RATIO	SIG. T
(CONSTANT)	1.107	5.280	0.000
INVENTORY CONTROL	.312	3.815	.001
INFORMATION COMMUNICATION & TECHNOLOGY	.178	2.071	.05

The results of regression analysis shows that all variables that is; inventory control and information communication and technology have a positive relationships with the materials management. This indicates that these factors positively affect materials management.

The regression equation can be presented as:

$$Y = 1.107 + 0.312X_1 + 0.178X_2$$

Where Y = Materials management

$X_1$  = Inventory control

$X_2$  = Information communication and technology

A linear regression done on factors that affect materials management shows that inventory control significantly contribute to the materials management. This findings conform with Ogbo (2011); Ogbo *et al.*, (2014) posits that the major objective of inventory control is to inform managers how much of a good to re-order, when to reorder the good, how frequently orders should be placed and what the appropriate safety stock is, for minimizing stock-outs. Thus, the overall goal on inventory is to have what is needed, and to minimize the number of times one is out of stock.

The other factor that affect materials management is information communication and technology. A linear regression to determine the relationships between them and materials management with F values less than 0.05.the factors studied under these objectives were all found statistically significant. The observation is consistent with the findings of Ondiek, (2009); Ondiek & Odera (2012); Banjoko (2000); Jacobs *et al.*, (2009), Keitany *et al.*, 2014) and Sindani (2011).

### SUMMARY OF THE FINDINGS

Materials Management is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources. The study sought to determine factors affecting material management in manufacturing firms in Nairobi, Kenya. The study was guided by the following objective: to analyze the effect of inventory control; information communication technology on materials management in small and medium-sized manufacturing firms.

**Specific objective 1:** To analyze the effect of inventory control on materials management



The study established that good inventory control can reduce production costs, stock levels, increase profitability and reduction in wastes, organizations resources and timely deliveries. This finding corresponds to the literature reviewed that posits that inventory control enhance profitability by reducing costs associated with storage and handling of materials. Inventory control is means by which materials of the right quality and quantity are made available as when required with due regards to the economy of shortages, ordering cost, purchase price and working capital. Ordering costs are costs of placing an order and receiving inventory. These include determining how much is needed, preparing invoices, transport costs and the cost of inspecting goods. Shortage costs result when demand exceeds the supply of inventory on hand. The costs include opportunity costs of making a sale, loss of customer goodwill, late charges and similar costs.

**Specific objective 2:** To determine effect of information communication technology on material management

The study established that information communication and technology is very important in materials management because it enables material managers to determine inventory level required, to identify the inventory during storage, can help in retrieval and pick up, locating of new suppliers and in determining demand forecast in products. This result agrees with the literature reviewed that modern information technology will offer opportunities for the fast and safe transmission and processing of extensive amounts of data, both internally for users within the company and externally for suppliers and customers. Paperless communication is coming to the forefront whereby routine tasks in order processing and scheduling will be decisively facilitated. As result, new information technology offers greater opportunities for linking the

planning, controlling and processing functions of material management.

## **Conclusions**

The purpose of these conclusions is to address the research objectives.

**Specific objective 1:** To analyze the effect of inventory control materials management

Based on the results of this study, the adoption of good inventory control practices in materials management could be concluded that good inventory control affect positively materials management. Reduction production costs, stock levels, increasing profitability and reduction in wastes organizations resources and timely deliveries are some of the factors that affect materials management positively. Therefore materials manager should be very keen in inventory control because inventory control is very important in materials management.

**Specific objective 2:** To determine effect of information communication technology on material management

Based on the results of the study, the adoption of information communication and technology in materials management is important. Information communication and technology enables material managers to determine inventory level required, identify the inventory during storage, can help in retrieval and pick up, locating of new suppliers and in determining demand forecast in products. Thus, modern information technology will offer opportunities for the fast and safe transmission and processing of extensive amounts of data, both internally for users within the company and externally for suppliers and customers. Paperless communication is coming to the forefront whereby routine tasks in order processing and scheduling will be decisively facilitated. As result,

new information technology offers greater opportunities for linking the planning, controlling and processing functions of material management.

### **Recommendations**

In general materials managers of small and medium-sized manufacturing firms are required to put first priority in inventory control if at all they want to boost performance of their organizations. Effective inventory control practices would reduce production costs, stock levels and more importantly increasing profitability and reduction in wastes, organizations resources. Therefore, firms would minimize costs associated with materials management and maximize profits through employment of efficient and effective methods of controlling materials management. This in turn would translate to employment opportunities for thousands of youths in the economy and thus contribute towards the achievement of vision 2030.

Small and medium-sized manufacturing firms should realize that modern information

technology offers opportunities for the fast and safe transmission and processing of extensive amounts of data, both internally for users within the company and externally for suppliers and customers. Thus for them to have good and vibrant materials management, new information technology would offer greater opportunities for linking the planning, controlling and processing functions of material management.

### **Recommendations for future research**

Most of the studies available are focusing materials management on manufacturing firms. Meanwhile service industries are under searched, yet they handle materials management. Therefore this study can be replicated in other sectors like service industry like banking and finance, transport service, health care which are important and some who facilitate manufacturing sectors in order to validate this study. It will be very interesting to carry out this study using longitudinal approach. The researcher can observe changes and corresponding response practice.

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