

**MATERIALS MANAGEMENT PRACTICES IN THE BUILDING  
INDUSTRY: THE CASE OF LARGE CONSTRUCTION FIRMS IN  
KENYA //**

**By**

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DECLARATION

This project is my original work and has never been submitted for a degree in any other university.

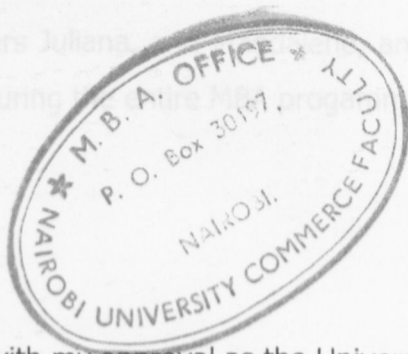
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November 8, 2005



The project has been submitted for examination with my approval as the University supervisor.

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# ACKNOWLEDGEMENT

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## ABSTRACT

The study sought to investigate and document the materials management practices in the building construction industry, establish the benefits, risks and problems in adoption of materials management programs, and establish the awareness of the effect of these programs on the different manufacturing strategies. It was based on 12 large building construction companies.

The first objective of the study was to document the materials management practices of large building construction firms in Kenya. The second objective was to determine the extent to which large building construction firms use materials management practices as part of their operations strategies. The third objective was to establish the benefits, risks and problems in implementing different materials management practices.

Cross sectional survey was used in this study. Primary data was collected by use of a questionnaire. The data was obtained from twelve construction firms by the researcher who visited their premises. The findings of the study indicate some level of usage of materials management practices although they face numerous problems. On risks and problems encountered in implementing different materials management practices by large building construction firms in Kenya, the following problems of lack of top management commitment, lack of proper measurement indices for all materials management practices, and Failure to recognize materials management practices as an operations strategy must be overcome for its implementation to be effective.

In view of the study's findings a few recommendations have been made. From the recommendations, it emerges that, companies in the Kenyan Construction Industry can, therefore, enhance competitiveness through application of materials management practices. These companies need to train more of their staff on the benefits of the application materials management practices.



## 1.0 INTRODUCTION

### 1.1 Background

The pressure of time-based competition is forcing leading edge companies to recognize the need to be agile, by effectively planning their business activities. Among the various strategic management levers to achieve the appropriate agility (i.e. internal processes redesign, workforce incentives, cooperation-oriented business models, etc.), is the formation of virtual enterprises through backward integration of certain processes to provide core competencies, and to take advantage of a market opportunity. However, this makes materials management one of the most critical management areas, in that it plays a decisive role in continuous replenishment programs, vendor managed inventories programs, joint managed inventories programs, and collaborative planning, forecasting and replenishment business models (Johnson, 1999).

According to Pyke (1997), companies have to sought competitive advantage though the adoption of inventory management models such as economic order quantity (EOQ), comprehensive planning approaches such as materials requirements planning (MRP) and Manufacturing resource planning (MRP II), and management philosophies such as just in time (JIT), total quality management (TQM), theory of constraints (TOC), time based competition (TBC), and supply chain management (SCM). These models, approaches and philosophies are often viewed as mutually exclusive and are part of the evolution of production and operations management philosophy and practice, which have continued to affect the management levers of operations management such as materials management.

As competition heats up both locally and globally, there is also need to continually identify and implement strategies that yield competitive advantage. Despite the fact that managers are constantly searching for the one perfect solution that will once and for all gain competitive advantage over their competitors, this is not to indicate that effective materials management is a perfect solution. Peter Drucker addresses the one perfect myth solution thus:

"For more than a century—from J.P Morgan and John D. Rockefeller in the United States, George Siemens in Germany, Henry Fayol in France, through Alfred Sloan at General

Motors, and upto the present infatuation with teams, we have been searching for the one right organization for our companies. There can no longer be any such thing. There will only be organizations as different from one another as a petroleum, a cathedral, and a suburban bungalow are from another, even though all three are buildings. Every organization in the developed countries (and not only businesses) will have to be designed for a specific task, time and place (Drucker, 1997).

For this reason, most companies (including those in the building construction industry), in recent years, have devoted a conspicuous amount of resources to implement and sometimes even reimplement materials management systems by embracing newer concepts such as supply chain management, advanced materials requirements planning, enterprise resources planning and/or advanced planning systems, procedures and optimization algorithms.

In order to gain and sustain competitive advantage that will ensure continued survival and prosperity, organizations especially in the west have been embracing these concepts.

Managing materials is crucial to a company's successes because the cost of buying, storing, moving and shipping materials accounts for over half of a products cost. Productivity basically means driving down the cost of doing business and doing the job of materials management better is increasingly seen as the key to productivity in the world.

The Kenyan building construction industry also continues to face competition, not only on a local basis, but also from international firms, which not only are able to marshal enough financial might to deliver but also have adopted cost management strategies, which make them very competitive. It is not only cost which has been used as an operations objective, but also objectives such as faster product deliveries, flexibility, customer service and quality. Some firms are focusing on their internal and external operations with the aim of making them offer top customer service, being more efficient and more flexible to cope with this increasingly global environment. Some of these building construction firms in Kenya are even implementing quality programs such as ISO 9001:2000 of Quality Management system with increasing focus also on implementation of ISO for environmental protection systems.

The Kenyan building construction industry consists of the special "one-off" projects. The contractor does not have a large permanent labour force nor owns much equipment. In effect, on receipt of an order from the customer, the contractor acquires all the necessary resources for the satisfaction of the order. In this case, materials management is complex since no material requirement is known prior to the order. In practice, each contract is different and it is normally difficult to determine exactly how much material is required.

The principal objectives of the Kenyan building construction industry are:

- i) Maximize customer service-in particular through minimizing project completion time
- ii) Maximum utilization of (consumed) resources

It is in the attempt to realize these objectives that, the firms have an option of focusing on materials management as one of the management levers to ensure competitive advantage.

The importance of this sector to the economy cannot be underscored since it is a crucial sector charged with physical infrastructure development, which has an immense impact on all other sectors. The sheer size of the sector as evidenced in the turnover of firms in the last three years also provides further impetus in undertaking the study. Cement sales of three cement companies indicates that, local cement consumption for the years 2000, 2001 and 2002 totaled Ksh: 31 Billion with increasing rate of consumption each year. Therefore the value of consumed cement provides an indicator of the sheer size of the building construction industry in Kenya. It needs to be remembered that cement constitutes just only about 5% of the total materials cost for building construction work.

## 1.2 Statement Of The Problem

Materials management seeks to take out the huge costs stored up in the typical supply chain in the building construction industry. To be successful, it relies on introducing the culture of partnering in the supply chain.

The objectives desired by materials management are to optimize performance in meeting agreed customer service requirements, minimizing cost, whilst optimizing the use of all resources throughout the entire supply chain' (Lord Chilver of Cranfield, 1990).

One survey has shown that, in UK building construction industry generally, awareness of the strategic importance of Materials Management concepts such as SCM, TQM, EOQ, TOC, and TBC e.t.c is high, but the implementation is low. However, there are significant differences between various industry sectors. In particular, the building construction industry does not feature among the more advanced sectors, and Small and Medium Enterprises (SMEs) in all sectors are lagging behind.

Materials management is a great opportunity for the building construction industry primarily to reduce costs and time, and thus improve revenues and still make the products more worth their prices. New latent markets for low price housing could be developed. Also product development and marketing for building construction material in the supply chains could be made more effective and efficient. Obstacles for supply chain management approaches are e.g. the poor level of logistical competence, the partly limited competition, the strong project focus as well as the attitudes and traditions in the building construction industry.

For this reason, most companies in the large building construction sector in Kenya, in recent years, have devoted a conspicuous amount of resources to implement and sometimes even reimplement enterprise resources planning and/or advanced planning systems, which allow them to effectively manage procurement activities to rapidly meet customer needs (Stadtler and Kilger, 2000). This study aimed to bridge the gap between materials management practices studies in other parts of the world and current industrial practice in Kenya because firms in Kenya cannot adopt wholesome, successful materials management practices as espoused in other parts of the world. Guide and Srivastava (2000) are of the view that, there is need to bridge the gap between

theoretical materials management practice and current industrial practice. Aosa (1992) also strongly supports the view that it is wrong to import wholesale the results of a research without taking into account the environmental differences. This gives further credence for the need to carry out local research in order to understand better how local firms are using materials management to make them more competitive.

Further, studies by Maina (2001) and Nyamwange (2001) also made the following suggestions for further research: That there is need to detail the specific practices on each of the operations strategies like flexibility and systems design. This study is therefore, partly a response to the challenge by these researches and reflects the desire to have a deeper understanding of how local building construction companies are progressively improving and developing strategic operations competencies in areas such as material management.

Available literature on materials management in large construction firms in Kenya is non-existent in Kenya and the basis of this research is on preliminary surveys carried out among building construction firms with additional literature from other studies mainly from USA, Western Europe and Japan.

It is against this background that, the study sets out to investigate materials management practices in the Kenyan building construction industry with a view to determining how prepared they are to compete effectively in the rapidly changing business environment that they are faced with. The study addressed the following questions:

- a) What are the materials management practices in large building construction firms in Kenya?;
- b) To what extent do large building construction firms use materials management programs as part of their operations strategies?; and
- c) What are the benefits, risks and problems experienced in implementing different materials management practices?

### 1.3 The Objectives Of The Study

The objective of this research were:

- a) To document the materials management practices of large building construction firms in Kenya;
- b) To determine the extent to which large building construction firms use materials management practices as part of their operations strategies; and
- c) To establish the benefits, risks and problems in implementing different materials management practices.

### 1.4 Importance Of The Study

The study is significant to the building industry, especially to business managers involved in crafting operations strategies for their businesses. The study will be important to this group, whether they already have a formal materials management program or not. It is expected to provide managers charged with responsibility of materials management with insight into the benefits and challenges of using materials management programs as part of their management levers in implementing operations strategy. The various programs used by the large building construction firms shall help other practitioners, not only in the building construction sector but also other sector, especially in SMEs in redesigning their own materials management procedures

It will be of value to researchers as a basis for future empirical and conceptual research, which will be helpful in refining and validating findings especially when a significant number of experiences is collected and studied.

We also hope to have enriched local literature on materials management practices and as the study will also act as a basis for further research in this area.

## 2.0 LITERATURE REVIEW

### 2.1 Definitions

Datta (2000) defines Materials Management as that "process of management which coordinates, supervises and executes the tasks associated with the flow of materials to, through and out of an organization in an integrated fashion".

The chartered institute of Purchasing and Supply defines materials management as the "total of all those tasks, functions, activities and routines which concern the transfer of external materials and service into the organization and the administration of the same until they are consumed or used in the process of production, operations or sales".

A simpler definition of materials management could be "the line of responsibility which begins with the selection of suppliers and ends when the material is delivered to its point of use". (Dean Ammer, Harvard Business Review, 1969).

Adam (2000) describes Materials Management as referring to the activities relating to managing the flow of materials into and through the organization. It brings together under one manager all the planning, organizing, and control activities associated with the flow of materials into and through the organization.

Put simply, materials management is a way of working in a structured, organized and collaborative manner, shared by all participants in inventory management. Each company is a link in a chain of activities, adding value at each stage, designed to satisfy end-customer demand in a win/win scenario. The activities are all those associated with moving goods from the raw materials stage through to acceptance of the product or service by the end-customer. The process also embraces all the information systems necessary to support and monitor these activities.

### 2.2 Materials Management: A historical perspective.

The conceptual foundation that gave rise to the management boom during and after the World War II, also gave birth to an entirely new approach and idea in the management field of what we understand today as materials management (Brown, 1977). Although

the concept is of recent origin and had its roots in the USA, it has now spread fairly widely all over the world.

It can, however, be traced as far back as 1920s, when the control of materials and therefore, the maintenance and repair of materials was the responsibility of the purchasing managers in some industries. During and immediately after World War II, Prof. T. Lewis of the Harvard Business School, who made extensive studies in industrial purchasing practices, found the businessmen had begun to realize what sound procurement policies meant to a well managed company (Datta, 2000). He attributed this largely to the efforts of such men as W.N. Mitchell, N.F. Harriman, L.F. Boffey and others.

There were also a number of those functions those days as control of stores, and operations such as procurement and inspection. Managerial and organizational practices were varied and many, depending upon the size and type of industry. On the basis of his studies, Prof. Lewis made recommendations for the establishment of a new position, viz. the Director of Materials. He envisioned the responsibilities for this new position to include purchasing, inventory control, receiving, inspection, warehousing, traffic and possibly several other activities.

It is also important to note that from the time mass-production of goods became reality, quality of output caught the attention of the manufacturers. Although, quality control is as old as industry, the concept of statistical quality control was new

## **2.3 Objectives and philosophy of Materials Management**

Efficient management of the materials function must be viewed as an important management tool for the furtherance of the objectives of the organization as a whole (Datta, 2000). The total control concept of materials management (Datta, 2000) aims at reducing costs of production and efficient distribution of the end products so as to achieve organizational objectives. However within the framework of organizational objectives, materials management objectives can be divided into two major segments according to Datta (2000); primary and secondary objectives.



The primary objectives will include provisioning, storage and minimization of inventories. This will include a natural corollary, economic procurement, proper store-keeping and physical upkeep, issuance, timely distribution, store accounting; record keeping and stores control. Inventory control will keep a close watch with an eye on high inventory turnover.

The secondary objectives will cover such functions as locating new sources of supply, vendor development, variety reduction, standardization and quality control, value analysis, value engineering and developing the skills of human resources with a view to harmonizing and coordinating all functions and activities for smooth flow of materials, to, through and out of the organization.

It must be remembered that, by and large, materials management is a staff function (Molinder, 1997), which must give supportive services to the production and other user departments to attain the basic objectives of the organization as a whole. Generally the basic objectives of the total organization include:

- i) Profit maximization for survival and growth;
- ii) Maximization of customer service;
- iii) Technological innovations to overcome resistance to growth and competition;
- iv) Good employee-employer relations; and
- v) Other social objectives.

Needless to mention therefore, that materials objectives of any organization should be supportive to these basic objectives, which inter alia include:

- a) Continuity of supply in order to maintain a uniform flow of materials;
- b) Reducing of overall materials costs through the use of scientific tools and techniques;
- c) Ensuring the right quality at the right price;
- d) Establishing a harmonious buyer-seller relationship;

- e) Releasing working capital by ensuring effective control over inventories; and
- f) Ensuring lower departmental costs, higher and better services to customers and maintaining of ethical practices and standards.

Pyke (1997) argues that, materials management has a philosophy close to that of modern marketing. The marketing concept involves all aspects of marketing, i.e. market research, advertising, sales, and e.t.c. Likewise the materials management concept involves production planning, stores, purchasing and transport. In marketing the organization and its entire staff have to think in a marketing-oriented way.

## 2.4 The Organization and functions of Material Management

### Four Major Types

Addonizio (1991) in a *Harvard Business Review* survey of Chrysler Corporation in her article titled *JIT and EDI* revealed four types of materials management organizations:

- a) Integrated structure; This shows the classical integrated materials management structure which accounts for 31% of the companies in which a materials manager is said to exist.
- b) Distribution Oriented; These are partially integrated organizations in which the distribution and traffic function, the production planning and inventory control function report together. Companies in which such structures exist accounted for 23% of the companies with a materials manager tended to integrate those materials functions that were closer to markets than to sources of supply in integration.
- c) Supply Oriented; These are partially integrated organizations in which the purchasing function and the production planning and inventory control functions report together. In such companies the two materials control functions that report to the same manager are close to the supply end of the materials pipeline. This type of materials management organization accounted for 18% of the cases in which the materials manager or the equivalent existed.

d) Manufacturing oriented; This type of structure is organized around manufacturing which is the middle of the materials flow. It accounted for 28% of the materials managers in the *Harvard Business Review survey*.

According to Mathew (1997), materials management works with all departments, the main objective being to provide the right materials to the right operating point at the right time in a usable condition and at the minimum cost. The basic functions of materials management are as follows:

- i) **Procurement of goods;** At the right time, the right quality and quantity and of course the right price, taking into account storage, delivery, handling costs and the maintenance of supplier relations.
- ii) **Production and materials planning;** To ensure efficient use of personnel, materials facilities and capacity. This also covers assistance in both long' and short-term planning with control over the materials used and issued.
- iii) **Distribution;** Covering receipts, storage, dispatch of packed finished goods and registration of all transactions.
- iii) **Materials handling;** With the responsibility for accepting, handling, and physically moving materials to production.
- iv) **Control of material costs;** Where costs arise materials management must organize reduction programmes for planning, stocks, purchasing, materials handling as well as providing and effective means of monitoring the effects of the programmes.
- v) **Communication;** To ensure a well balanced and efficient communication system between various activities.

## **2.5 Materials Management Practices and Philosophies**

### **2.5.1 Economic Order Quantity (EOQ) & Economic Batch Quantity (EBQ)**

In an effort to reduce average manufacturing costs, the manufacturing process was buffered by raw materials, work-in process and finished goods inventories. Inventory waste resulted from obsolescence and damage due to extended storage of raw materials, work-in process and finished goods. The manufacturing process itself generated waste through scrap and rework.

In an attempt to control finished goods inventory levels, manufacturers adopted the EOQ or EBQ (Economic Batch Quantity) inventory model. The model proved appropriate for independent demand situations by minimizing stockholding and order placing costs. It is also applicable for low value high usage materials and is based on the assumptions that demand and, Lead time are known and constant, Receipt of materials is instantaneous, Quantity discounts are not possible, stockouts can be completely avoided if orders are placed on time and the only variable costs are set-up costs and holding or carrying costs.

### **2.5.2 Materials Requirements Planning (MRP) and Manufacturing Resource Planning (MRPII)**

In response for a need for an inventory model that worked well in dependent demand situations, MRP was introduced in the early 1970s (Green, 2000). MRP assisted with controlling work-in process inventory costs as well as raw materials inventory costs and helped reduce lead times. EOQ was incorporated in MRP systems and used to determine lot sizes. Successful MRP required precise bills of materials and inventory information and was complicated to implement (Fogarty, Blackstone, Hoffman, 1991). The success of MRP and improvements in computer hardware and software technologies led to the development of the more encompassing MRP II that integrated all resources of a firm, including business planning, production planning, master production scheduling, material requirements planning, and capacity requirements planning, and the execution support systems for capacity and material. MRP II was a closed loop system and virtually self-contained planning and control system for demand-dependent situations

(Wild 2002). MRP and MRP II served to attack WIP and finished goods inventories and effectively reduced lead times.

### **2.5.3. JUST-IN-TIME (JIT)**

With the adoption of EOQ, MRP and MRP II, there was need however for a system that attacked waste throughout the manufacturing system. Toyota and Ohno had developed such a system at Toyota Motor Corporation (Togo and Wartmen, 1993)

Kiichiro Toyoda is attributed to originating the JIT philosophy as he prepared to manufacture automobiles at their Koromo plant in 1938.

JIT is defined as the philosophy for eliminating waste in the total manufacturing environment (Hay, 1988). Slack, Chambers, and Johnson (2001), define JIT as a disciplined approach to improving overall productivity and eliminating waste. It provides for the cost effective production and delivery of only the necessary quantity of parts at the right quality, at the right time and place, while using a minimum amount of facilities, equipment, materials and human resources, JIT is dependent on the balance between the suppliers flexibility and the users flexibility, it is accomplished through the application of elements which require total employee involvement and team work. A key philosophy of JIT is simplification.

### **2.5.4 THEORY OF CONSTRAINTS (TOC)**

Once competitors incorporated the double focus of waste and quality management, it was necessary to search elsewhere for advantage. TQM required continuous improvement. Goldratt's primary contribution with TOC was to identify where improvement efforts should be focused. Goldratt and Cox published the Goal in 1984 and shifted the focus to throughput improvement. They recommended protecting constraints using inventory buffers and a drum buffer rope approach (Umble and Srikanth, 1990). Now managers had to effectively manage waste, quality and identify

and exploits constraints on the factory floor to improve throughput. Improved throughput would for a time generate competitive advantage through increased sales.

## **2.5.5 TIME-BASED COMPETITION (TBC) AND AGILE MANUFACTURING**

Kiicho Toyoda envisaged an elegant manufacturing system that was lean, flexible and agile (Togo and Wartman, 1993). Agility requires physical and fiscal quickness to respond to unpredictable events. It was no longer a matter of how well an organization could respond, but how quickly it could respond. The traditional concepts of time and distance were forever altered by increased worldwide competition and dramatically improving information technology. Emphasis turned to using time as a competitive weapon (Stalk and Hout, 1990). The successful use of time effectively shortened the manufacturing process thereby reducing inventory levels and waste while increasing sales.

## **2.5.6 TOTAL QUALITY MANAGEMENT (TQM)**

Dr. Deming's 1950-51 lectures on statistical quality control in Japan mark the beginnings of what we call TQM philosophy (Nonaka, 1995). The focus in Japan expanded to include quality. The works of Deming, Juran and Cosby became popular during the early 1980s in the USA and TQM became the battle cry for competitive advantage (Juran, 1995). TQM combined a management philosophy with an established set of tools and techniques. Primarily TQM required a focus on the customer's definition of quality, continuous improvement of the production process, and the use of statistical quality control techniques (Juran, 1995).

TQM is a means of achieving total quality and is evidenced by delighted customers, empowered employees, high Revenue and lower Costs. TQM is not just about Product Quality, it embraces every activity carried out by every employee in a business.

Customers define quality, thus companies must identify what their customers want, produce it at the agreed time, and at minimum cost.

The objective of TQM is to satisfy customer's requirements as efficiently and profitably as possible. There is therefore a need to continuously improve performance as fast as development allows. It can also be viewed as programs build by organizations that produce products and services that are considered first in class by its customers. In a total quality environment all employees strive to:

- a) Do the right things – Only activities that help a business to satisfy the requirements of their customers are acceptable
- b) Do things right first time, every time.
- c) To continuously improve every piece of the business.

### **2.5.7 SUPPLY CHAIN MANAGEMENT (SCM)**

EOQ, MRP, MRP II, JIT, TQM and TOC focused on the manufacturing activity. With TBC and SCM, it was time to consider possible avenues of advantage outside the manufacturing organization. The SCM philosophy appears to have its origins in the organizational extension theory described by Mallen (1963). Mallen advocated extending the organization to include all members of the distribution channel. In using this concept, successful managers built strong relationships with suppliers and gained advantage. They removed barriers to direct communication with customers thereby improving demand estimates to the point where individual products could be custom made to individual customers. To be competitive, an organization must minimize waste, produce quality products, maximize throughput and shorten and strengthen the supply chain.

## 3.0 RESEARCH METHODOLOGY

### 3.1 Research Design

The objectives of the study was to investigate the materials management practices in the building construction industry, establish the benefits, risks and problems in adoption of materials management programs, and to establish the awareness of the effect of these programs on the different manufacturing strategies. The study has, therefore, adopted a cross-sectional design with the respondents being the senior-most manager in charge of materials management function.

### 3.2 Population

The study focused on large building construction firms because it is presumed that they have adopted modern materials management approaches such as ERP, given the impact of globalization and advances in technology. It also felt that, large firms would have access to human, physical and financial resources to adopt modern materials management approaches. It was further presumed that, due to costs involved, small firms may not have fully embraced extensive materials management practices and therefore the current study did not focus on small building construction firms.

The 54 active large building construction companies were drawn from a total of 198 registered class "A" building construction companies at the ministry of public works(appendix 4). Cement purchases from the three major cement manufacturers was used as a guide to weed out the firms which may not be operational.

The unit of analysis in this study was the firm itself as presented through the relevant management staff.

### 3.3. Sample

The population of the study was all large building construction firms classified in class "A" as defined by Ministry of Roads and Public Works (appendix 3). 85 % of the population operates within Nairobi and thus the reason why the study focused on this



area. Further, the building construction companies in Nairobi are deemed to represent all categories in the sector. It was, therefore, deemed that, a study of building construction firms in Nairobi would give findings that represent the whole country. The choice of Nairobi was also based on the fact that it is more convenient in terms of accessibility in data collection.

The random sample for this study was made up of 30 firms drawn from a sampling frame of 54 active large building construction companies in Kenya. This is largely due to the time and cost involved, data analysis tools and the response rate expected. Rosco (1975) also contends that a sample of 30-500 is usually appropriate for most studies.

### **3.4 Data Collection**

In the implementation of a materials management program within building construction firms, at least two parties are normally involved. These are the Site Manager/Project Manager/Site Accountant and the Purchasing Manager of the firm. Therefore, a research design that captures the perspectives offered by these respondents was required. A questionnaire (Appendix 2) was administered to the respondents in order to get a broad, global perspective of the various materials management practices that have been adopted by the building construction firms.

Primary data was used for this study. The major method of data collection was through a self-administered questionnaire, which was semi-structured, having both open-ended and close-ended questions. It was administered to the respondents at their offices.

The questionnaire was divided into two parts (sections). The objective of the first part was to provide a taxonomy of the characteristics of these businesses and other general information deemed relevant for the study. The second (section) of the questionnaire was used to gather the basic data sought by the study. This section contained detailed questions which acted as indicators of the presence of materials management practices. The questions were simplified as much as possible so that all the respondents could have a clear meaning of each of the questions.

### 3.5 Data Analysis And Presentation

The data collected was edited for accuracy, uniformity, consistency, and completeness and arranged to enable coding and tabulation before final analysis (Cooper and Emory, 1998). The data was mainly presented through the use of summarized percentages, proportions and tabulations in all the three sections of the questionnaire.

#### 4.2 General overview of the construction firms sampled.

This section shows the general overview of the firms surveyed.

##### 4.2.1 Company ownership

The respondents were asked to indicate whether their firms are locally owned or foreign owned or both. Chart 4.1 indicates the ownership of the 12 companies surveyed

Chart 4.1 shows that 41.67 % of the firms surveyed were locally owned, 41.67 % foreign owned and 16.67 % both locally and foreign owned. This indicates that there is no dominance by either local or foreign owned firms.

## **4.0 DATA ANALYSIS AND FINDINGS**

### **4.1 Introduction**

Data collected during the research is analyzed in this chapter. The data is summarized and presented in the form of proportions, means, tables and standard deviations. It documents the extent to which large construction companies in Kenya practice material management practices, which firms use material management practices as part of their operation strategy and the problems they experience in implementing material management practices. Appendix 3 shows the sampled firms

### **4.2 General overview of the construction firms sampled.**

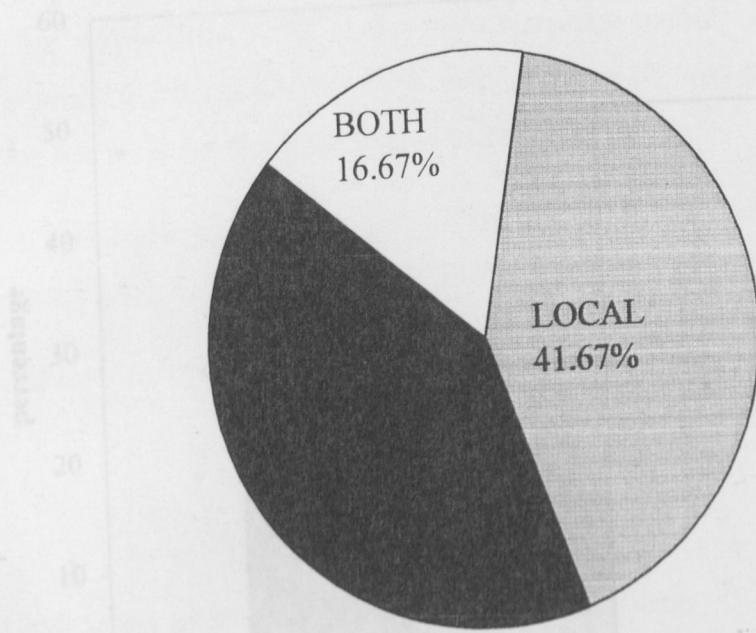
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**Chart 4.1 Company Ownership**



- upto 1 billion
- 500 million to 1 billion
- 100 million to 500 million
- Under 100 million

#### **4.2.2 Annual Turnover**

the respondents were asked to indicate their annual turnover and bar chart 4.2 below gives their responses.

From the bar chart above 50 % of the firms surveyed were operating with a turnover of 100 million to 500 million. However during the survey the respondents complaint of a reduced turnover due to low economic growth and controlled government spending of capital projects.

### Bar chart 4.2 Annual Turnover

In this section all the respondents indicated some form of manufacture of bulk inputs and specialized products. This is due to the variety in the end products, the houses.

From the survey only 20 % of the firms surveyed manufacture materials for sell while 70 % produce exclusively for their own projects. It was also noted that, those who produce materials for sell have excess capacity.

Only a percentage of 16.7 % of the firms surveyed were found to produce materials to stock. The rest forming 83.3 % produced on order.

25 % of the firms surveyed owned a subsidiary and 75 % did not own one.

### 4.3 Utilization of PM

The firms were required to indicate on a Likert Scale the extent to which they utilized material management practices for their material management activities. Their response are represented in bar chart 4.2 next page.

From bar chart 4.2 it emerges that:

- Inventory control is the most utilized with a mean score of 4.42;
- The second most utilized is Production Planning with a mean score of 4.17;
- Forecasting is the 1st utilized with a mean score of 3.92; and

From the bar chart above 50 % of the firms surveyed were operating with a turnover of 100 million to 500 million. However during the survey the respondents complaint of a reduced turnover due to low economic growth and controlled government spending on capital projects.

### 4.2.3 Manufacture of materials used in the industry

In this section all the respondents indicated some form of manufacture of bulk inputs and specialized products. This is due to the variety in the end products, the houses.

From the survey only 30 % of the firms surveyed manufacture materials for sell while 70 % produce exclusively for their own projects. It was also noted that, those who produce materials for sell have excess capacity.

Only a small percentage of 16.7 % of the firms surveyed were found to produce materials for stock. The rest forming 83.3 % produced on order.

25 % of the firms surveyed owned a subsidiary and 75 % did not own one.

### 4.3 Utilization of Material Management Programs.

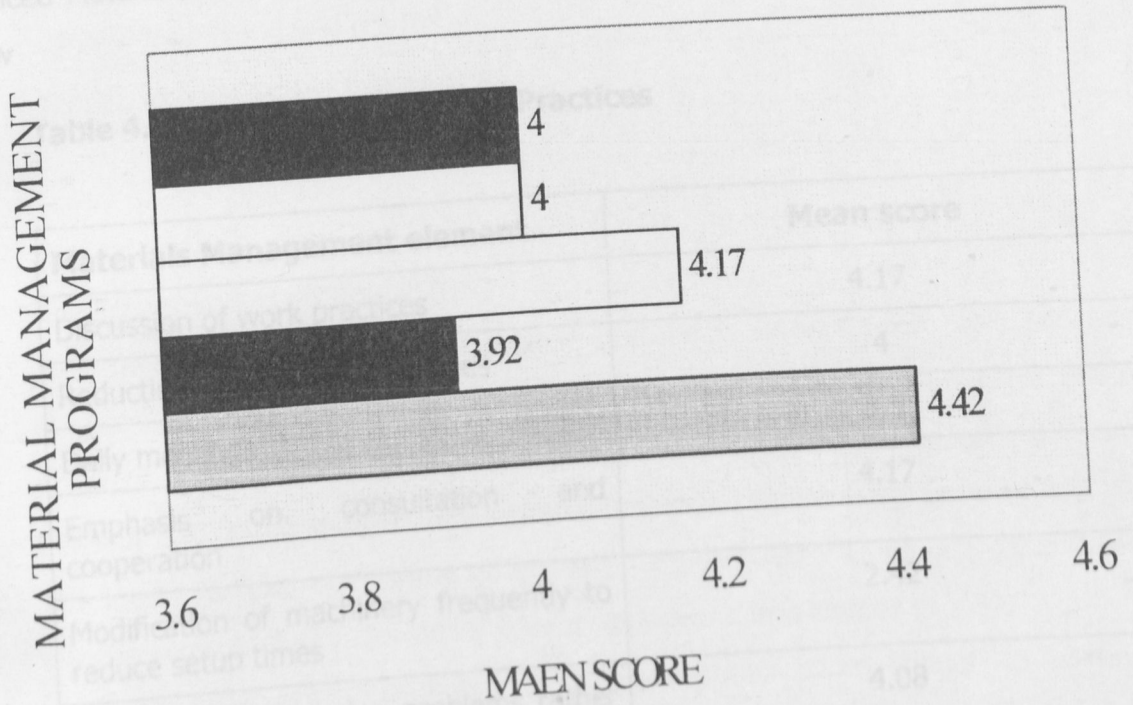
The firms where required to indicate on a 5 point Likert Scale the extend to which they utilized material management programs for their material management activities. Their response are represented in bar chart 4.2 next page

From bar chart 4.2 it emerges that;

- i) Inventory control is the most utilized with a mean score of 4.42;
- ii) The second most utilized is Production Planning with a mean score of 4.17;
- vi) Forecasting is the list utilized with a mean score of 3.92;and
- vii) All the firms utilized all the Material Management Programs.

Bar chart 4.3 Utilization of Material Management Programs

The firms were required to indicate on a 5 point Likert Scale the extent to which they practiced Materials Management Practices. Their response are represented in table 4.3 below



| Material Management Program | Mean Score |
|-----------------------------|------------|
| Inventory Procurement       | 4.0        |
| Materials Scheduling        | 4.17       |
| Production Planning         | 3.92       |
| Forecasting                 | 4.42       |
| Inventory Control           | 4.4        |

#### 4.4 Practices of Material Management Practices

The firms were required to indicate on a 5 point Likert Scale the extent to which they practiced Materials Management Practices. Their response are represented in table 4.3 below

**Table 4.4 Material Management Practices**

| <b>Materials Management element</b>  | <b>Mean score</b> |
|--|-------------------|
| Discussion of work practices   | 4.17              |
| Reduction of "buffer" inventories  | 4                 |
| Daily meetings   | 3.5               |
| Emphasis on consultation and cooperation   | 4.17              |
| Modification of machinery frequently to reduce setup times                                     | 2.42              |
| A strategy of exposing problems rather than covering up and revealing bad practices            | 4.08              |
| Use of MRP tools such as Master Production Schedules, Bill of Materials, Product structure etc | 4.67              |
| Preventive maintenance   | 3.75              |
| A database of information for administering materials flow into and within the organization    | 3.08              |
| Database consisting of supplier names and their characteristics                                | 3.25              |
| Transportation routing and data scheduling   | 4                 |
| Master construction schedules  | 4.42              |
| Inventory levels   | 4.08              |
| Pricing data   | 2.92              |
| Demand forecasts for production  | 4.17              |



|   |      |
|---|------|
| Data on inventory levels for materials, delivery schedules, pricing, forward buys, and suppliers are information provided by MM | 3.5  |
| Inventory planning and control  | 3.42 |
| Elimination of wastage in materials   | 4.42 |

From table 4.3 above it is noticeable that;

- a) The most used materials management practice is Use of MRP tools such as Master Production Schedules, Bill of Materials, Product structure with a mean score of 4.67 followed closely by Master construction schedules with a mean score of 4.42 and Elimination of wastage in materials with a mean score of 4.42;
- b) The least practiced is Modification of machinery frequently to reduce setup times a mean score of 2.42 followed by Pricing data with a mean score of 2.92.

Overall, all the firms practiced materials management practices though in varying degrees.

#### 4.5 Materials Management Practices in relation to the operations strategies.

The firms were required to indicate on a 5 point Likert Scale the importance of five Materials Management Practices in relation to their operations strategy. Their responses are represented in table 4.4 below.

**Table 4.5 Importance of materials management practices in industry.**

| Operations Strategy  | EOQ/EBQ | Inventory management | MRP  | MRP II | JIT  | Average |
|--|---------|----------------------|------|--------|------|---------|
| Quality of products  | 4.67    | 3.92                 | 4.17 | 4.42   | 4.42 | 4.32    |
| Cost   | 4.08    | 3.83                 | 3.58 | 4.25   | 3.83 | 3.92    |
| Flexibility  | 3.08    | 3.67                 | 3.25 | 3.83   | 3.25 | 3.42    |
| Time/speed (e.g. meeting targets in reference to project completion times) | 4.67    | 4.33                 | 4.33 | 4.17   | 4.00 | 4.30    |
| Innovativeness   | 3.17    | 4.17                 | 3.83 | 3.75   | 4.08 | 3.80    |

From the table 4.4 above it emerges that;

- Quality of products and Time/speed (e.g. meeting targets in reference to project completion times) had the highest score of 4.32 and 4.30 respectively;
- Cost was the third Important materials management practice with mean score of 3.92; and
- The least Important materials management practice was Flexibility with a score of 3.42.

#### 4.6 Materials Management Practices in industry.

The firms were required to indicate on a 5 point Likert Scale, the level of importance attached to the following materials management practices in their Organizations.

- Adequate stock controls;
- Breakages;
- Pilferage;
- Lack of proper specifications;
- Fluctuation of prices during contracts;

**Table 4.6 Importance of materials management practices in industry.**

| Function                          | Mean score |
|-----------------------------------|------------|
| Production and Materials planning | 4.50       |
| Materials Handling                | 4.42       |
| Procurement of inventory          | 4.75       |
| Distribution                      | 3.42       |
| Control of material costs         | 4.75       |
| Communication                     | 3.83       |

From the table above it emerges that;

- a) Procurement of inventory and Control of material costs both with a mean score of 4.75 are the most important materials management practices;
- b) The least important is distribution with a mean score of 3.42; and
- c) All respondents showed that they valued all the mentioned materials management practices

#### **4.7 challenges/risks with respect to Materials Management functions**

Respondents were asked to give a descriptive response to the challenges/risks with respect to materials management functions. Listed below are some of the challenges highlighted by the Respondents;

- a) Timeliness to avoid late production;
- b) Production of quality goods;
- c) Adequate stock controls;
- d) Breakages;
- e) Pilferage;
- f) Lack of proper specifications;
- g) Fluctuation of prices during contracts;

- 5.0 CONCLUSIONS AND RECOMMENDATIONS
- h) Lack of specialized materials;
  - i) High quality demand by clients; and
  - j) Breakages during production and transportation.

The first objective of the study was to document the materials management practices of large building construction firms in Kenya. The second objective was to determine the extent to which large building construction firms use materials management practices as part of their operations strategies. The third objective was to establish the benefits, risks and problems in implementing different materials management practices.

### 5.1.1 Materials management practices practiced by large building construction firms in Kenya.

On materials management practices practiced by large building construction firms in Kenya the study looked at the various practices and it was found that all the firms practiced materials management practices though in varying degrees. In the study MRP tools came out clearly as the most practiced Materials management practice. Master Production Schedule. (MPS) – In the Construction Industry this is called the Master Construction Schedule. Most of the companies have a MPS either drawn by the client through his representatives i.e. the consultants or jointly by the consultant and the construction company. It represents all the activities to be done expressed in specific configurations, quantities and dates.

The other used Materials management practices are JIT, EOQ/EBQ, Inventory management and TQM although in varying degrees.

### 5.1.2 Extent of usage of materials management practices as part of operations strategies for large building construction firms in Kenya.

On the extent of usage of materials management practices as part of operations strategies for large building construction firms in Kenya, it emerged from the study that the usage of materials management practices was high. The surveyed firms have some

## **5.0 DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Discussions**

The first objective of the study was to document the materials management practices of large building construction firms in Kenya. The second objective was to determine the extent to which large building construction firms use materials management practices as part of their operations strategies. The third objective was to establish the benefits, risks and problems in implementing different materials management practices.

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#### **5.1.2 Extent of usage of materials management practices as part of operations strategies for large building construction firms in Kenya.**

On the extent of usage of materials management practices as part of operations strategies for large building construction firms in Kenya, it emerged from the study that the usage of materials management practices was high. The surveyed firms have some

professionals in their establishment who have knowledge of materials management practices.

### 5.1.3 Risks and problems encountered in implementing different materials management practices

On Risks and problems encountered in implementing different materials management practices by large building construction firms in Kenya, the following problems of lack of top management commitment, lack of proper measurement indices for all materials management practices, and Failure to recognize materials management practices as an operations strategy must be overcome for its implementation to be effective.

## 5.2 Conclusions

Materials management seeks to take out the huge costs stored up in the typical supply chain in the building construction industry. To be successful, it relies on introducing the culture of partnering in the supply chain. The objectives desired by materials management are to optimize performance in meeting agreed customer service requirements, minimizing cost, whilst optimizing the use of all resources throughout the entire supply chain.

From the survey it has emerged that, building construction firms generally use Materials management to reduce costs and time, and thus improve revenues and still make the products more worth their prices. New latent markets for low price housing could be developed. Also product development and marketing for building construction material in the supply chains could be made more effective and efficient. Obstacles for supply chain management approaches are e.g. the poor level of logistical competence, the partly limited competition, the strong project focus as well as the attitudes and traditions in the building construction industry.

For this reason, most companies in the large building construction sector in Kenya, in recent years, have devoted a conspicuous amount of resources to implement and sometimes even re-implement enterprise resources planning and/or advanced planning

systems, which allow them to effectively manage procurement activities to rapidly meet customer needs.

### 5.3 Recommendations

Companies in the Kenyan Construction Industry can enhance competitiveness through application materials management practices as outlined below.

Kenya construction companies can benefit from MRP and MRP II by Improvement in project completion time. improved completion time can also be used as a performance measurement criteria for the industry. This also increases competitiveness. Both MRP and MRP II improves Reduction in inventory, Provides data for planning construction capacity requirements, Improves direct labour productivity, Improves productivity of support staff and closes the loop with total business planning.

The application Of JIT can be done by developing programs with suppliers to establish long-term relationships and develop few supplier - arrangements that provide frequent deliveries in small quantities. The advantages of this system is the reduction in inventory cost which include holding costs like storage, insurance, pilferage, breakage, deterioration, obsolescence, opportunity costs etc. A reduction in inventory costs would translate into increased profits and increased competitiveness. Although price is important, the ability of Kenyan suppliers to deliver enough construction materials of exceptional quality, and being trustworthy and cooperative are even more important. Long-term multiyear contracts can be used by the Kenyan Construction companies to guarantee suppliers security and to provide incentives for developing trust and cooperation.

Kenyan Construction Companies can use quality as a weapon of choice to capture jobs in the local and regional markets. Also preeminent product and service quality is the number one distinctive competency for which they can thrive.

previously paid for work not done and a government commission had being instituted by the Ministry of Public Works to investigate them.

Kenyan Construction companies should stop depending on inspection to catch defects and concentrate every organizational effort in doing everything right the first time, every time. They should strive to find and fix their quality problems, not to have inspection programs aimed at catching defects while sloppy construction methods continue. They should employ JIT Construction, material standardization, automated equipment and preventive maintenance not just to reduce costs but also for the impact on quality and customer service.

Kenyan Construction Companies should commit resources to put in place total quality management (TQM) programs aimed at continuous quality improvement.

To become competitive the Kenyan Construction Companies should invest in all areas of their business: personnel training and education, market development, new construction methods, construction equipment and advance high-tech construction processes, and research and development.

The Kenyan Construction Industry can use computer networking with suppliers as an important operations strategy that should enable them to be more responsive in materials management through effective communication.

#### **5.4 Limitation of study.**

The study was intended to gather information and data through interviews using a questionnaire from 30 construction firms. Gathering of more underlying information was done when the respondents filled the questionnaire, and any issues were clarified then. This was only possible with 12 construction firms. The political climate surrounding the performance of the construction firms was not conducive and many firms feared or shied away. This was because there were allegations that construction firms had been



previously paid for work not done and a government commission had being instituted by the Ministry of Public Works to investigate them.

The researcher did not have a mechanism to verify the information filled by the respondents.

## 5.5 Suggestions for further research

The study was to documents the materials management practices of large building construction firms in Kenya, the extent to which large building construction firms use materials management practices as part of their operations strategies, and to establish the benefits, risks and problems in implementing different materials management practices. The study only managed to collect data from 12 construction firms instead of the planned 30 construction firms. This cannot be said with finality to a true representation of large building construction firms in Kenya. The researcher recommends a full study to be conducted to determine the true position of the study.

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APPENDIX 1: SAMPLED BUILDING CONSTRUCTION COMPANIES

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a. Aristocrats Conc. Ltd

b. Epcn Builders Limited

c. H. Young & Company

d. Kinnyaga Building construction (K) Ltd

e. Laxmanbhai Building construction Ltd

f. strabag international

g. Ongata Works Limited

h. Cementers Limited

i. Jipsy Civil & Building Contractors

j. Karuri Civil Eng. Ltd

k. Lalji Meghji Patel & Company Ltd

l. Mugoya Building construction & Eng. Ltd

## APPENDICES

### **APPENDIX 1: SAMPLED BUILDING CONSTRUCTION COMPANIES**

1. Name of the company  
a. Aristocrats Conc. Ltd
2. Location
3. Owner  
b. Epco Builders Limited  
c. H. Young & Company  
d. Kirinyaga Building construction (K) Ltd
4. Over and above building work, are you engaged in any of the following:  
e. Laxmanbhai Building construction Ltd  
f. strabag international  
g. Ongata Works Limited
5. What is your company's average annual turnover in Kenya over the last 5 years?  
h. Cementers Limited  
i. Jipsy Civil & Building Contractors  
j. Karuri Civil Eng. Ltd  
k. Lalji Meghji Patel & Company Ltd

### **PART B. Material Management Practices**

1. Do you manage your materials as follows?  
i. Mugoya Building construction & Eng. Ltd

2. Do you use your materials as follows?  
i. Mugoya Building construction & Eng. Ltd

3. Do you produce to stock?  
i. Mugoya Building construction & Eng. Ltd

**APPENDIX 2 : QUESTIONNAIRE**

4. Do you own subsidiaries that supply part of your input?

**PART A: Company Profile**

1. Name of the company \_\_\_\_\_

2. Location \_\_\_\_\_

3. Ownership of the company
- Local
  - Foreign
  - Both (local & foreign)

4. Over and above building work do you engage in any of the following :
- Civil engineering
  - Building products
  - Other (please specify) \_\_\_\_\_

5. What is your company's average annual turnover in Kshs. over the last 5 years?

- Up to 1 billion
- 500 million to 1 Billion
- 100 million to 500 million
- Under 100 million

**PART B. Material Management Practices**

1. Do you manufacture materials?
- Yes
  - No

2. Do you use your materials exclusively or do you sell?
- Yes
  - No

3. Do you produce to stock?
- Yes

- No

4. Do you own subsidiaries that supply part of your input?

- Yes
- No

5. Please indicate the extent to which you utilize the following Materials Management programs for your materials management activities: On a scale of 1 to 5 (5 is most utilised and 1 least utilised) rank the level of utilisation.

|                       | 1 | 2 | 3 | 4 | 5 |
|-----------------------|---|---|---|---|---|
| Inventory control     |   |   |   |   |   |
| Forecasting           |   |   |   |   |   |
| Production planning   |   |   |   |   |   |
| Materials Scheduling  |   |   |   |   |   |
| Inventory procurement |   |   |   |   |   |

6) Please indicate whether these elements of Materials Management Practices are practiced in your firm. Select not practiced if the element is non-existent or insignificant and on a scale of 1 to 5 (5 is most important and 1 least important) rank the importance attached to each.

| Materials Management element             | Strategic contribution |   |   |   |   | Not practiced |
|--|------------------------|---|---|---|---|---------------|
|  | 1                      | 2 | 3 | 4 | 5 |               |
| Elimination of wastage in materials      |                        |   |   |   |   |               |
| Discussion of work practices             |                        |   |   |   |   |               |
| Reduction of "buffer" inventories        |                        |   |   |   |   |               |
| Daily meetings                           |                        |   |   |   |   |               |
| Emphasis on consultation and cooperation |                        |   |   |   |   |               |

|   |  |  |  |  |  |  |
|---|--|--|--|--|--|--|
| Modification of machinery frequently to reduce setup times  |  |  |  |  |  |  |
| A strategy of exposing problems rather than covering up and revealing bad practices   |  |  |  |  |  |  |
| Use of MRP tools such as Master Production Schedules, Bill of Materials, Product structure etc                                  |  |  |  |  |  |  |
| Preventive maintenance  |  |  |  |  |  |  |
| A database of information for administering materials flow into and within the organization                                     |  |  |  |  |  |  |
| Database consisting of supplier names and their characteristics   |  |  |  |  |  |  |
|   |  |  |  |  |  |  |
| Transportation routing and data scheduling  |  |  |  |  |  |  |
| Master construction schedules   |  |  |  |  |  |  |
| Inventory levels  |  |  |  |  |  |  |
| Pricing data  |  |  |  |  |  |  |
| Demand forecasts for production   |  |  |  |  |  |  |
| Data on inventory levels for materials, delivery schedules, pricing, forward buys, and suppliers are information provided by MM |  |  |  |  |  |  |
| Inventory planning and control  |  |  |  |  |  |  |
| Elimination of wastage in materials   |  |  |  |  |  |  |



7) On scale of 1 to 5 (where 5 is very significant and 1 least significant) please indicate the importance currently attached to the following materials management practices in relation to the mentioned operations strategies.

a)

| Operations Strategy  | EOQ/EBQ |   |   |   |   |
|--|---------|---|---|---|---|
|  | 1       | 2 | 3 | 4 | 5 |
| Quality of products  |         |   |   |   |   |
| Cost   |         |   |   |   |   |
| Flexibility  |         |   |   |   |   |
| Time/speed (e.g. meeting targets in reference to project completion times) |         |   |   |   |   |
| Innovativeness   |         |   |   |   |   |
| Others (please specify)  |         |   |   |   |   |
| (i)  |         |   |   |   |   |
| (ii)   |         |   |   |   |   |
| (iii)  |         |   |   |   |   |

b)

| Operations Strategy  | Inventory management |   |   |   |   |
|--|----------------------|---|---|---|---|
|  | 1                    | 2 | 3 | 4 | 5 |
| Quality of products  |                      |   |   |   |   |
| Cost   |                      |   |   |   |   |
| Flexibility  |                      |   |   |   |   |
| Time/speed (e.g. meeting targets in reference to project completion times) |                      |   |   |   |   |
| Innovativeness   |                      |   |   |   |   |

|                         |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| Others (please specify) |  |  |  |  |  |
| (i)                     |  |  |  |  |  |
| (ii)                    |  |  |  |  |  |
| (iii)                   |  |  |  |  |  |

c)

| Operations Strategy  | Material Requirement Planning (MRP) |   |   |   |   |
|--|-------------------------------------|---|---|---|---|
|  | 1                                   | 2 | 3 | 4 | 5 |
| Quality of products  |                                     |   |   |   |   |
| Cost   |                                     |   |   |   |   |
| Flexibility  |                                     |   |   |   |   |
| Time/speed (e.g. meeting targets in reference to project completion times) |                                     |   |   |   |   |
| Innovativeness   |                                     |   |   |   |   |
| Others (please specify)  |                                     |   |   |   |   |
| (i)  |                                     |   |   |   |   |
| (ii)   |                                     |   |   |   |   |
| (iii)  |                                     |   |   |   |   |

d)

| Operations Strategy                 | Manufacturing Resource Planning (MRPII) |   |   |   |   |
|-------------------------------------|---|---|---|---|---|
|                                     | 1                                       | 2 | 3 | 4 | 5 |
| Quality of products                 |   |   |   |   |   |
| Cost                                |   |   |   |   |   |
| Flexibility                         |   |   |   |   |   |
| Time/speed (e.g. meeting targets in |   |   |   |   |   |

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| reference to project completion times) |  |  |  |  |  |
| Innovativeness                         |  |  |  |  |  |
| Others (please specify)                |  |  |  |  |  |
| (i)                                    |  |  |  |  |  |
| (ii)                                   |  |  |  |  |  |
| (iii)                                  |  |  |  |  |  |

e)

| Operations Strategy  | <b>JUST-IN-TIME (JIT)</b> |   |   |   |   |
|--|---------------------------|---|---|---|---|
|  | 1                         | 2 | 3 | 4 | 5 |
| Quality of products  |                           |   |   |   |   |
| Cost   |                           |   |   |   |   |
| Flexibility  |                           |   |   |   |   |
| Time/speed (e.g. meeting targets in reference to project completion times) |                           |   |   |   |   |
| Innovativeness   |                           |   |   |   |   |
| Others (please specify)  |                           |   |   |   |   |
| (i)  |                           |   |   |   |   |
| (ii)   |                           |   |   |   |   |
| (iii)  |                           |   |   |   |   |

f)

| Operations Strategy  | <b>SUPPLY CHAIN MANAGEMENT (SCM)</b> |   |   |   |   |
|--|--------------------------------------|---|---|---|---|
|  | 1                                    | 2 | 3 | 4 | 5 |
| Quality of products  |                                      |   |   |   |   |
| Cost   |                                      |   |   |   |   |
| Flexibility  |                                      |   |   |   |   |
| Time/speed (e.g. meeting targets in reference to project completion times) |                                      |   |   |   |   |
| Innovativeness   |                                      |   |   |   |   |
| Others (please specify)  |                                      |   |   |   |   |
| (i)  |                                      |   |   |   |   |
| (ii)   |                                      |   |   |   |   |
| (iii)  |                                      |   |   |   |   |

8) On a scale of 1 to 5 (where 5 is most important and 1 least important) indicate the level of importance attached to the following materials management practices in your Organization.

| Function                          | <b>Level of importance</b> |   |   |   |   |
|-----------------------------------|----------------------------|---|---|---|---|
|                                   | 1                          | 2 | 3 | 4 | 5 |
| Production and Materials planning |                            |   |   |   |   |
| Materials Handling                |                            |   |   |   |   |
| Procurement of inventory          |                            |   |   |   |   |
| Distribution                      |                            |   |   |   |   |
| Control of material               |                            |   |   |   |   |

|                         |  |  |  |  |  |
|-------------------------|--|--|--|--|--|
| costs                   |  |  |  |  |  |
| Communication           |  |  |  |  |  |
| Others (please specify) |  |  |  |  |  |
| (ii)                    |  |  |  |  |  |
| (iii)                   |  |  |  |  |  |

Communication

9) What are the challenges/risks with respect to each of the following materials management functions?

**Production and materials planning**

.....

.....

.....

.....

**Procurement of inventory**

.....

.....

.....

.....

**Distribution**

.....

.....

.....

.....

**Materials handling**

.....

.....

.....

.....

## Control of material costs

.....

.....

## APPENDIX 2 CLASSIFICATION OF CONTRACTORS

.....

| CLASS | CLASSIFICATION          |             |
|-------|-------------------------|-------------|
| A     | Unlimited and more than | 100 Million |
| B     | Up to                   | 50 Million  |
| C     | Up to                   | 25 Million  |
| D     | Up to                   | 10 Million  |
| E     | Up to                   | 5 Million   |
| F     | Up to                   | 2 Million   |
| G     | Up to                   | 1 Million   |
| H     | Up to                   | 500,000     |

Source: Ministry of Public Works and Housing, 2003

**Appendix 3 : CLASSIFICATION OF CONTRACTORS**

| CLASS | CLASSIFICATION          | THRESHOLD   |
|-------|-------------------------|-------------|
| A     | Unlimited and more than | 100 Million |
| B     | Up to                   | 100 Million |
| C     | Up to                   | 75 Million  |
| D     | Up to                   | 50 Million  |
| E     | Up to                   | 25 Million  |
| F     | Up to                   | 10 Million  |
| G     | Up to                   | 5 Million   |
| H     | Up to                   | 2 Million   |

Source: Ministry of Public Works and Housing, 2003

## APPENDIX 4: SAMPLING FRAME - CLASS A BUILDING CONTRACTORS

|    | REG. | CONTRACTOR NAME                         | ADDRESS   | OWNERSHIP |
|----|------|---|-----------|-----------|
| 1  | 5977 | Aristocrats Conc. Ltd                   | 30118 NRB | Kenyan    |
| 2  | 61   | Atlas Plumbers (K) Ltd                  | 10661 Nrb | Kenyan    |
| 3  | 3392 | BIRDI Civil Engineering                 | 58223 NRB | Kenyan    |
| 4  | 26   | Carpentocraft Building Contractors      | 28138NRB  | Foreign   |
| 5  | 2670 | Cementation Contractors Limited         | 32802 NRB | Kenyan    |
| 6  | 538  | Cementers Limited                       | 42426 NRB | Foreign   |
| 7  | 3914 | Charasons Limited                       | 12437 NRB | Kenyan    |
| 8  | 3043 | Coast Projects Limited                  | 87532 MSA | Foreign   |
| 9  | 1142 | Come-cons Africa Limited                | 18429 NRB | Kenyan    |
| 10 | 63   | Continental Builders                    | 41845 NRB | Kenyan    |
| 11 | 5152 | Crescent Building construction Co       | 49094 NRB | Foreign   |
| 12 | 2426 | Dhanjal Brothers Ltd                    | 82909 NRB | Kenyan    |
| 13 | 1037 | Donwoods Company Ltd                    | 73667 NRB | Kenyan    |
| 14 | 1647 | Epcoc Builders Limited                  | 55628 NRB | Kenyan    |
| 15 | 1633 | Ernie Campbell & Co. Ltd                | 47284 NRB | Foreign   |
| 16 | 2246 | G. Issaias & Company<br>(Kenya) Limited | 43500 NRB | Foreign   |
| 17 | 84   | H. Young & Company                      | 30118 NRB | Foreign   |
| 18 | 3012 | Hayer Bishan Singh & Sons               | 253 KSM   | Kenyan    |
| 19 | 3218 | Intex Building construction Ltd         | 60293 NRB | Kenyan    |



|    |      |   |                   |            |
|----|------|---|-------------------|------------|
| 20 | 219  | Jina Ratna Contractors                          | 40812 NRB         | Foreign    |
| 21 | 4574 | Jipsy Civil & Building Contractors              | 58824 NRB         | Kenyan     |
| 22 | 422  | Kartar Singh Nyeri Ltd                          | 5 NYERI           | Foreign    |
| 23 | 747  | Karuri Civil Eng. Ltd                           | 32126 NRB         | Kenyan     |
| 24 | 858  | Kay Building construction Co.                   | 43114 NRB         | Non Kenyan |
| 25 | 597  | Kaydee Building construction Co.                | 81141 MSA         | Kenyan     |
| 26 | 224  | Kirinyaga Building construction (K) Ltd         | 48632 NRB         | Kenyan     |
| 27 | 393  | Kishore Building construction                   | 43598 NRB         | Kenyan     |
| 28 | 5539 | Konoike Building construction Co.               | 59236 NRB         | Kenyan     |
| 29 | 403  | Lalji Meghji Patel & Company Ltd                | 48514 NRB         | Foreign    |
| 30 | 646  | Laxmanbhai Building construction Ltd            | 44706 NRB         | Foreign    |
| 31 | 548  | Mavji Consruction Co. Ltd.                      | 84452 MSA         | Foreign    |
| 32 | 1082 | Mistry Jadva Parbat & Co. Ltd.                  | 90643 MSA         | Kenyan     |
| 33 | 5282 | Mondola Ltd                                     | 39462 NRB         | Foreign    |
| 34 | 954  | Mowlem Building construction Co. Ltd            | 30078 NRB         | Foreign    |
| 35 | 2249 | Mugoya Building construction & Eng. Ltd         | 47011 NRB         | Kenyan     |
| 36 | 447  | Mulji Devraj (E.A.) Ltd                         | 82261 MSA         | Foreign    |
| 37 | 2700 | Neliwa Builders& Civil Engineers                | 51337 NRB         | Kenyan     |
| 38 | 4    | Njunguna Builders & Plumbers<br>Drainlayers Ltd | 53621 NRB         | Kenyan     |
| 39 | 1013 | Nyakio General Building construction Ltd.       | 63053 Ngong HILLS | Kenyan     |
| 40 | 3456 | Ongata Works Limited                            | 58160 NRB         | Kenyan     |

|    |      |  |           |            |
|----|------|--|-----------|------------|
| 41 | 2313 | Orbit Enterprises  | 49604 NRB | Kenyan     |
| 42 | 1784 | Pelican Engineering &<br>Building construction Co. Limited | 18755 NRB | Kenyan     |
| 43 | 2638 | S.S. Mehta & Sons Ltd.                                     | 41853 NRB | Kenyan     |
| 44 | 3075 | Seyani Brothers Co.  | 60070 NRB | Non Kenyan |
| 45 | 6036 | Siesta Investment Ltd.                                     | 21313 NRB | Kenyan     |
| 46 | 2847 | Spenco Limited   | 14294 NRB | Foreign    |
| 47 | 3456 | Stirling Civil Engineering (K) Ltd                         | 40770 NRB | Foreign    |
| 48 | 2455 | Sumitomo Building construction Co. Ltd.                    | 48794 NRB | Foreign    |
| 49 | 5835 | Tusk Building construction Limited                         | 47011 NRB | Kenyan     |
| 50 | 1453 | V.K. Building construction Co. Ltd                         | 11949 NRB | Foreign    |
| 51 | 1556 | Vakkep Building Contractors                                | 42147 NRB | Kenyan     |
| 52 | 70   | Victory Building construction Co. Ltd                      | 45329 NRB | Kenyan     |
| 53 | 2341 | Warren Enterprises Ltd                                     | 48139 NRB | Foreign    |
| 54 | 1134 | Zenneth Steel Fabricators Limited                          | 18314 NRB | Kenyan     |