THE UNIVERSITY OF NAIROBI

A STUDY ON EFFECTIVE BUILDING MATERIAL MANAGEMENT BY KENYAN LOCAL CONTRACTORS: EMPHASIS ON PROCUREMENT

A CASE STUDY OF NAIROBI COUNTY

BY

GATHONI ANTHONY MBUGUA

B66/0797/2010

A RESEARCH PROJECT SUBMITTED IN PART FULFILLMENT FOR THE AWARD OF BACHELOR OF QUANTITY SURVEYING DEGREE IN THE DEPARTMENT OF REAL ESTATE AND CONSTRUCTION MANAGEMENT, SCHOOL OF THE BUILT ENVIRONMENT.

MAY 2014
DECLARATION

I, GATHONI ANTHONY MBUGUA, hereby declare that this research project is my original work and has not been presented for examination for a degree in this university or any other university.

………………………..                                                                   …………………………..

Signature                                                                                                        Date

Anthony Mbugua

With the university supervisor and approval of

………………………..                                                                   …………………………..

Signature                                                                                                        Date

QS. Tom O. Oketch (B.A Building Economics M.A Construction Management)
ACKNOWLEDGEMENT

I wish to acknowledge the assistance of the many people who helped me through encouragement and in many other ways to achieve the completion of this work and to all of them I am very thankful. However some of them I feel the need for particular mention.

I am particular indebted to my supervisor, QS. Tom O. Oketch for his worthy comments, assistance and the guidance he provided in the course of my work.

I also thank all my lecturers and staff in the department for their tireless efforts and dedication to educate and train me up to this far.

Thanks to all those who offered to kindly respond to questionnaires of this study.

I express my sincere thanks to my class mates for their support and encouragement throughout the course. At the top of the list are Shaban, Macharia, Maingi, Kobia, Karuoya, Munyua, Abu and Mac.

I would also like to thank my mum Mrs Joyce Gathoni Mbugua, for her care, effort and commitment to educate me. I also thank Mr and Mrs John Kibandi for their support and guidance

Above all I thank Almighty God for His love and the gift of life. His grace has been sufficient for me.

GOD BLESS YOU ALL
DEDICATION

I wish to dedicate this work to my mum Joyce Gathoni Mbugua. God bless you.
ABSTRACT

The main aim of this study was to study how Kenyan local contractors can effectively manage building materials particularly on procurement. In the building contract or otherwise stated the contractor shall procure building materials in accordance with the contract. It is therefore important for the contractor to procure the building materials in time so as to avoid project delays.

The study objectives of this study are to:

i. To identify the various challenges facing the local contractors in the procurement of building materials.

ii. To identify the sources of these challenges.

iii. To suggest possible solutions that would minimise the challenges ascertained

The research hypothesis was that the challenges facing Kenyan local contractors in the procurement of building materials are mainly caused by factors beyond their control.

To prove this argument two sets of questionnaires were administered. The first one to local building contractors and the second one to material suppliers within Nairobi County. The total of number local contractors studied were 38 and material suppliers were 29. The result from the fieldwork was analysed using tables, pie charts and bar graphs.

It was found out that most challenges local contractors face were caused by factors which are not within their control. The challenges included delayed payment by clients, suppliers default, government, delayed instructions by the architect and lack of sufficient involvement by structural engineers and quantity surveyors etc. Various possible solutions were evaluated.
# TABLE OF CONTENT

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>I</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>CONTENTS</td>
<td>v</td>
</tr>
<tr>
<td><strong>CHAPTER ONE: INTRODUCTION OF THE STUDY</strong></td>
<td>1</td>
</tr>
<tr>
<td>1.1 Background information</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Problem statement</td>
<td>3</td>
</tr>
<tr>
<td>1.3 Research questions</td>
<td>4</td>
</tr>
<tr>
<td>1.4 Objectives of the study</td>
<td>5</td>
</tr>
<tr>
<td>1.5 Study hypothesis</td>
<td>5</td>
</tr>
<tr>
<td>1.6 Justification and significance of the study</td>
<td>5</td>
</tr>
<tr>
<td>1.6.1 Reduction in costs</td>
<td>5</td>
</tr>
<tr>
<td>1.6.2 Marketing</td>
<td>5</td>
</tr>
<tr>
<td>1.7 Scope and limitations of the study</td>
<td>5</td>
</tr>
<tr>
<td>1.8 Assumptions of the study</td>
<td>6</td>
</tr>
<tr>
<td>1.9 Organisation of the study</td>
<td>6</td>
</tr>
<tr>
<td>1.8 Definitions of terms</td>
<td>7</td>
</tr>
<tr>
<td><strong>CHAPTER TWO: LITERATURE REVIEW</strong></td>
<td>8</td>
</tr>
<tr>
<td>2.1 Materials</td>
<td>8</td>
</tr>
<tr>
<td>2.2 Building materials commonly used in Kenya</td>
<td>10</td>
</tr>
<tr>
<td>2.3 The demand of building materials</td>
<td>14</td>
</tr>
<tr>
<td>2.4 Factors affecting the demand for building materials</td>
<td>15</td>
</tr>
<tr>
<td>2.5 Composition of construct demand</td>
<td>17</td>
</tr>
</tbody>
</table>
2.5.1 Demand for various types of construction .......................................................... 17
2.6 The supply of building materials .............................................................................. 19
  2.6.1 Development of a building material supply industry .............................................. 19
  2.6.2 Factors causing constraints in the establishment of building materials industry ...... 20
  2.6.3 Building material supply industry in Kenya .......................................................... 20
2.7 Driving forces for the equilibrium between demand and supply of building materials ... 21
2.8 Procurement .............................................................................................................. 21
  2.8.1 Who procures in an organization? ........................................................................ 22
  2.8.2 Demand Justifies Procurement Action .................................................................. 23
2.9 Procurement and purchasing ....................................................................................... 23
2.10 Procurement process ............................................................................................... 24
2.11 Procurement of materials in the construction industry .............................................. 25
2.12 The purchasing department in the construction industry ......................................... 25
  2.12.1 The positions in the purchasing department ......................................................... 26
  2.12.2 Qualifications for purchasing positions ................................................................. 28
2.13 Procurement process in the construction industry .................................................... 29
  2.13.1 Recognition and description of the need ................................................................. 29
  2.13.2 Selection of potential suppliers or vendor ............................................................. 31
  2.13.3 Ascertaining the price through negotiating and competitive bidding ................. 37
  2.13.4 Placing the order .................................................................................................. 38
  2.13.5 Receipt and checking of deliveries from suppliers ............................................... 39
  2.13.6 Progressing and expediting ............................................................................... 40
2.14 Material scheduling .................................................................................................. 42
2.15 Planning for procurement of materials ....................................................................... 42
2.16 Planning using Critical Path Method (CPM) ................................................................. 43
2.17 Procurement schedule ............................................................................................. 45
2.18 Monitoring Procurement Commitments ................................................................... 45
2.19 Choosing a minimum cost procurement source ....................................................... 46
LIST OF TABLES

Table 2.1 Classification of materials.................................................................9
Table 2.2 List of cement manufacturers in Kenya.............................................11
Table 2.3 Common metals in Kenya.................................................................11
Table 2.4 Percentage distribution of construction demand.............................17
Table 2.5 Percentage distribution of construction between private and public sector...18
Table 3.1 List of contractor categories and value limits.....................................53
Table 4.1 Response from Participants...............................................................58

LIST OF FIGURES

Figure 2.1 Cement production and consumption in Kenya............................10
Figure 2.2 Procurement schedule.................................................................41
Figure 2.3 Purchase commitment curve.........................................................46
Figure 4.2 Source of finance...........................................................................59
Figure 4.3 Financial problems.........................................................................60
Figure 4.4 Problems obtaining finance............................................................60
Figure 4.5 Source of materials.......................................................................61
Figure 4.6 Problems obtaining material from source........................................62
Figure 4.7 Transportation of building materials...............................................63
Figure 4.8 Problems in transportation..............................................................63
Figure 4.9 Chart of organization.....................................................................64
Figure 4.10 Procedure of ordering building material………………………………………..65

Figure 4.11 Presence of procurement schedule……………………………………………….66

Figure 4.12 Presence of a follow up system……………………………………………………66

Figure 4.13 Supplier cooperation in the follow up system…………………………………67

Figure 4.14 Purchase records……………………………………………………………………68

Figure 4.15 Architect’s instruction………………………………………………………………68

Figure 4.16 Architect requests…………………………………………………………………….69

Figure 4.17 Involvement of Quantity Surveyor………………………………………………70

Figure 4.18 Involvement of the Engineer…………………………………………………………71

Figure 4.19 Material unavailability……………………………………………………………72

Figure 4.20 Actions taken by suppliers…………………………………………………………73

Figure 4.21 Transportation……………………………………………………………………74

Figure 4.22 Problems in transportation…………………………………………………………74

Figure 4.23 Delivery of wrong quantities of materials………………………………………75

Figure 4.24 Follow up on delivered materials………………………………………………76

Figure 4.25 Replacement of damaged material……………………………………………77

Figure 4.26 Duration of replacement…………………………………………………………77

Figure 4.27 Level of government’s effort………………………………………………………78

LIST OF CHARTS

Chart 4.1 Response to questionnaires………………………………………………………59
LIST OF ABBREVIATIONS

G.D.P- Gross Domestic Product

B.S - British Standard

C.P.M- Critical Path Method

N.C.A- National Construction Authority

J.B.C- Joint Building Council
CHAPTER ONE

INTRODUCTION OF THE STUDY

1.1 Background information

According to Duggal (1998) building materials have an important role to play in this modern age of technology. Although their most important use is in construction activities, no field of engineering is conceivable without their use. Also, the building materials industry is an important contributor in our national economy as its output governs both the rate and the quality of construction work.

There are certain general factors which affect the choice of materials for a particular scheme. Perhaps the most important of these is the climatic background. Obviously, different materials and forms of construction have developed in different parts of the world as a result of climatic differences. Another factor is the economic aspect of the choice of materials. The rapid advance of constructional methods, the increasing introduction of mechanical tools and plants and changes in the organisation of the building industry may appreciably influence the choice of materials (S. K. Duggal, 1998)

Due to the great diversity in the usage of buildings and installations and the various processes of production, a great variety of requirements are placed upon building materials calling for a very wide range of their properties; strength at low and high temperatures, resistance to ordinary water and sea water, acids and alkalis etc. Also, materials for interior decoration of residential and public buildings, garden sand parks should be, by purpose, pleasant to the eye, durable and strong. After the choice of materials has been made procurement can now begin.

The construction industry in Africa particularly in Kenya has recorded exponential growth for the last couple of years. The growth is also set to continue as the government and the private developers increase their investment in infrastructure and housing. The growth is mirrored by the significant increase in consumption of cement from 667.1 million tonnes in 2006 to 779.3 million tonnes, representing a growth of 16.8 percent. (Business Construction Review, December 2010)

This has led to the application of improved techniques influencing production rates, construction processes and total quantity of materials used each year have brought about
considerable change in the construction industry. Individual contracts have increased in size and value, necessitating more sophisticated management techniques and increased mechanization of the construction process. All this has increased the demand for materials beyond the traditional sources of supply hence plants for the local manufacture of building materials such as cement, lime, clay bricks and tiles, iron and steel products, fixtures and fittings, paints etc. have been set up in Kenya during the past 25 years. Therefore this increase in demand has led to an increase in procurement of building materials.

Material management is concerned with the planning, identification, procuring, storage, receiving and distribution of materials. The purpose of material management is to assure that the right materials are in the right place and in the right quantities when needed. The basis of material management is the flow of materials from the time they are ordered, received and stored until they are used.

There are many definitions of material management by different researchers. Ballot (2006) defines material management as the process of planning, acquiring, storing, moving and controlling materials to effectively use facilities, personnel, resources and capital.

Tersine and Campbell (1977) define material management as the process to provide the right materials at the right place at the right time in order to maintain a desired level of production at minimum costs.

Ammer, Dean (1991) defines material management as the process in which a company acquires materials that it needs to achieve their objectives. This process usually begins with the requisites of materials from the supplier until the material is used or incorporated into a product.

Baily and Farmer (2009) defines material management as a concept concerned with the management of materials until the materials have been used and converted into the final product. Activities include cooperation with designers, purchasing, receiving, storage, quality control, inventory control and material control.

Stukhart (2007) defines material management as the activities involved to plan, control, purchase, expedite, transport, storage and issue in order to achieve an efficient flow of materials and that materials are bought in the required quantities at the required time, with the required quality and acceptable price.
Therefore according to Tersine and Campbell (1977), Ammer Dean (1991) and Stukhart (2007), typical tasks associated with a material management system are identification of materials, procurement, storage, expediting, materials handling and inventory control. This study will focus on procurement as typical task in material management. Procurement is the acquisition of goods, services or works from an external source. It is favourable that all that the goods, services or work are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality, quantity, time and location.

1.2 Problem statement

The effective management of materials particularly the procurement of materials plays a key role in the successful completion of a project. The cost of materials is a very important and vital subject for every construction company and should be handled effectively for the successful completion of the project. This is because materials account for a big part production and project costs. Bernold and Treseler (1991), argues that materials account for 50-60% of the project cost. The overall cost of materials is high because it includes, in addition the manufacturer selling cost, the cost of the material, the cost of procurement (cost of placing, processing and paying the material, physical distribution and the distribution of materials) and site handling costs (costs of receiving, storage, issuing and disposal).

Materials are critical in the operations in every industry particularly in the construction industry, since unavailability of materials can stop production. Mbatha (1986), in his studies of building contracts performance in Kenya cited that unavailability of building materials as a significant factor causing delays in completion of construction projects. Delays usually affect the performance of a building project negatively through fluctuations in cost of building materials and labour. Also according to Bakuli (1986), shortage of building materials was ranked fourth from a list of seven problems faced by contractors in Kenya. However both Mbatha (1986) and Bakuli (1986) did not look at problems local Kenyan contractors face in the procurement of building materials as the major cause of unavailability of building materials leading to construction delay. In his undergraduate studies, Agaromba (1997) argued that government project delays hinder the supply of housing and public amenities such as schools and hospitals. Unavailability of materials due to problems faced by contractors in procurement of building materials could also lead to excessive quantities of materials hence create serious problems to the contractor. Storage of these excess materials can increase the cost of production and the total cost of any project. When there are limited areas available for storage, the contractor may have to find other alternatives to store the
materials until they are needed. Some of these alternatives might require re-handling of materials, which will increase the costs associated with them.

The building industry has not only become a major consumer of materials and energy but it has also become a source of pollution, through consumption of dangerous materials that cause cancer and also other poisons and plastics. The picture becomes quite complex when considering that around 80,000 chemicals are in use in the building industry and that the number of health damaging chemicals has quadrupled (Environmental Resources Limited, pg. 17-21, 2007). A number of common construction materials are considered hazardous wastes when spilled or leaked. Such materials include concrete, curing compounds, asphalt products and paints. These materials may contaminate surface or ground water and therefore there is need for procurement of the right quantity of materials and at the right time on site. Poor strategy in procurement due to the problems faced by contractors may lead to excess quantities of materials with harmful chemicals which may create difficulty in storage especially if there is inadequate space and hence pollution may occur.

One of the major factors that lead to the stall of construction projects or delays in practical completion of works is the delay in deliveries of materials to site. Timely procurement of material represents a key role in the successful completion of the work. It is important to the contractor to consider that there may be significant difference in the date that the material was requested or the date when the purchase order was made and the time at which the material will be delivered.

1.3 Research questions.
1. What challenges do Kenyan local contractors face in the process of procuring building materials?
2. Are these challenges beyond his control or not?
3. What are the possible solutions that may be used to reduce these challenges Kenyan local contractors face in procuring of materials?
1.4 Objectives of the study

The objectives of this study include;

1. To identify key challenges Kenyan local contractors face in the procurement of building materials.
2. To identify the sources of these challenges.
3. To suggest possible solutions to minimise the challenges ascertained.

1.5 Study hypothesis

The problems facing Kenyan local contractors in the procurement of building materials are mainly caused by factors which beyond his control.

1.6 Justification and significance of the study

The findings from these study will create awareness of the problems the contractors’ faces and will offer suggestions on how they can be avoided. This when achieved will be beneficial to contractor or even the client. For example

1.6.1 Reduction in costs

According to Ogola (1993), building material contribution to total building costs account for 55 percent compared to 27 percent of labour and 18 percent of plant. Therefore shortage of materials will lead to delay or even abandonment of the project leading to both time and cost infringements of construction plans. Therefore if the problems are well solved, construction cost will reduce in the long run to the benefit of the client and the contractor.

1.6.2 Marketing

Contractors who make the effort to complete their construction projects in time due to timely planning of procurement of building materials will have market themselves. This is an important marketing tool for the contractor especially in this era of liberalized economies.

1.7 Scope and limitations of the study

The researcher will limit himself to only one task associated with a material management system. The tasks is procurement of materials. This is because this task is the most critical part of a material management system, since it affects cost, time and productivity of a construction project directly.

Due to the limitations of fund and time constraints, coupled with the fact that contractor’s population within Nairobi is considerable high than that of all the other towns in Kenya, the
study area will be Nairobi County. According to Tom O. Oketch (2004), Nairobi County has diverse construction sites with the largest share of big building projects amounting to over 70% of the national output. Therefore the researcher would be de-limited to Nairobi County and information obtained would be assumed to be a true representative of the population.

1.8 Assumptions of the study
This research will be conducted with an assumption in mind. This assumption is that all the materials are purchased within the country i.e. there is no importation of materials from other countries.

1.9 Organisation of the study
Chapter 1
This chapter will cover background information, the problem statement, research questions, and the objectives of the study, study hypothesis, justification and significance, scope and limitations of the study, assumptions of the study, research methodology and finally the organisation of the study.

Chapter 2
This chapter will cover literature review from secondary data and conceptual framework.

Chapter 3
This chapter will cover research methodology.

Chapter 4
This chapter will cover research findings, data presentation and analysis.

Chapter 5
This chapter will cover conclusions and recommendations based on the results of the findings. Suggested areas of further study will also be mentioned.
1.8 Definitions of terms
The words used herein shall be deemed to mean as stated below

**Contractor:** A person or firm that has been awarded a contract for the construction and completion of a building.

**Construction delay:** This is where completion of a building project happens later than it should.

**Material unavailability:** Refers to where building materials are not accessible or at hand.

**Project:** Refers to a unique endeavour to produce a sense of deliverance within clearly specified time, cost and quality constraints.

**Management:** This refers to the function that coordinates the efforts of people to accomplish goals and objectives using available resources efficiently and effectively.

**Building materials:** Materials delivered to a building site and to be incorporated as permanent works.

**Local contractor:** A person or firm originally from that country that has been awarded a contract for the construction and completion of a building.

**Procurement:** Is the acquisition of goods, services or works from an external source.

**Prime Cost Items:** These are items that either have not been selected or whose price is not known at the time the contract is entered into, and for which the cost of supply and delivery, the contractor has made allowance for in the contract price.

**Large scale specialized suppliers:** These are suppliers who supply one type of material in great quantities.

**Effective material management:** This is the art of managing materials properly and involves maximizing material productivity that requires well-co-ordinated approach towards various problems related to materials.
CHAPTER 2

LITERATURE REVIEW

2.1 Materials

The Webster’s dictionary defines materials as ‘the elements, constituents or substances of which something is composed or can be made’. Ballot (2006) defines materials as the physical materials that are purchased and used to produce the final product and does not suggest that materials are the final product. In other words, materials are the parts used to produce the final product. Bailey et al (2009) define materials as the goods purchased from sources out of the organisation that are used to produce finished products. Stukhart (2007) defines materials as the items that are used to produce a product and which include raw materials, parts, suppliers and equipment items.

Dobler and Burt (2009) classify materials into five categories. These categories are:

- Raw materials- These are materials that the company converts into processed parts. This might include parts significantly produced for the company and parts bought directly from the shelf. For example bolts and nuts.
- Purchased parts- These are parts that the company buys from outsiders. For example rubber and plastic parts
- Manufactured parts-These are parts built by the company. For example tower case for a computer
- Work in progress-These are semi-finished products found in the various stages in the production process.
- MRO Supplies- These are maintenance, repairing and operating supplies used in the manufacturing process but are part of the final products. For example soap and lubricating oil.

Chandler (2001) states that the construction materials can be classified into different categories depending on their fabrication and in the way that they can handled on site. The categories are

a) Bulk materials- These are materials that are delivered in mass and are deposited in a container.
b) Bagged materials-These are materials delivered in bags for ease handling and controlled use

c) Palleted material-These are bagged materials that are placed in pallets for delivery.

d) Packaged material-These are materials that are packaged together to prevent damage during transportation and deterioration when they are stored

e) Loose materials-These are materials that are partially fabricated and that should be handled individually.

The table below represents some example of commonly used materials in construction and their classification.

**Table 2.1: Classification of materials**

<table>
<thead>
<tr>
<th>Material</th>
<th>Bulk</th>
<th>Bagged</th>
<th>palleted</th>
<th>packaged</th>
<th>loose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard-core</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paving slabs</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timber</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cement</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipes</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Tiles</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Electrical Fittings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Source: Chandler (2001)
2.2 Building materials commonly used in Kenya

a) Cement

In 1845, Isaac C. Johnson invented the cement by increasing the temperature at which the mixture of limestone and clay were burned to form clinker and this cement was the prototype of the modern Portland cement (S.K. Duggal, 1998). Cements are adhesive and cohesive materials which are capable of bonding together particles of solid matter into a compact durable mass. Cement used in construction industry may be classified as hydraulic and non-hydraulic. The latter does not set and harden in water such as non-hydraulic lime or which are unstable in water e.g. Plaster of Paris. The hydraulic cements set and harden in water and give a product which is stable. Portland cement is one of such. Today cement finds extensive use in all types of construction works in structures where high strength is required. Cement is one of the building materials whose data is readily available locally. Cement production in Kenya expanded at an average rate of 11.6% for the period 2006-2011 to 4.09mT in 2011 from 2.41mT in 2006(KNBS Economic Survey, 2009 and 2012). This rise in production was driven by the entry of new cement producers and extensive capacity expansion by existing players in response to increasing competition. As at now, the local cement industry has six cement companies with mines concentrated in three sites across the country.

Figure 2.1: Cement production and consumption in Kenya

Source: KNBS Economic Survey (2009 and 2012)
Table 2.2: List of cement manufacturers in Kenya

<table>
<thead>
<tr>
<th>Cement Company</th>
<th>Mines</th>
<th>Cement Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bamburi Cement LTD (BMBC)</td>
<td>Mombasa</td>
<td>Nguvu</td>
</tr>
<tr>
<td>Athi River Mining LTD (ARML)</td>
<td>Athi River</td>
<td>Rhino</td>
</tr>
<tr>
<td>East Africa Portland Cement (EAPC)</td>
<td>Athi River</td>
<td>Blue Triangle</td>
</tr>
<tr>
<td>Mombasa Cement LTD (MCL)</td>
<td>Athi River</td>
<td>Nyumba</td>
</tr>
<tr>
<td>National Cement Company LTD (NCCL)</td>
<td>Lukenya</td>
<td>Simba</td>
</tr>
<tr>
<td>Savannah Cement Company (SCC)</td>
<td>Athi River</td>
<td>Savannah</td>
</tr>
</tbody>
</table>

Source: KNBS Economic Survey (2009 and 2012)

However there are some cement companies on the verge of joining the industry such as Dangote cement from Nigeria and Cemtech from India.

b) Metal products

In spite of their high costs there will always be a place for metals in the construction industry in Kenya.

Table 2.3: Common metals in Kenya

<table>
<thead>
<tr>
<th>Common Metals</th>
<th>Use in Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>Reinforcement, rainwater goods, roofing, balustrades, nuts, bolts and tubing</td>
</tr>
<tr>
<td>Zinc</td>
<td>Door furniture, roofing and weathering</td>
</tr>
<tr>
<td>Brass</td>
<td>Door furniture</td>
</tr>
<tr>
<td>Copper</td>
<td>Electrical wires</td>
</tr>
</tbody>
</table>
Aluminium Window and door frames, cladding, roofing and rain water goods


The country at present imports almost all the raw materials required for the manufacture of metal products. For example, Kenya imports rare earth minerals, coal and iron ore to produce steel. The locally-sourced scrap metal is also smelted to produce steel billets which are further rolled into reinforcement bars for use in the construction industry. For the production of special products like screws, bolts and nuts, nails and rivets, the local steel mills have to import quality billets. However the recent discovery of rare earth minerals in Kwale, coal in Ukambani and iron ore in Taita Taveta (Manyatta), Tharaka (Marimali) and Siaya(Samia) will make Kenya a steel producer in near future (J.K Machira, 2011). According to Machira (2011) there are almost 20 steel rolling mills in Kenya.

c) Plastic products

Plastics are used for various purpose in construction. These include manufacture of, rain water goods, and window frames wall and floor tiles and in some rare case glazing and in cold water cisterns. The plastic industry in Kenya is well-developed and produces goods made of polyvinyl chloride (PVC), polyethylene, polystyrene and polypropylene. These raw materials are all imported in form of granules and then manufactured locally to various plastic products.

d) Glass products

Glass refers to any material which is largely amorphous (non-crystalline) in solid state (G.D Taylor 2000). Glass is mainly used for glazing which forms a very important part of a building. Ingredients in the manufacture of glass include silica (silicon oxide), sodium carbonate to reduce melting point and calcium carbonate to reduce water solubility of the product. Currently Kenya has no sheet glass plants. There is a growing demand for sheet glass due to increasing construction activities. However Kenya has the capacity to produce sheet glass because there is soda ash production at Lake Magadi.

e) Quarry stones

Quarry stones are used to erect the substructure of the building, walling, facing, boundary walling and chimneys. According to the Kenya NGO Earth Summit 2002 Forum, 70-80% of
quarry stone mining is done by small-scale to artisan miners. Quarry mines are distributed all over the country.

f) Timber

Timber is one of the important materials in construction. It is used mainly for formwork during construction, in door panels, roof trusses, as a finish for floor and wall, frame structure and finally as beams and columns. Kenya has both softwood and hardwood trees. The main softwood species include cedar, podo, pine and cypress. Hardwoods include camphor (for furniture and shelving), mvule (for joinery and furniture), Meru oak and Elgon olive (for parquet flooring). The timber sector in Kenya is not well developed to its full potential this is mainly because in March 2000, the cabinet gave the forest department to carry out inventory of all plantations leading to the closure of 300 saw mills, with 50,000 direct jobs and an estimated 300,000 indirect ones being lost, apart from resulting in timber scarcity (Kenya Association of Manufactures Journal 2010). According to the journal the sector contributes about 5% of the country’s GDP and it is estimated that over 30,000 are currently employed indirectly and another 10,000 directly. The main products that are produced in this sector include poles, chipboards, and block boards, fibreboards, plywood, doors, hardwood, roof trusses and particle boards.

g) Paints

Paint is a liquid surface coating which when dries forms a thin film (S.K Duggal 1998). They can be classified as oil paints, water paints, cement paints, bituminous paints and special paints such as fire proof paints. Ingredients of paint include the pigment which give the desired colour, base which gives the paint its binding properties, vehicle which enables the paint to be spread easily, drier to accelerate drying of the vehicle. Kenya manufactures paint locally but some ingredients like pigments are imported from Taiwan, India and China. The leading paint manufactures include Sadolin Paints, Basco Paints, and Crown Berger. Each of these companies manufactures its own specialized product with some also offering professional painting services and training.

h) Gypsum

This is a non-hydraulic binder occurring naturally as a soft crystalline rock or sand (S.K. Duggal, 1998). Gypsum is mainly used as a ceiling and wall finish. It is mined at a small scale level in Kajiado district in the southwest part of Kenya.
i) **Bituminous materials**

Bitumen occurs naturally in the form of asphalts, which are mixtures of bitumen, minerals and water found in the form of rock or lake asphalt. The majority of bitumen is however produced as a residue from the fractional distillation of crude oil. The properties of bitumen vary greatly according to composition which, in turn, depends on the manufacturing method and crude material. However, all bitumen are thermoplastic. They soften on heating, though they have no well-defined melting point. On cooling they become progressively more brittle. They dissolve in many organic solvents, though this may not always be an advantage. Bitumen is mainly used in road construction, construction of flat roofs and basements. The largest dealer in bituminous products in Kenya is Bitu-bulk Handlers (EA) Ltd. It controls 50% of the market in stocks (Business construction review 2011). Others are Total, KenolKobil, Shell, Engen, Pan African Petroleum Ltd.

2.3 The demand of building materials

Kenya is under rapid development in its infrastructure, urbanisation, commercial and residential buildings and tourism resorts. It is estimated that Kenya’s construction industry value will double from 2010-2015 (16th edition of Build Expo 04-06 May 2013). The demand of building materials therefore has witnessed a precipitous rise.

According to construction industry analysts in Kenya, the residential sector is growing rapidly as both the government and private developers are trying to keep with the high demand of housing, occasioned by the rise in population (4th Kenya Building Material Exhibition 22-25 November, 2012).

As earlier on mentioned, cement production is one of the indicators for the growth of the construction industry. Increased activity in Kenya’s property market in recent years has pushed up cement production to about 400,000 metric tonnes per month. In January 2012, the country’s cement production stood at approximately 300,000 metric tonnes per month but rose to 373,916 in October, the highest in Kenya’s history (Kenya National Bureau of Statistics, 2013). The rise in production is attributed to increased demand for cement in the construction industry as Kenya experiences a boom in the real estate sector.

Steel consumption has also grown tremendously. As it is, the country imports steel which are later distributed by Kenyan dealers who include Athi River Steel Ltd, Brollo Kenya Ltd, Devki Steel Mills Ltd, Accurate Steel Mills Ltd, Elgo Steel Fabricators Ltd, Iron Africa Ltd
and Simba Products Ltd. Steel imports have grown more than 100 percent in the past five years from US $263 million to US $538 million (Kenya Bureau of Statistics, 2013).

2.4 Factors affecting the demand for building materials

According to Moavenzadeh (1984) the building material industry is subject to various influences on demand. It is important to note that the demand for building materials is dependent exclusively upon construction sector activity. The demand for building materials is therefore is seen to be a derived demand for construction industry services. This makes it necessary to treat the two industries as one when examining the factors that affect the demand for their services or products. They are:

a) **Per capita income**.

This refers to the average wealth of a nation. A rise in capita income will result to an increase in the demand of building materials as the people will be able to afford.

b) **Distribution of income**

This refers to how a nations GDP is distributed among its citizens. In developing countries like Kenya income is not distributed evenly. As a result some areas have high income earners while others have low income earners. Therefore areas with high income earners will have more demand of building materials creating a quite different pattern of demand.

c) **Investment patterns**

According to Lipsey (1989) investment refers to putting money into an asset with the expectation of capital appreciation, dividends or interest earnings. Therefore investment especially in the construction industry will result to an increase in the demand of building materials.

d) **Credit policies**

This refers to clear, written guidelines that set the terms and conditions for getting loans from banks or other financial institution (Richard G. Lipsey, 1988). If the credit policies are favourable to an individual, company or partnership then it will easier to acquire loans which may be invested in the construction industry.
e) Risk and uncertainty

Risk and uncertainty are major influences on construction demand. During periods of uncertainty, individuals are simply unwillingly to invest in fixed capital formation. Rather they tend to favour investment in items such as gold, silvery or other works of art.

f) Influence of population shifts on demand

In most countries urbanization of population seems to be moving ahead of the capability to provide adequate housing, thus contributing to a large unfilled demand for construction.

g) Technological change and research

According to Ogolla (1993) changes in both constructional technology and production technologies of building materials will affect the demand for building materials. Research into appropriate materials will also shift demand towards relatively cheaper but standardized building materials as compared to more expensive conventional ones. For example the use of pre-cast concrete components in construction reduce the consumption cement per unit.

Changes in the production technology of building materials would definitely affect future patterns of consumption and demand. This can be exercised through pricing and product substitution. As changing technologies bring new building materials within the purchasing power of low-income consumers in developing countries, the demand for the products which they replace will most likely fall.

h) Availability and prices of building materials

If a building material is readily available and is of a high quality, its demand will be high. However, other materials such as steel have other uses apart from construction. Steel is also used in ship building and also the auto-mobile industry. Therefore there will be competing demand from these sectors. The law of demand also applies in the construction industry as high prices of building materials will result in low demand and low prices of building materials will result in high demand. High prices of building materials is brought about by the high prices of inputs which include labour, price of raw materials, running costs and transportation costs. Any hike in price of these factors will absorbed by the building materials.
2.5 Composition of construct demand

According to Moavenzadeh (1984), the structure of construction demand in developed and developing countries can be presented in several ways. They are discussed below.

2.5.1 Demand for various types of construction

The composition of construction demand in terms of three types of construction which are residential, non-residential and other construction (civil engineering and infrastructure) varies substantially among the developing countries studied by Fred Moavenzadeh and overtime within each individual country. This variability is given in the table below which gives the percentage distribution of construction demand among these three types of construction.

Table 2.4: Percentage distribution of construction demand by type of construction

<table>
<thead>
<tr>
<th></th>
<th>Residential building</th>
<th>Non-residential building</th>
<th>Other construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1962</td>
<td>20</td>
<td>24</td>
<td>56</td>
</tr>
<tr>
<td>1970</td>
<td>38</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>1975</td>
<td>37</td>
<td>22</td>
<td>41</td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>40</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>Kenya</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>37</td>
<td>26</td>
<td>37</td>
</tr>
<tr>
<td>1970</td>
<td>35</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td>1974</td>
<td>30</td>
<td>27</td>
<td>42</td>
</tr>
<tr>
<td>1978</td>
<td>29</td>
<td>27</td>
<td>44</td>
</tr>
</tbody>
</table>

Sources: Bolivia - Banco Central, Cuentas Nacionales 1970-1975
Private versus public sector demand

The distribution of construction demand in terms of public sector and private sector in six countries that were studied by Fred Moavenzadeh (1984) is given below. It is clear that the public sector currently dominates total construction demand ranging from a share of 63 percent in Honduras and Kenya to a high of 90 percent in the case of Tunisia. This also indicates that the bulk of private sector demand is in building construction, particular residential dwellings and that much of the public sector is in the category of other construction (infrastructure and civil engineering projects).

Table 2.5: Percentage distribution of construction between public and private sectors

<table>
<thead>
<tr>
<th></th>
<th>Public sector</th>
<th>Private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Honduras</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>42</td>
<td>58</td>
</tr>
<tr>
<td>1976</td>
<td>53</td>
<td>47</td>
</tr>
<tr>
<td>1979</td>
<td>63</td>
<td>37</td>
</tr>
<tr>
<td><strong>Kenya</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>31</td>
<td>69</td>
</tr>
<tr>
<td>1970</td>
<td>49</td>
<td>51</td>
</tr>
<tr>
<td>1974</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>1978</td>
<td>63</td>
<td>37</td>
</tr>
<tr>
<td><strong>Tunisia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>90</td>
<td>10</td>
</tr>
</tbody>
</table>

Sources: Tunisia- United Nations, Yearbook of Construction Statistics

Kenya-United Nations, Yearbook of Construction Statistics
Demand for new construction versus repair and maintenance

The relatively modest share of maintenance work in total construction demand in developing countries can obviously be accounted for in part by a relatively younger average age of limited stock of constructed facilities. This impression suggests that in many countries the maintenance of existing facilities is being neglected.

2.6 The supply of building materials

It has been established that the output of building materials in developing countries does not sufficiently satisfy demand in general especially for sophisticated industrial goods such as glass (Elijah O.Ogola, 1993). So what is the supply of building materials that is available to meet the deficit caused by the lack of over a year’s building? If it were necessary to take an exhaustive inventory of all the hundreds of kinds of raw and partly finished building materials, such as cement blocks, door knobs, floor finishes, we would have tables of statistics sufficient to fill this entire volume. However such an elaborate stock taking is not required because it would prove little even if prepared.

Building materials are produced as they are needed. The supply is forthcoming when there is evidence of a demand. Building materials are not grown like annual crops and stacked up to warehouses to be sold to the highest bidder (Homer Hoyt, 1980). Consequently, the quantity of finished building material, now on the shelves, has little bearing on the quantity that could be produced if a building boom stimulated production. We need only to look at the amount of timber, quantity of steel, the quantity of cement, the volume of common clay, and the deposits of limestone. Mother earth is the primary source of these building materials and therefore it can be safely said that the supply of these basic materials is sufficient for all housing requirements that will rise now and for many years to come.

2.6.1 Development of a building material supply industry

The establishment of building materials manufacture in developing countries will depend on both economic and technical considerations (Fred Moavenzadeh, 1984). First and foremost, the first step in establishing a building material plant is to perform a pre-investment survey and market study. This is commonly known as a feasibility study. The existing building skills must also be assessed before the suitability of any new building material can be produced. The geographical extent of the market is important and depends partly on size,
weight and usually required quantity of any given building material. If a building material has a wide market it will be easy to establish its plant. This is because the availability of a ready market.

The costs of production are also important to consider in the establishment of a building material plant. These costs are directly related to the cost of labour, raw materials, production supplies and maintenance. These factors, in turn are influenced by the availability, accessibility and quality of appropriate raw materials, labour and production supplies in the needed quantities, the type, location and size of the plant.

2.6.2 Factors causing constraints in the establishment of building materials industry

However there are a number of factors causing constraints in the supply of building materials. According to Ogolla (1993) they are as follows.

A) Low value : weight ratio of building materials

Some building materials have a low value: weight ratio making transportation difficult and even more expensive

B) Inadequate local support industries

Support industries include the capital goods industry which supply the equipment necessary to manufacture building materials such as cement. These equipment are all imported and are very expensive.

C) Capital cost of initiating and maintaining operations.

The capital expenditures necessary to establish various building materials plant vary from a very small amount for bricks to several million dollars for steel (Fred Moavenzadeh, 1984).

2.6.3 Building material supply industry in Kenya

The building materials industry is an important contributor to the Kenyan economy and also makes a major contribution to the quality of housing in Kenya. Most African countries including Kenya over the recent years have made a remarkable progress in establishing plants to manufacture building materials so as to meet the high demands. Republic of Kenya: Development Plan (1974-1978) described the Kenya’s building industry as having been established and further stated that the cost of houses only constituted 25 to 30 percent of imported materials by value. The industry is composed of a wide variety of companies that
make a vast array of products used in both residential and non-residential construction. Although the products differ, the companies typically face many of the same pressure and constraints.

a) They are dependent on the same source of demand (residential and non-residential)
b) They are subject to the same regulatory constraints (building codes and standards)
c) They are exposed to shifts in demand for their products from constantly evolving technologies and practices
d) They operate within the same, increasingly, competitive, global market place.

2.7 Driving forces for the equilibrium between demand and supply of building materials

The equilibrium between demand for and supply of building materials is basically determined by the availability and prices of a good in the market. The guarantee of continuous supply of materials is of great importance so as to attain improved performance and development. Lack of materials cannot be compensated either by organizational measures or by good equipment (W.C. Benton 2010). High prices of building materials negatively affect the activity level of construction. The more available building materials are, the lower the prices of those materials.

According to Bernold and Treseler (2011) the cost of building materials constitutes a main element that controls the cost budget for housing in developing countries therefore the factors that determine that cost are crucial to understand the dynamism of demand and supply. Apart from the shortage of materials, the distribution of materials is a contributory factor to the equilibrium between demand and supply this is because the cost of transport is a major component of materials price. The enormous size of poor transport infrastructure of developing countries as well as the unbalanced distribution of production facilities are invariably responsible for creating a gap between demand and supply of building materials. For example a 50kg bag of cement costs KSH 850 in Bungoma, Western Kenya, whilst it costs KSH 750 only in Nairobi.

2.8 Procurement

It is difficult to imagine any commercial organization which is so self-sufficient that it does not need to purchase materials, components and services from others. Such is the interdependence of modern society that we are all buyers and sellers and every company relies on the skills of its procurement department to ensure an inward of defect-free goods and serves, on time and on the right price. Procurement is involved with acquisition,
possession and conversion of what is to be sold (Anyon G.J. 1963). It also involves decision making that draws upon affect every phase of an organization and is the obligation of the overall management. The point of coordinated effort where procurement’s interlocking activity is performed is the fulfilment of management’s procurement obligation as well as the point of material’s control. Whenever the volume and complexity of the activity in procurement justifies it, there may be a division of labour established, by using specialists for each cluster of activities. One cluster gravitates around the nurturing and managing of all the means and agencies available, to fabricate completely or in part what is needed by the customer. This activity becomes the conversion process which is the production end of an organization.

The need for further specialization may lead to a further division of labour for example planning and control. Another cluster rotates around acquiring what is needed, by means other than the process of creation and conversion. Purchasing is central to this cluster of activity. This group is the receiving line that buys, subcontracts what is needed to supply the conversion process, so that production can make what the customer wants. The tasks involved in possession of what has to be available whether made or bought, create the bridge between “making”, “buying” and “selling”. According to Anyon G.J (1963) possession is a burden born out of the failure to accomplish interstitial balance between these activities.

2.8.1 Who procures in an organization?

In many organizations the purchasing department is the one that carries out procurement of materials or services. It may have different talents available at different times to meet the needs of each incident in the procurement process. The financial officer of the company may be involved on those occasions where commitments and costs of error in procurement may affect the financial status of the company. Certain requisitions may be routed across the budget officer’s desk in order to police the expenditure authorizations in planned procurement programs of any special import.

The production talent may become active in the acquiring aspects of the receiving line, where the technology involved may create special problems of capacity limitations. Engineering talent and product development know-how may be mustered to strengthen the receiving line’s ability to resolve critical problems of specifications or their equivalents. Sales representation may have to be strengthened on the receiving line of the purchase department.
where style factors are of great importance or when customer’s requirement are unique. Thus the best brains are made available as need dictates.

According to Anyon (1963) the purchasing department is a bulwark of procurement and as a specialization its contributions to procurement can be great. The purchasing department may perform a facilitating service in establishing and maintaining the organization needed to get the most economical use of the company’s talent and resources by satisfying all the needs in the market place by itself. In this role it becomes the buyer for all the users, the point of accountability for the proper performance of all acquiring activities.

As a source of specialized know-how, the purchasing department may become the administrative centre from which come all the directives and where are designed all the procedures to guide the entire management team in purchasing.

2.8.2 Demand Justifies Procurement Action

Demand is the stimulus of procurement and the justification for its existence (W.J Fabrycky, 1967). Demand at retail level causes the retailer to place orders upon the wholesaler. Orders placed upon the wholesaler by several retailers necessitate procurement from the factory distributor. The factory distributor places orders upon the factory to meet the demand caused by orders placed by wholesalers. To satisfy its several factory distributor, the factory must procure raw materials and component parts as well as indirect material, production equipment and tools, and maintenance and operating supplies. Material and equipment suppliers must initiate procurement action from their respective sources to meet the demand placed upon them. This illustrates the sequence of procurement activities beginning with consumer wants and terminating with the demand for raw materials by the supplier. Therefore, procurement action is the process through which demand is satisfied.

2.9 Procurement and purchasing

In the traditional sense, there is a significant difference between purchasing and procurement. Procurement describes the activities and processes to acquire goods and services. Importantly and distinct from purchasing, procurement involves activities involved in establishing fundamental requirements and negotiating contracts. Purchasing entails only the process of ordering and receiving of goods and services. It denotes the action to obtain something by the payment of some consideration of value or medium of exchange. Purchasing is a subset of the wider procurement process and hence in an effort to procure something a purchase must be made.
2.10 Procurement process

a) Recognition and description of the need

Recognition of the need for an item to be procured refers to the means by which a need is officially called to the attention of the purchasing department (J.H. Westing, 1961). Two basic procedures are followed. One involves the issuance of requisitions from the stores department and the other involves the issuance of a bill of materials.

b) Selection of the supplier

After a need has been recognized and described, the buyer must select the source or sources from who to secure prices and with whom to eventually place the order (J H. Westing). Selecting the source, as the term is used here, is the process of narrowing down a large list of potential suppliers to a list of relatively few from which list the final choice will be made.

c) Supplier communication

When one or more suitable suppliers have been identified, requests for quotations, requests for proposals, request for information, request for tender may be advertised or direct contact may be made with suppliers.

d) Ascertaining the price through negotiation

For most standard items supplier’s catalogues and price list are available so that the buyer need merely check current listings to ascertain them. The buyer can also negotiate on the price and mode of delivery and after agreeing a contract is established.

e) Supplier liaison

At this stage, the organisation evaluates the performance of the material or service in order to determine whether to consider other suppliers or to continue with the same suppliers.

f) Logistics management.

This stage deals expediting, delivery and payment of materials based on contract terms.
2.11 Procurement of materials in the construction industry

Procurement of materials tend to differ with the industry. There will be considerable variance between industries in the proportion of the sales spent on procuring goods or services. In a highly mechanized industries labour costs are low and this fact tends to increase the proportion spent for goods and services. In assembly-line industries there is likely to be a considerable amount of procuring of fabricated parts and assemblies and this tend to keep the proportion of the sales expended for goods and services high. On the other hand, the extractive industry tend to have a low percentage of procurement because they work on raw materials. The difference is brought about by the following:

a) Nature of the industry  
b) Nature of the material or service  
c) Demand of the material or service

In the construction industry, the traditional procurement sequence commence with a primary purchaser, usually referred to in contracts as the employer (J.L. Ashford 1989). The employer purchases design and site supervision from an architect or engineer and places a contract for construction work with a contractor. The contractor after being awarded the contract will procure materials and components from suppliers for incorporation into the works and may also place sub-contracts for parts of the construction with other smaller contractors. The materials are procured from suppliers, manufactures or even local building merchants. The building merchants are those that specialize in the buying of building materials and equipment from manufacturers and distribute to contractors at the site (Elijah O.Ogolla, 1993).

It is stipulated in the JBC Form of Contract clause 23.1 and 23.2 that the burden of procuring building materials will be entirely on the contractor. However some terms may be added or removed such that it will allow the client to be able to supply certain materials or components which may be necessary due to the desire of the client to control certain quality standards. Another provision is where the client will purchase and supply the building materials.

2.12 The purchasing department in the construction industry

The construction industry like any other industry also has a purchasing department that deals with the procurement of materials. In many construction firms the purchasing department is situated at the head office and carries out the following tasks.
A) Send a correctly drawn up buying order.
B) In collaborations with other functions, follow up deliveries with reference to punctuality, quality and quantity and record the information for use in connection with the assessment of suppliers.
C) Function as a kind of ‘radar’ for the company and continuously seek and assemble information about new suppliers.
D) Arrange and supervise all contacts between the company and its suppliers where purchasing materials are concerned.
E) Select the best possible sources of supply.

2.12.1 The positions in the purchasing department

The number of positions in the purchasing department varies greatly from one construction firm to another. There are a number of factors that explain this variation. The more the purchasing powers of a company are centralized, the larger the purchasing department will be. It should be pointed out, however, that with a centralized purchasing department the total number of man-hours spent on purchasing activities will tend to be lower than in a company that decentralizes its purchasing operations. Another factor is the amount of work load. A company that is handling a lot of projects will have a larger purchasing department. The third cause of variation is the way in which the clerical function is organised. Some companies establish pools of clerical employees which also serves all departments. Among the positions in a typical purchasing department are:

a) Purchasing agent

The number and kind of duties and responsibilities assigned to the purchasing agent depend to a considerable extent on the level of management he belongs. In many of the large construction firms the head of purchasing is a high-level official. The duties and responsibilities of such an official deal primarily with the formulation and supervision of purchasing policy. These duties and responsibility generally include:

1. Establishment and supervision of purchasing procedures that are in keeping with company policies.
2. Supervision over such departmental activities as the selection of suppliers that are not specified in the bills of quantities, placing orders and the approval of invoices for payment.
3. Development of sound supplier relationships.
4. Coordination between the purchasing department and other departments of the company for example the accounts department.

5. Internal organization of the purchasing department so as to function efficiently in carrying out purchasing policies and procedures.

6. Preparing forecasts of supply conditions and price trends.

b) Assistant purchasing agent

The purchasing agent delegates his duties and responsibilities to the assistant purchasing agent in order to lighten the load of the head of the department. He generally supervises all of the clerical activities of the department.

c) Buyer

The duties and responsibilities of the buyer include:

1. Checking requisitions
2. Obtaining quotations and interviewing sales men
3. Checking for discrepancies in invoices
4. Checking on the progress of all orders of all overdue, or about to become due and reporting to the personnel concerned.
5. Keeping in contact through correspondence with vendors.

d) Assistant buyer

This position is mainly in big construction firms. He is usually permitted to do some buying as both as a means of lightening the work load of the senior buyer and as a means of training the assistant for his future responsibilities.

e) Expediter

The duties of the expediter depend largely on company policy as to the method of expediting and the degree of expediting employed. In many construction companies this position is primarily of a clerical nature, involving the maintenance of ticker files and the follow-up of purchase orders so as to secure acceptance copies with promised delivery dates.

f) Clerical employees

The lowest ranking positions in a purchasing department are the clerical positions. A wide variety of activities are performed by such personnel. Among these duties are the typing of
purchase orders and other correspondence with suppliers, and maintenance of purchase order files and requisition files.

2.12.2 Qualifications for purchasing positions

The desirable qualifications for individuals who aspire to success in procurement may conveniently be grouped into three categories. Personal characteristics, educational background and business experience. However knowledge on construction will be an added advantage. In the list of personal characteristics that follows no attempt is made to be exhaustive. Rather it is a list of the more important characteristics with some indication of the reasons for their importance. The personal characteristics include:

Integrity

Purchasing agents and buyers expend huge sums of company money. They must be impervious to the financial temptations that accompany such a position of trust, whether in the form of a gift or bribery.

Dependability

This personality trait is important in purchasing personnel because frequently the continuity of operations of the site depends on the reliability of purchasing department in following through on requisitions until goods are delivered according to specifications.

Initiative

Purchasing personnel are constantly faced with situations demanding initiative and imagination. The continual search for alternative sources of supply or alternative materials is but one area where initiative is important. It also frequently happens that unexpected requirements necessitating locating materials and supplies in unusual places and on extremely short notice.

Cooperation

The purchasing personnel must possess an unusual ability to cooperate with the foreman and the other construction workers on site. This is essential to minimise the many points of friction which may evolve out of such situation.
Tact

Many purchasing agents consider tact the most important single personal characteristics. The reason for this is the crucial importance of maintaining sound and friendly supplier relations.

Ability to learn

A good purchasing agent must have an acquiring mind. He must always be seeking information about the project undertaken and must study the suitability of every supplier’s offerings. The individual who does not have the desire or ability to learn will not make a good purchasing agent.

Educational background is also important especially those have a specialized on purchasing and supplies management. Business experience is almost universally considered to be necessary for purchasing personnel. This is because a purchasing personnel with business experience will be able to practice the concept of value analysis. Value analysis represents a planned, methodical approach to the problem of securing maximum value for money spent (J. H. Westing, 1961). It requires a searching inquiry into every purchase to determine not only if the purchase is being made at the lowest price but also whether the item is needed at all or whether some lower cost material could be used.

2.13 Procurement process in the construction industry

First and foremost the Quantity Surveyor takes off quantities from the working drawings he is provided so that he is able to prepare a Bills of Quantities and a Schedule of Materials if it is required by him in the contract. However if preparation of the Schedule of Materials is not in the contract, the contractor’s Quantity Surveyor will be the one who prepares it. Preparation of the Schedule of Materials should be meticulously done and necessary allowances should be given for material wastage. In the Bills of Quantities, some suppliers of certain materials and their specifications will be specified. The Standard Agreement and Conditions of Contract for Building Works clause 23.8 states that the Architect may issue instructions in regard to the removal from the site of any work, materials or goods which are not in accordance with the contract.

2.13.1 Recognition and description of the need

Procurement of materials by the contractor starts with the recognition of the need for a material by someone at the site. Generally the need is recognized by the store man or the
foreman. A purchase requisition form will then be issued to the purchase department. A purchase requisition is a simple form which describes the need and becomes the basis for action by the purchasing department. It is a single-page document with space for the project name and number and the required delivery date. This form is usually prepared in duplicate with the carbon copy being retained by the store man or foreman at the site as record of its action. It should be signed by the site agent in order to avoid irresponsible purchase requests.

Once the need has been recognized, it must be so accurately described that all parties will know exactly what is wanted. The requisition is the basic form used in describing the need. It clearly specifies the details such as specification of materials, quality and quantity or even the specified supplier. Problems in connection with describing needs primarily concern the methods used to check and verify descriptions furnished on the requisition form in order to assure complete and accurate information for ordering. Therefore, the buyer must check the requisition closely on the basis of his own knowledge of the requisitioned item and records of past purchases. A buyer should never assume responsibility for changing an inadequate requisition, interpreting an inadequate requisition, or in any way making arbitrary judgements about a questionable requisition. He should refer such matters back to the foreman or store man. Insistence on accurate descriptions from the site promotes harmony in the construction company. Such insistence leads the foreman to place greater confidence in the purchasing department. If a purchasing officer assumes responsibility for changing requisitions that he thinks are wrong, sooner or later he will make a mistake, resulting in a shipment of wrong materials. Then friction between the site agent and the purchasing department will be inevitable. Even obvious errors should be checked at the site before changes are made in the description because time is lost when it becomes necessary to check back on requisition at the purchasing department.

An improperly or poorly described need can also be costly especially if not discovered until after the order has been issued. In some cases the order may be filled and the material brought to site before the error is observed. At this point it may be difficult to convince the supplier that he should accept the goods for return without some price adjustment. Besides such loses there is the cost of handling materials.

According to Ashford (1989), there are certain materials such as electrical fittings and finishes that require the employer’s approval. In such cases, the requisition form will grow to a multiple page dossier and pro-formae to incorporate the following:
1. A general description of the materials
2. Schedule of recommended suppliers
3. Delivery date(s)
4. Budget value
5. Shipping instructions
6. Signature of approving authority.

The above will be attached to a material list and a specification package. The material list will schedule the quantities and items to be purchased and give reference to the appropriate specification requirements. The specification package may include the following

1. A schedule of standard specifications to be complied with
2. Copies of project specifications
3. Drawings
4. Data sheets

### 2.13.2 Selection of potential suppliers or vendor

The next step is the selection of source or sources for the requisitioned material. There will be no need in selection if the bills of quantities specified the source of the materials. If not specified there will be a number of alternative suppliers from which one must ultimately be selected. The selection of potential suppliers is the acid test of procurement. A buyer may describe the quality of the desired material accurately and completely and specify the exact time of delivery. All this careful planning may be jeopardized by poor selection of prospective suppliers. Some suppliers will not be capable of producing the desired quality specifications or others who may able to meet the required quality and quantity will not sell at the right price.

Time and money spent on careful source selection usually prove to be a good long run investment. Once a good choice has been made, succeeding orders can be placed economically and with confidence. Satisfactory experience with a chosen supplier is the best possible basis for repeat orders. For materials that are repurchased frequently or that are secured through middlemen, a purchasing agent usually has a few suppliers from whom he buys regularly. In such cases he merely selects one, frequently on rather arbitrary basis, as the source of pending purchase. His selection of the one to be favoured with the current order will depend on such considerations as price, his desire to allocate his orders so as to maintain the goodwill of alternative sources as a safety factor and his company’s reciprocity policies.
For non-routine purchases the procedure involves a careful survey of potential sources of supply. The extent and thoroughness of the survey depends on the importance of the material being procured, in terms of its cost and quality. The more important the material, the more exhaustive will be the survey of the potential suppliers of that material.

The second step consists of narrowing down the list of potential suppliers to the few with whom final negotiations are to be conducted. It makes good sense that suppliers of materials should have both the means and the will to comply with the requirements of an order. In the construction industry, it has long been the custom for contractors to be obliged to provide information about their financial standings, their resources of people and equipment and their record of past work in order to pre-qualify for inclusion on tender lists. Similarly a potential supplier will also be required to demonstrate his capability to control the works and to assure conformance with specified requirements. The B.S. 5750: part 0.2 lists the following methods of establishing a vendor’s capability.

a) On-site assessment and evaluation of supplier’s capability
b) Evaluation of product samples
c) Past history with similar supplies
d) Test results of similar supplies
e) Published experience of other users.

There are various sources from which the buyer may build his list of potential suppliers:

a) Experience

Past experience with suppliers is perhaps the most available and widely used source of information about potential suppliers. Since so much purchasing is repetitive in nature, a wealth of information is available to the buyer on the basis of which he can judge the performers of suppliers. When a new material is under consideration, a buyer, should therefore, first of all inquire whether any of his present or past suppliers are likely prospects. Some buyers rely on their memory for facts about their relationships with suppliers. Since human memory is short lived, uncertain and sometimes biased, it is much more satisfactory to have records available for reference. Most purchasing departments maintain supplier files which contain the name and address of all supplier files with whom the company has dealt throughout its history as well as a notation of the materials that have been purchased from each supplier. Frequently such files are set up to include additional data on which things such
as the reliability of the supplier in meeting commitment dates, willingness to handle emergence and rush orders and defect or reject ratios on shipments received in the past. The emergence of computers has made maintenance these records an easy task since updating of information can be rapid and easy access to a number of users.

b) Salesman interviews

The salesmen who call on purchasing agents or the Quantity Surveyor are extremely valuable sources of information about suppliers of particular products. Some salesmen are much better sources of information than others and a buyer learns from his experience which salesmen are likely to be able to supply him with reliable information. In evaluating the salesman as a source of information about the value of a company as a supplier, one must recognize the strong impression that is left in the mind of the buyer by the character and personality of the salesman. If the salesman is reliable, cooperative and competent, the buyer is inclined to assume that the company he represents is also the same. This is not necessarily true. Some poor companies have good salesmen and vice versa. Therefore a buyer should not rely solely on representations of the salesman in evaluating a supplier where the amount of the transaction is large.

a) Catalogues

The catalogues published by vendors in which they list and describe the various items they make for sale constitute a valuable source of information about possible suppliers. There are two factors that seem to govern the effectiveness of catalogues as a source of supplier information. One factor, the form in which the catalogue is published, is a matter under the control of the supplier. If catalogues are too small or large they will not fit conveniently into the buyer’s file and hence will not be used frequently. The second factor, the organisation of the catalogue for the buyer’s use, depends on the filing and indexing system that the purchasing department sets up for the catalogue file. The better the indexing and filing system, the more use the buyer can make of the catalogue.

b) Trade Directories

A trade directory is a publication that lists and classifies suppliers according to the products they make. Frequently it also gives a minimum amount of information on such matters as the financial status of the companies, their method of distribution and location of sales offices.
c) Trade Journals

As sources of information on suppliers, the value of trade journals depends on the regularity and thoroughness with which they are read and the amount of information that the purchasing agent can retain in his memory.

d) Trade Shows and Conventions

Practically nearly all important industrial groups hold such shows at various times during the year. At the trade show the members of an industry display their wares in an attempt to attract buyers, build up their interest and if possible make sales.

e) Request for Quotations

A final way is through a request for quotation form. It is used when a potential supplier is asked to furnish prices and terms of the transaction. This brings to light many bidders who can be investigated further as likely sources of supply. To make sure it will not be mistaken for an order, it bears very clearly across its face an imprint to that effect. It describes the proposed purchase in detail including the description of the item, quantity required, time and place of delivery and the terms. The quotation should also state if the price is based on full loads of ten tonnes, (or whether the accepted standard is for the material) or on part loads of three tonnes.

f) Architect nomination

In some cases the Architect nominates potential suppliers on behalf of the client especially for the supply of Prime Cost items. Prime cost items are items that either have not been selected or whose price is not known at the time the contract is entered into, and for which the cost of supply and delivery, the contractor has made allowance for in the contract price. The Architect will therefore advise the nominees of their liabilities under the main conditions of contract. When the buyer receives from the Architect, quotations from nominated suppliers, it is essential that these are the originals quotations and not copies so that the buyer is absolutely sure that he is in possession of all conditions of sale. These should therefore be scrutinised and if there is doubt about anything, the queries should be raised with the architect immediately.
2.13.2.1 Factors to be considered in supplier evaluation

After the list of possible suppliers has been complied, the next step is to evaluate each supplier so that the list may be narrowed down to the predetermined number with whom the buyer choses. This process of evaluation is conducted by comparing the suppliers in terms of their ability to provide desired quality, quantity and price. In the procurement context, quality refers to the suitability of an item for its intended purpose. In procurement, therefore the best quality is not necessarily the highest quality. In fact, sometimes the best quality may be the lowest quality. Quality must always be judged in the light of the use to which the product will be judged (J.H. Westing, 1961)

In procurement parlance, quantity also has a somewhat specialized meaning. It refers to not only to the total amount required but to the schedule according to which the material is required. Thus, a supplier who might be able to supply the desired quantity during the time period specified but could not supply that quantity on the dates specified would not be a satisfactory supplier from the point of view of quantity (J. H Westing, 1961)

A price is good only if it is the lowest price offered for a desired quality, in the right quantity and in some cases accompanied by sufficient useful services. When talking in general terms about comparing quality, quantity and price, it is difficult to say much more than it is highly important for a buyer to make certain that he has considered these three factors carefully and in combination with each other.

The inspection methods and quality control standards maintained by the prospective supplier are also important in evaluation. Since assurance of supply means not only that the materials will be delivered, but also that they will be in usable condition. A supplier who is careless about inspection and quality control will supply many materials that must be rejected and returned because they are not satisfactory for purpose.

2.13.2.2 Factors that limit supplier evaluation

While it is always desirable to evaluate prospective suppliers on the basis of the several preceding considerations, such evaluations is not always practicable. In a few instances, a buyer may face an industry in which all the suppliers operate under a rather rigid sales contract and standardized code of practice. In terms of evaluating suppliers, a situation of this kind means that the buyer is faced with a limited choice. One supplier may still be better than another in terms of his geographical location and inspection methods and quality control standards, but all suppliers are likely to deal with buyers on much the same contractual terms.
In other situations, company policy will serve to limit the free play of supplier evaluation. When a company follows a policy of reciprocal relations, the buyer is not free to place orders in accordance with concussions reached through objective evaluation. In many cases reciprocity is practiced only if all other conditions and terms are equal. Where there is a rule reciprocity does not interfere seriously with the evaluation process.

Now and then a personal conflict develops between the buyer and the representative of the seller. One can easily say that such considerations should be ruled out of a business transaction, but it would be unrealistic to suggest that personality difference never influence decisions.

2.13.2.3 Special considerations affecting source selection

a) **Size**

Frequently the buyer is faced with the alternative of buying either from a large supplier or relatively small one. Although size is not a criterion of effectiveness of supply, there are some advantages in dealing with large firms. Size provides some measure of the reserve facilities of the supplier and therefore a large supplier can meet the quantity requirements of the buyer. A larger supplier will also ordinarily maintain a large technical and research staff and be more interested in the technological improvement of its products and processes than a small supplier.

However a small supplier will more likely to be appreciative of his customers since he has fewer of them and cannot afford to advertise. He will probably give greater considerations to special or unusual requests from his customers.

b) **Type of supplier**

Sometimes the buyer has a choice of purchasing directly from the manufacturer or through the distributor. The preference of buying directly is rather general among purchasing personnel. This preference based on the prestige of buying direct and the possibility of extra profit, which may accrue to the buyer through the absorption of the middleman’s margin.

c) **One or more supplies**

Frequently a construction company has a policy of placing orders where possible with several suppliers rather than a single supplier. In some respects this makes the problem of source selection more difficult since it is frequently to choose the best out of a group than
several comparable supplies. Deciding on the best policy as between one or a number of suppliers is difficult since good reasons can be advanced for either choice. Occasionally there may be no alternative as, for example when a supplier has an item protected by patent. He then is the only source.

d) Standard of communications with potential suppliers

The choice of suppliers may to some extent be related to the quality of communication which the supplier receives from the contractor’s buyer (R.A. Burgess and G. White, 1979). When a supplier is invited to quote, he should be informed of the type of contract for which the quote is requested. He will want to know whether fluctuations apply or whether it is a fixed price contract. If it is a fixed price contract he will want to know when the materials are required and the date of completion of the contract.

Many contractors have a set of conditions applicable to suppliers and these will be included with the enquiry and specifically referred to in the enquiry letter. According to Burgess (1979), it is usually necessary to send a copy of that section of the bill of quantities which applies to the supplier.

The willingness of a supplier to furnish samples on request may be a deciding factor in the final choice of the source. Firstly a policy must be established samples are to be accepted free or paid for in every case. A policy covering the reporting of test results to the vendor must also be established. A sample, properly tested will furnish much useful information to the buyer. The standard agreement and conditions of building works clause 23.6 states that the architect may issue instructions requiring the contractor to open up for inspection any work covered up or to arrange for or carry out tests of any materials or goods (whether or not incorporated in the works) or of any executed work. The cost of such opening up or testing, together with the cost of making good in consequence thereof, shall be added to the contract price unless provided for in the contract bills or unless the inspection or test shows that the work, materials or goods are not in accordance with the contract. Particulars of the way in which loads are to be prepared and delivered should be stated clearly. If materials are to be delivered loose, crated or palleted, this should be stated (R.A. Burgess and G. White, 1979).

2.13.3 Ascertaining the price through negotiating and competitive bidding

During the process of selecting a source the purchasing department secured the price of the materials through supplier’s catalogues. However, the buyer may want a reduction in price of the materials and this is where negotiation comes in. Negotiation implies a certain amount of
bargaining between the buyer and the seller. This is suited especially where materials are made to the specifications of the buyer.

Another method the purchasing department can ascertain price information is through competitive bidding. It is a standard practice in competitive bidding to solicit bids from prospective suppliers by means of a bid request or similar form, which specifies the requirements. After the lapse of a period of time usually indicated on the bid request, the bids are received, analysed and compared and the contract is awarded.

2.13.4 Placing the order

After the contract has been awarded an order is officially placed with the potential supplier on a form known as a purchase order. Site agents if allowed to make orders themselves, should find it advisable to enquire from head office with which supplier’s or manufacture’s orders should be placed for the various materials. The vendor or the potential supplier is then called the supplier once the purchase order has been issued or the contract signed. It becomes a legal contract if it is submitted in acceptance of a formal quotation or offer. It becomes such a contract in other cases when it is accepted by the seller.

A purchase order should contain space for the date of issue, a purchase order number for identification purposes, the name and address of the vendor, the quantity. The price of the material, signature of the buyer and conditions and terms that govern the transaction. The number of copies vary from one contractor to another. However the original copy is sent to the vendor and this is usually accompanied by one carbon copy which is known as the acknowledgement copy. On this carbon copy the vendor is expected to signify acceptance of the order and the date on which delivery is promised. Additional copies may be sent to the accounting department and one copy is retained for filing in the purchasing department. When bulk orders have been previously placed with the suppliers by the purchasing department in a centralised purchasing set up and site agents are given the responsibility to call forward these materials required, care must be exercised in calling sufficient for the storage areas available and sufficient to maintain the levels of production without the need to hoard. (George Forster, 1989). If the supplier takes too long to supply the materials, the purchasing department may have to follow up on the order to ensure and encourage the suppliers to meet their contractual requirements. First it is necessary to secure an acceptance and a promise of delivery. Then, it is necessary to review outstanding orders at regular intervals and communicate with suppliers as required.
2.13.5 Receipt and checking of deliveries from suppliers

Site agents should expect some notification from the supplier of materials on impending deliveries. This can be by a posted advice note or by a telephone call, unless, when an order was made originally, phased delivery dates had been agreed between parties. If forewarned of imminent deliveries the site agent can make arrangements for safe storage, and labour and plant can be provided to facilitate off loading and other essential handling procedures to prevent undue damages.

Delivery notes should accompany delivered goods and must be present by the delivery drivers as proof of the consignments’ quantity and quality. Although it is more easily said than done, meticulous checks should be made of every consignment by the person delegated to receive the goods. Delivery notes should not be signed until the goods are checked and if damages have arisen during transit or there are discrepancies between the delivery notes and deliveries, the amounts should be indicated on both copies of the delivery notes and records should be made for future records (George Forster, 1989). If there are no discrepancies, one copy of the delivery note is sent to the purchasing department and another remains at the site.

A seller’s invoice must be checked against the original order or the delivery note that was made out when the order was receive. The invoice quantity is checked against the quantity ordered according to the purchase order and the quantity received as indicated by the delivery note. Terms and price are checked against the purchase order. Description of the materials is checked against both forms. It is also common practice at this time to check extensions and footings to prevent over or underpayments resulting from clerical errors. In some construction companies this is left to the accounts payable department.

If discrepancies are found, the buyer who initiated the order is notified and he takes whatever action is needed. If the invoice is in error, the buyer usually returns it to the supplier for correction. In such a case it is usual practice to insist that the invoice date for discount purposes be moved forward to the date on which the corrected invoice is received.

It is the responsibility of the clerk of works to inspect promptly all materials delivered to site prior to their being used in the work. This is according to the standard agreement and conditions of contract clause 10.1 the employer shall be entitled to appoint a clerks of works whose primary duty shall be to act as inspector of the works on behalf of the employer under the direction of the architect. The practice of withholding inspection until the job is done, then announcing to the contractor that the work fails to conform to the specifications is totally
unacceptable conduct. In certain cases it may be desirable to perform inspection of materials or fabricated products prior to their delivery at site (Edward R. Fisk, 2000). A case in point would be an inspection of the pre-casting operation at a concrete pre-casting plant. Usually, the product remains in the casting yard for an extended period before delivery to the site, and failure to make early discovery of patent defects may hold up a project for several months while the pre-casting yard clears the casting beds to work in a new casting schedule and set up the new forms on the beds between other scheduled operations just to recast defective work.

Upon rejection of non-conforming materials by the clerks of works, they should be clearly and indelibly marked if possible and the marks should not be easily erased. If not possible, the clerks of works should ensure that all rejected materials are removed from the site.

If the materials are of the right quantity and quality as ordered, payment to the supplier will be done by the accounts department based on the terms of the contract.

2.13.6 Progressing and expediting

According to Harrison (1985), expediting involves the continuous review of the performance of the suppliers under the supervision of the purchasing department. This is done by obtaining from the supplier a formal delivery commitment and to monitor the suppliers during the life of the order.
<table>
<thead>
<tr>
<th>TENDER</th>
<th>ENQUIRY</th>
<th>SELECTION</th>
<th>SUPPLY</th>
<th>SETTLEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESTIMATOR</td>
<td>ESTIMATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACCOUNTS DEPT.</td>
<td>COPY ORDER</td>
<td>COPY ORDER</td>
<td>COPY ORDER</td>
<td>CHECK DELIVERY NOTE &amp; AUTHORISE PAYMENT</td>
</tr>
<tr>
<td>CONTRACTS DEPT. AND SITE</td>
<td>CONSTRUCTION PROGRAMME</td>
<td>COPY ORDER</td>
<td>PREPARE FOR DELIVERY &amp; CHECK WITH DEL. NOTE &amp; ORDER</td>
<td>DELIVERY NOTE</td>
</tr>
<tr>
<td>BUYING DEPT.</td>
<td>ENQUIRY</td>
<td>ENQUIRY</td>
<td>ORDER</td>
<td>PROGRESS &amp; CONTROL</td>
</tr>
<tr>
<td>SUPPLIERS</td>
<td>QUOTATION</td>
<td>CONFIRMATION OF OR REQUOTATION</td>
<td>ACKNOWL. OF ORDER</td>
<td>ADVICE NOTE</td>
</tr>
</tbody>
</table>

Figure 2.2: A procurement structure  Source: R.A.Burgess (1979)
2.14 Material scheduling

A material schedule can also be prepared to show the contractor what materials are needed and when they should be on site. In addition to acting as a guide for ordering materials, the schedule also serves as a checklist of materials needed for the project. It is usually minor items that get forgotten by the contractor and cause temporary delays and disorganisation. This is a problem brought about by his own making. According to J. Ward, (1996) material schedule normally contains the following information:

1) What is to be ordered
2) How much to order
3) When it will be required
4) Which part of the building or which item on the list of quantities the materials are for:

The information needed to make the materials schedule comes from two main sources:

1. The quantities are taken from the material calculation for tender
2. The dates for which the materials are required are taken from the work programme and the ordering dates depend on how long the supplier takes to deliver the materials.
   If the supplier takes one week to deliver, then order the materials at least a week before they are needed.

In addition to delivery time, allow for the materials to arrive on site a few days before they are needed. This gives for stacking and preparation, and makes it possible to correct mistakes in the delivery if it does not exactly match the order (R. Neale and J. Ward, 1996).

2.15 Planning for procurement of materials

Innumerable projects are delayed due to late delivery of materials and yet many project plans show a single arrow entitled delivery of materials in a work programme. It cannot be emphasized strongly enough that management and planning of this phase of a project is as important and should take as much effort as that of design and construction no matter the size of the project (Harrison F.L. 1985). Some contractors maintain a supply of certain types of materials on hand at all times. Often obsolete materials are found in stock. Materials are also sometimes ordered from a supplier for delivery to a project without verifying the quantities stored in the warehouse. For material procurement to be efficient, it must take into considerations in-house inventories.
Many organisations suffer from lack of communication between the various groups responsible for material procurement, such as personnel responsible for specifications, contracts, scheduling, purchasing and stock control (Ahuja H.N 1976). Often there is no established pattern for issuing information on the progress of delivery of materials. Thus panic situations are apt to occur at every delay resulting from late arrivals. Materials should be procured so as to alleviate such problems by supplying information to each division on a regular basis. Thus according to Ahuja H.N. (1976), the following objectives should be met by a material procurement procedure in the construction industry

1. Determine whether the materials will be available on time as required by the project construction schedule
2. Produce instant information on the status of all materials at any time
3. Eliminate construction delays resulting from lack of materials when needed
4. Take into account surplus stock and minimize inventory levels
5. Make economic purchasing arrangements in terms of quantity and time
6. Reduce panic situations and at the same time, save management time by reporting only those cases that require action.

2.16 Planning using Critical Path Method (CPM)

Critical Path Method (CPM) is a technique for analysing projects by determining the longest sequence of tasks through a project network (Sengupta, B. 1995). By concentrating on the most critical tasks it can be ensured that project is on time and is keeping pace with the schedule set up.

Just as subcontractors complain that the general contractor neglects their situations, most purchasing agents complain that their own companies fail to keep them informed about material needs. (O’Brien, J.J 1999). Obviously this problem can be solved with CPM this is because every activity require materials of some sort, someone would have to review all of the activities in order to control the delivery of all the materials.

O’Brien (1999) argued that a practical method of reducing the workload is to separate materials into two classes: commodities and key materials. Materials that can be ordered out of stock for delivery in a week or less can be classified as commodities, and the schedule for the first shipment of any type of commodity is useful. Key materials are those with long delivery times. The CPM also helps to furnish all of the necessary information about materials, particularly the order in which key materials should be requisitioned. If an arrow is
added to the diagram for each key delivery is generated as part of the computer run. Materials are not usually available at the start of a project, a reasonable delivery time estimate is assigned to the delivery activities. Introducing delivery times increases the duration of the project and this may cause the critical path to shift. The purchasing department therefore can order the materials based on the new late start information. According to O’Brien (1999) the CPM will give the order in which materials should be ordered, however, it will have two distinct weakness. First, although the late start dates does for ordering are important, they are extremes. If the order is placed this late, all activities following the delivery will be critical. Second, the early start times have very little value. This is because orders for example on the first day of the project could lead to materials being delivered too early before they are required. These problems have often discouraged the use of CPM for coordinating materials procurement. The real effect in the system is that the early start time is unrelated to the fieldwork. Leaving the delivery arrows to represent delivery times adds another set of arrows to represent the actual movement of the material from the storage to the job site.

In addition to the time required for material delivery and the determination of the delivery time, which should be specified on the order, a number of other steps are time in materials procurement are time consuming and must not be neglected. These can include approving shop drawings, the architect review of the shop drawings, a resubmittal time for any shop drawing corrections, and review by other agencies. These steps can sometimes be accelerated for critical activities. However, there is a tendency to minimize the impact of these routine steps by properly reflecting them on your diagram.

O’Brien (1999) recommends that, since the average project requires several separate sheets to represent its network, the materials procurement work should be on its own sheet to avoid confusion between the office and field functions. The purchase department should develop a procurement plan that ensures that the materials are delivered on time. This can be done on a spread sheet listing all materials to be purchased. They should include time for negotiations and placing the orders, lead time for the supply of bulk materials, testing and transport to site. When this is completed they can use this data to bridge the time between the time required on site and lead time for the procurement of each material.
2.17 Procurement schedule

This is basically the determination of when the materials are to be procured with the sequenced delivery dates associated with the selected supply. Burke (2003) argues that the procurement schedule should be considered after the network diagram in the CPM and the schedule bar chart have been established, but before the resource histograms and cash flow statements. He further points out that it is important to identify the materials that are on the critical path and any special handling and storage requirements. The procuring of materials on the critical path may delay the start of its associated activities. This needs to be identified and managed by accelerating the procurement process.

According to Burke (2003), by working back from the activities early start dates, subtracting the purchase order lead time and the just-in-time margin, this will give the order by date.

Order Date=ES (early start date)-Lead Time-JIT

2.18 Monitoring Procurement Commitments

On integrated projects, especially in the early stages, procurement activity has a profound impact on the project schedule. According to Ritz (1994) the design and construction downstream activities are closely tied to the availability of vendor data and delivery of the physical resources. He further argues that the statement does not apply to straight architectural projects where the construction is bid lump-sum after completion of the design.

The tool used to gauge the performance of the procurement team is the purchasing commitment curve. As with any activity with build-up, peak and build-down phases the result is the familiar S curve. The value of the materials to be purchased is plotted against time planned for the procurement. The curve should show an early upturn due to the early placement of the long delivery material orders. Most bulk materials are purchased later in the project. The commitment dollar value is posted to the curve only when the written purchase order is issued. It is bad practice to count verbal orders as commitments. Pressure must be maintained on procurement to get the written purchase orders out, because vendors do not perform nearly as well on verbal orders.

If commitments fall below the line, the purchase agent must investigate the cause as soon as it becomes apparent. Procrastination now will eventually affect the schedule across the whole project. After buying activity has been completed, procurement activities will continue in the expediting and inspection mode until all materials are delivered to the site. Progress in
that area is hard to chart and must be gauged through expediting and reported late deliveries from the site.

**Figure 2.3: Purchase commitment curve**

![Purchase commitment curve](image)

**Source:** Ritz (2004)

### 2.19 Choosing a minimum cost procurement source

When the number of units on hand and on order falls to a predetermined level, action is initiated to procure a replenishment quantity from one of several possible sources (Anyon G.J., 1963). One of the objectives is to procure the material from a source whose cost is minimal. According to Fabrycky (1967), the equation below is used to find the minimum cost procurement source.

\[
TC = Ci x D + \sqrt{(1 - D/R) x (2Cp x Ch x Cs x D)/(Ch + Cs)}
\]

**Source:** Fabrycky (1967)

- \( TC \): Total Cost
- \( D \): Demand Unit
- \( Cp \): Procurement Cost
- \( Ci \): Item Cost
- \( R \): Replenishment Rate
- \( Ch \): Holding Cost per Unit per Period
- \( Cs \): Shortage Cost per Unit Short per Period

The total cost of each vendor is calculated and on the basis of the analysis, the vendor with the minimum cost will be chosen as the minimum cost procurement source.
2.20 Procurement systems

Ahuja (1976) describes a procurement system as a computerised system developed to manage and provide a structured approach to the procurement process. One good example is the Material Expediting System developed by Graham Frampton at Memorial University of Newfoundland, St. John’s as part of his master’s program. The system is designed to be executed with the aid of a computer that establishes a link with the network analysis program. Thus the material procurement schedule should be updated whenever the network schedule is changed.

Input requirements

To use these system according to Ahuja (1976), all pertinent information on the project and on the necessary materials must be complied. This information is then coded on three input sheets. The division of a project into work packages helps keep shipment sizes within reasonable limits. Hence the input is kept within the framework of work packages already established.

Next, all materials to be used in this project must be tabulated. For each material the estimated time required for various operations such as preparation of shop drawings, fabrications, shipping time, and so on must be given. Finally materials should be at the site three days before they are incorporated into the job so that they may be sorted. Since most of this information remains unchanged from one project to the next, this input need only be prepared once and only requires periodic updating, after which it can be used for subsequent projects. Depending on the type of work being done, the organization may have in stock a few or most of the materials it is using on the project.

An up-to-date physical inventory of stocked materials in needed by the planner are included in an inventory record. The name and code number of each material is given as well as the description of the material (size type and so on) and the units in which the material is measured. Each line defines a material of a particular specification.

Finally, a bill of materials is needed. This is a complete list of all the materials, showing quality for each to be used in the project. The first activity in each work package requiring each material is also included so that the computer can obtain its start date from the project network.
Output-Material Procurement Schedule

Ahuja (1976) argues that the first requirement of a material procurement schedule, which is an output of the Material Expediting System, is to establish that materials required by the construction schedule can be obtained in time. If they cannot be obtained in time, negative slack will appear on all the activities leading to the delivery of the materials expected to cause delay. Another requirement is that the schedule must provide complete information on the status of each material at any time as its progress through the procurement process. A schedule against which the actual progress can be checked is needed. If any discrepancies exist, they can be spotted in time to take remedial action.

Each entry from the Bill of Materials is included and the event times on which action must be taken to ensure arrival at the required time are given. The total quantities of each kind of material to be ordered as well as a breakdown by work packages is given. In order to calculate the data on which action must be taken, the activity start date given on the bill of materials and the times required for each operation in the procurement process given on the materials information sheet are needed. When the planner has obtained the quantities and order dates of each material, he must inform the purchasing department. In the Material Expediting System this is done by the generation of requisitions and manual interaction is necessary here to evaluate the delivery schedules against space constraints and often storage and financing difficulties.

When a purchase order is issued the vendor’s commitment to the dates mentioned in the material procurement schedule is obtained. If it is not forthcoming, the information is used to update the material procurement schedule and if necessary the project schedule. Thus the material procurement schedule becomes the expediting schedule.

The material procurement schedule gives the project expeditor necessary to keep track of each material to be used in the project. Thus when he receives word that the delivery of a material is falling behind schedule, he can check the material procurement schedule, determine whether the delay will affect the delivery date, and if necessary, inform the project manager.
Out-put for replenishment of stocks

Each time that a material is requisitioned from stock the quantity of that material in stock is reduced. Since many materials are maintained in constant supply in stock, the quantity left after each order must be checked to make sure that it is not below the minimum. This information is found on the inventory record and is known as the ‘reorder level’. If the quantity left is less than the reorder level, an order is placed to replenish the stock. Lead time is not used for the materials required for the replenishment of stock since it is already used for the supply of these materials to the project. It is important to note that project delays should be converted to calendar dates for the benefit of the expediter and others using the report. Also each time that an order is placed to replenish stock and each time a material is requisitioned from the stock, the inventory record must be updated.

Advantages of this system

The Material Expediting System is a very useful tool for construction management due to

1. By establishing that contracts can be awarded in time and that the materials can be obtained as required, the feasibility of the construction schedule is established
2. By relating to the construction schedule, the system provides a means of getting materials when needed
3. The materials in stock are used efficiently
4. The lack of communication that can result in panic situations is eliminated
5. The system is flexible enough to provide for expediting equipment as well
6. Management time is saved through exception reporting since the expediter need only report critical situations
7. The system is very suitable for a computer environment and can help to eliminate much red tape.

According to Ahuja (1976), an additional advantage can be gained if the designers are encouraged to use code numbers used in the expediting system. Since each code number would identify a unique specification item, the use of such codes can partly eliminate the need for repetition of specification referrals. This tends to foster the use of standardized materials, which allows better-quality materials at a lower price and tighter specifications. He also suggested that another facility can be added to this system. The quantity of actual materials used on a project can be compared with the bill of material list. Any discrepancy
found can be analysed and a final adjustment of the quantities can be made. This provides a basis for a more accurate projection of future requirements. Every month a report can be prepared to show workloads for the contract and purchase departments. If necessary, the schedule is modified within the limits of floats to spread the workload. If this cannot be done, additional hands are employed in time to carry the work load.

2.21 Legal aspects of procurement

According to Westing (1961), the primary interest of a purchasing agent in legal matters is to use knowledge of the basic principles of law in such a way as to avoid litigation. Litigation is both costly and of uncertain outcome and should be therefore be avoided except as a last resort. Westing (1961), further says that one effective way in which a purchasing agent can minimize litigation is by investigating new suppliers as to their ability to perform, their financial responsibility, and their record of performance with other concerns. It is also advisable for the purchasing agent to request a periodic review of the company’s purchase order terms and conditions by a competent lawyer.

Law of agency

An agent according to Westing (1961), refers to someone authorized to act for some other person, known as a principal. Often, the exact duties and limitations of the purchasing agent are not stated and will have developed over a period of time through experience on the job. In such instances the purchasing agent will learn the hard way just for how far his authority extends and what his duties are. Westing (1961), argues that these two methods, one specific and exact definition of duties and limitations, illustrate two types of authority from a legal point of view. The first is specific authority and the other is implied authority under the laws of agency.

In order to ascertain the extent of an agent’s express authority one must refer to the written or oral statements of the principal granting the authority which are found in the minutes of a directors meeting in the case of corporate agent or the applicable statutes. Most purchasing agents, however operate under implied authority and the laws of agency give very definite protection to anyone doing business with an agent who is operating under implied authority.
Law of contracts

Procurement is a form of contract and is therefore governed by the general rules affecting all contracts. A contract to be valid and binding it must include

1. An offer and acceptance
2. Consideration
3. Legality of the subject matter
4. Competent parties

Generally, a purchase order is an offer to buy and the seller’s acknowledgment is an acceptance of such offer. However, an acceptance to be binding must not attempt to vary the terms of the original offer. Therefore, if the provisions of the acknowledgement form, printed or otherwise, vary in a material respect from those of the purchase order, the acknowledgement is not an acceptance. It is the rejection of the purchase order and a counter offer. In order to create a binding contract, the purchaser must now accept the seller’s offer on the seller’s terms and conditions, or, if the seller’s terms and conditions are unsatisfactory, then the purchase must negotiate with the seller regarding them.

The purchasing agent should carefully note the terms and conditions of acknowledgments. To accept delivery of the goods without taking exception to variations in the acknowledgement mat constitute acceptance of its terms and conditions. Generally, an offer will be considered varied in a ‘material respect’ if the acknowledgement differs from the purchase order in such important elements as delivery date, quantity, quality, price or warranty.

An offer should be properly communicated and will continue until such a time as it is accepted, rejected, revoked or until the expiration of a specified period of time. If no time is specified, it will continue only for a reasonable length of time. An offer to buy may be withdrawn by the purchasing department at any time before the offer is accepted. However, the withdrawal of the offer is only effective if it has been communicated to the seller before the seller’s acceptance of the offer.

There can be no enforceable contract unless there is consideration. The two additional requirements of a valid contract are that the subject matter be legal and that the parties involved are competent.
CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the methodologies that were used in collecting data for the purpose of this research. Importantly, computations was undertaken in order to be able to draw relevant conclusions and make recommendations.

3.2 Research design

According to Ranjit (2005) a research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. The plan is the complete scheme or program of the research. Ranjit further sites Thyer(1993) “….research design is a blueprint or detailed plan for how research study is to be completed, operationalizing variables so they can be measured, selecting a sample of interest to the study, collecting data to be used as a basis for testing hypothesis and analysing results.” In this study, data was collected on the problems and their sources local contractors face during the procurement of materials.

3.3 Study area and population

3.3.1 Case study area

This research was carried out in Nairobi County. According to Ogola (1993), Nairobi is the most active economic centre in the country and covers an approximate area of 684 square kilometres. It has the highest urban population in East Africa, with an estimated population of between 3 and 4 million and has grown to become the largest city in Kenya, and one of the largest cities in Africa. The city lies at the southern end of Kenya’s agricultural heartland, 1.19 degrees south of the Equator and 36.59 degrees east of Meridian. Its’ altitude varies between 1,600 and 1850 metres above sea level. The climate is generally a temperate tropical climate, with cool evenings and mornings becoming distinctly cold during the rainy seasons.

According to Oketch (2004), Nairobi has diverse construction sites with the largest share of big building projects amounting to over 70% of the national output. Oduor (1991) in his Master’s Thesis revealed that construction industry activities are widely concentrated in Nairobi than any other town in the republic. Nairobi also hosts many contractors and forms a heterogeneous sampling frame that is representative of the country. Therefore it is an ideal area for the study.
3.3.2 Population

The target population under study was the local General Building Contractors registered under the National Construction Authority and large scale specialized suppliers of steel, timber and cement. The main reasons for choosing these suppliers is because these materials are very important during construction and also because they run out at a high rate. Steel and cement are used in all the various structural concepts such as solid structures, skeletal structures and surface structures. Timber is important because it is widely used in roofs, formwork and finishes.

3.4 Sampling

3.4.1 Sampling size

To compile a list of local General Building Contractors in Nairobi County the researcher went through the National Construction Authority register of building contractors. This was the most current one at the time of the study. Generally, the building contractors are classified according to the money value of work they can undertake. Hence there are eight categories of building contractors. Each category designates the money value limit of work a building contractor can handle as shown below:

Table 3.1: List of contractor categories and their value limits

<table>
<thead>
<tr>
<th>Category</th>
<th>Value Limit (Ksh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NCA1</td>
<td>Unlimited</td>
</tr>
<tr>
<td>2 NCA2</td>
<td>Up to 500,000,000.00</td>
</tr>
<tr>
<td>3 NCA3</td>
<td>Up to 300,000,000.00</td>
</tr>
<tr>
<td>4 NCA4</td>
<td>Up to 200,000,000.00</td>
</tr>
<tr>
<td>5 NCA5</td>
<td>Up to 100,000,000.00</td>
</tr>
<tr>
<td>6 NCA6</td>
<td>Up to 50,000,000.00</td>
</tr>
<tr>
<td>7 NCA7</td>
<td>Up to 20,000,000.00</td>
</tr>
<tr>
<td>8 NCA8</td>
<td>Up to 10,000,000.00</td>
</tr>
</tbody>
</table>

Source: National Construction Authority Register of Building Contractors 2013
Due to time constraint, the researcher will analyse only contractors from NCA1 and NCA2. Another reason is because contractors from these categories have a clearly organized purchasing department. There are currently 218 registered NCA1 and NCA2 (NCA Register of Building Contractors 2013).
NCA1 has a population of 113
NCA2 has a population of 105
Gay (1981) was quoted by Mugenda (2003) ‘…for descriptive statistics, ten percent of the accessible population is enough as the target population….’ A sample of ten percent of the accessible was therefore used.
To get the most conservative sample size for each category, the following equation was used.

\[ n = \frac{Z^2 \times P \times Q \times N}{e^2 (N-1) + Z^2PQ} \]

Source: (Chava and Nachmias 1996)

Where:
N= size of the population
n= sample size
P= sample proportion
Q= 1-P
e= acceptable error
Z= the value of the standard variance at a given confidence level and worked out from the table showing area under normal curve
e= 0.05 since the estimate should be within 5% of the true value
The researcher assumed a 95% confidence level that the response would be within + or -5 of the true state of affairs.

\[ n = \frac{1.96^2 \times 0.95 \times (1-0.95) \times 218}{0.05^2 \times (218-1) + 1.96^2 \times 0.95 \times (1-0.95)} \]
\[ = 55 \]

The proportion of the different sample group was further identified as follows
\[
\begin{align*}
\text{n} & = \frac{1.96^2 \times 0.95 \times (1-0.95) \times 113}{0.05^2 \times 218 + 1.96^2 \times 0.95 \times (1-0.95)} \\
& = 28
\end{align*}
\]

For NCA1 the sample size was 28

\[
\begin{align*}
\text{n} & = \frac{1.96^2 \times 0.95 \times (1-0.95) \times 105}{0.05^2 \times 218 + 1.96^2 \times 0.95 \times (1-0.95)} \\
& = 27
\end{align*}
\]

For NCA2 the sample size was 27

In Nairobi County there are a total of 14 large-scale specialized suppliers of steel, 16 large-scale specialized timber suppliers and 20 large-scale specialized cement suppliers (Kenya Postal Directory Yellow Pages 2014)

To get the appropriate sample size the same formulae was used

\[
\begin{align*}
\text{n} & = \frac{1.96^2 \times 0.95 \times (1-0.95) \times 14}{0.05^2 \times (14-1) + 1.96^2 \times 0.95 \times (1-0.95)} \\
& = 11
\end{align*}
\]

For specialized steel suppliers the sample size was 11

\[
\begin{align*}
\text{n} & = \frac{1.96^2 \times 0.95 \times (1-0.95) \times 16}{0.05^2 \times (16-1) + 1.96^2 \times 0.95 \times (1-0.95)} \\
& = 13
\end{align*}
\]

For specialized timber suppliers the sample size was 13

\[
\begin{align*}
\text{n} & = \frac{1.96^2 \times 0.95 \times (1-0.95) \times 20}{0.05^2 \times (19-1) + 1.96^2 \times 0.95 \times (1-0.95)} \\
& = 16
\end{align*}
\]

For specialized cement suppliers the sample size was 16
3.4.2 Sampling technique

Simple random sampling was adopted for questionnaires. The following method was used

NCA1 = 113/28 ≈ 4
Every 4th contractor was selected

NCA2 = 105/27 ≈ 4
Every 4th contractor was selected

Steel suppliers = 14/11 = 1
Every 1st steel supplier was selected

Cement suppliers = 20/16 = 1
Every 1st cement supplier was selected

Timber suppliers = 16/13 = 1
Every 1st timber supplier was selected

3.5 Data collection instruments and procedures

Various tools will be employed in data collection and are as follows

3.5.1 Secondary data

Secondary data was obtained from what has already been collected, statistically processed and published by others. This will include books, journals, magazines, reports and any other relevant publications. All this was necessary to appreciate the literature of various scholars while identifying the gap that will be filled by the study.

3.5.2 Primary data

Primary data involved field research with the aid of questionnaires. A structured questionnaire was used and administered to the purchasing department at the contractor’s office and another to the large scale specialized suppliers of steel, timber and cement. The size and the layout of the questionnaire was designed to make completion as easy as possible taking into consideration the targeted population. Where possible the answers was given in a multiple choice format. Where open-ended questions was asked, little space was left for answers to encourage brief answers, partly to ensure that respondents do not spend too long on these questions.

Question wording was kept specific and simple and the vocabulary used was kept as simple as possible. The most helpful information was given by those willing to expand their views. For this reason, some research was undertaken by means of free interview after the
respondents filled the questionnaires. However, at some instances interviews were invoked, especially where respondents were less willing to fill the questionnaires as desired or had little knowledge of the subject matter of the study. Questionnaires were preferred because of the following advantages.

   a) They present data in a form that enables easy data analysis.
   b) They are easier to administer because most questions are followed with an alternative answer.

3.6 Data analysis and presentation

Data analysis was also done. The data collected from the field was analysed using descriptive statistics and presented using instruments such as tables, bar graphs, pie charts and text. Analysis was done by MS Excel.

3.6.1 Classification

This involved setting standards for grouping responses, tabulation etc. so as to simplify the analysis of the data collected. The primary data collected was first summarized, organized and presented inform of tabulations and charts.

3.6.2 Analysis

This incorporated comparison of percentages, then relating them to the literatures reviewed. The researcher then embarked on analysing the data so as to meaningful describe and interpret it.

3.6.3 Presentation

The presentations was made through tables and charts showing results and deductions from the analysis section. Descriptive statistics was also used to give meaningful description of scores and measurements using simple statistics tools.
CHAPTER FOUR

DATA COLLECTION, ANALYSIS AND PRESENTATION

4.1 Introduction

Data collected for this research has been done in two phases, the first one being the primary data which has been analysed in this chapter and the secondary data which has been analysed in part IV of the literature review.

4.2 Response from participants

Table 4.1: Response from participants

<table>
<thead>
<tr>
<th>Target population</th>
<th>Number of questionnaires administered</th>
<th>Number of questionnaires filled</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCA1-Contractor</td>
<td>28</td>
<td>20</td>
<td>71.43%</td>
</tr>
<tr>
<td>NCA2-Contractor</td>
<td>27</td>
<td>18</td>
<td>66.67%</td>
</tr>
<tr>
<td>Steel suppliers</td>
<td>11</td>
<td>9</td>
<td>81.82%</td>
</tr>
<tr>
<td>Timber suppliers</td>
<td>13</td>
<td>8</td>
<td>61.54%</td>
</tr>
<tr>
<td>Cement suppliers</td>
<td>16</td>
<td>12</td>
<td>75.00%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>95</strong></td>
<td><strong>67</strong></td>
<td><strong>70.53%</strong></td>
</tr>
</tbody>
</table>

Source: Field Survey, (March 2014)

According to Gay’s Educational Research; Competencies for analysis and Application, 1981, a response rate of 70% is reliable for data analysis and drawing conclusions. However, there were a few respondents particularly the timber suppliers who were sensitive and suspicious to the questions.
4.3 Data from contractors

4.3.1 Sources of finance

Figure 4.2: Source of Finance

40% of general contractors from NCA1 stated their source of finance to be from interim payments. 30% of them stated their source of finance to be from retained profits/savings while 25% their source of finance was from trade credit. In NCA2, 50% of the general contractors stated their source from interim payments. 11% of them stated their source to be...
from personal savings while 33% their source of finance was from trade credit. There are more contractors from NCA1 than in NCA2 who stated their source of finance from retained profits/savings. This is due to the fact that NCA1 has a high money value limit and hence it is able to handle larger projects than NCA2.

**Figure 4.3: Financial problems**

![Financial Problems Chart]

Source: Field Survey, (March 2014)

**Figure 4.4: Problems Obtaining Finance**

![Problems Obtaining Finance Chart]

Source: Field Survey, (March 2014)
Delayed payments from clients was the major problem local contractors faced when obtaining finance for procurement of building materials. Most local contractors pointed out that the clients did not pay them for the work they have so far done even though the interim valuation certificate had been prepared by the Quantity Surveyor and approved by the Architect. This makes them to experience severe cash flow problems particularly contractors from NCA2. This is because as seen from Figure 4.1, most contractors from NCA1 and NCA2 have their source of finance from interim payments. Currently, financial institutions such as banks charge high interest rates on loans. This has discouraged local contractors from obtaining loans from financial institutions as evidently shown in Figure 4.1. 25% of contractors from NCA1 and 33% of contractors from NCA2 stated lack of security as a problem when obtaining materials on credit from suppliers and also financial institutions. This mainly affected NCA2 contractors more than NCA1 contractors due to the fact that NCA1 contractors had more assets and had a higher money value limit. Other problems stated included

1) Misappropriate of funds needed in the procurement of materials particularly NCA1
2) Poor financial planning resulting to inadequate funds needed for the procurement of materials

**4.3.2 Source of Materials**

**Figure 4.5: Source of Materials**

![Source of Materials](chart)

**Source:** Field Survey, (March 2014)
More than 80% of contractors from NCA1 and NCA2 have suppliers as their source. 15% of contractors from NCA1 had manufacturers as their source. This was mainly because of the level of size and complexity in the projects they handle.

**Figure 4.6: Problems Obtaining Materials from source**

Source: Field Survey, (March 2014)

6% of the contractors from NCA1 (representing one of out of eighteen) who procure from merchants stated that the problem they faced was mainly that most merchants required payment for the materials before they are delivered. This results to financial constraints on the side of the contractor particularly if the interim payments he depends on are delayed. Contractors who procure building materials from suppliers stated biasness and nepotism as problems they face. During an interview from one of the purchasing agents from a local contractor claimed that most suppliers and manufacturers of building materials especially steel and cement are Indians. He added that the Indian suppliers and manufacturers rarely sell building materials on credit to African contractors. However they often sell building materials on credit to their fellow Indians. It is therefore difficult to procure materials from these suppliers if you do not have enough funds.
4.3.3 Transportation of materials

Figure 4.7: Transportation of Building Materials

More than 70% of contractors from NCA1 and NCA2 transported the building materials themselves. This is because it was expensive if the suppliers transported the materials.

Figure 4.8: Problems in Transportation

Poor road infrastructure was the major problem that local contractors in NCA1 and NCA2 faced during transportation of building materials. One of the purchasing agent claimed that
poor road infrastructure was experienced mainly in Athi River and Dagoretti areas. Traffic jam was also a major problem local contractors faced during transportation of building materials. The same purchasing agent also claimed that major roads affected by traffic jam included Ngong Road, Langatta Road and Jogoo Road. Other problems experienced by local contractors were the high cost of fuel and inaccessible areas by large trucks. Local contractors were forced to unload building materials a distance away from the site in order to be transported by labourers or small trucks. Inaccessible areas included Nairobi CBD and some parts of Hurlingham and Westlands.

4.3.4 Chart of organization

Figure 4.9: A clear chart of organization

Source: Field Survey, (March 2014)

All the local contractors in NCA1 and NCA2 stated that they had an up to date chart of organization clearly defining the duties and responsibility of each officer in the purchasing department. Most contractors claimed that duties and responsibility of each officer is spelt out immediately on hiring and is updated if need arises.
4.3.5 Procedure of ordering building material

Figure 4.10: Procedure of ordering building material

Most purchases are made against written requisitions in both NCA1 and NCA2 contractors. However there were situations where verbal requests were done especially if small quantities of building materials were needed. Verbal requests were higher in NCA2 contractors than those in NCA1. In some instances both written and verbal requests were done. One purchasing agent during an interview stated that during a purchase, verbal request were done first and then written requisition were done later for confirmation and formality. Suppliers are known not to act accordingly if building materials are ordered verbally. This could turn out to be a problem.
4.3.6 Procurement schedule

Figure 4.11: Presence of a procurement schedule

Source: Field Survey, (March 2014)

All contractors from NCA1 and NCA2 stated that they had a purchase budget plan that was used as a guide during the procurement of building materials.

4.3.7 Follow up System

Figure 4.12: Presence of a follow up system

Source: Field Survey, (March 2014)
Most contractors stated that they had a follow up system if there was delay in arrival of ordered building materials. However there were two contractors in NCA2 who stated that they had no follow up system.

**Figure 4.13: Supplier’s co-operation in the follow up system**

![Chart showing cooperation levels]

**Source: Field Survey, (March 2014)**

Most contractors stated that the level of cooperation from suppliers was average. One local contractor from NCA2 stated that the level of cooperation was very low. Some of the factors leading to this was mainly due to ethnicity and in some cases miscommunication between the supplier and the contractor. However two local contractors from NCA1 stated that the level of cooperation was high. This was attributed to a good relationship between the supplier and the local contractor.
4.3.8 Purchase records

Figure 4.14: Purchase records reflection of previous prices and suppliers

Survey: Field Survey, (March 2014)

All contractors stated that their purchase records reflected previous prices and suppliers. This was used as a form of purchase budget plan.

4.3.9 Architect’s instructions

Figure 4.15: Architect’s instructions on the use of alternative available materials

Source: Field Survey, (March 2014)

Most local contractors stated that it took 14 days for the architect to issue instructions on the use of alternative available materials if the materials in the contract bills were unavailable. However in some local contractors particularly from NCA2 stated that the architect took 21
days. 20% from NCA1 and 16% from NCA2 stated that it took the architect 7 days. 14 days is a long duration and this may cause delay in the completion of the project.

### 4.3.10 Architect’s request for suppliers’ brochures and catalogues

**Figure 4.16: Frequency of Architect’s request for suppliers’ brochures and catalogues**

![Bar graph showing the frequency of Architect's request for suppliers' brochures and catalogues.]

Source: Field Survey, (March 2014)

Most contractors stated that the Architect sometimes requested for suppliers’ brochures and catalogues. However, some stated that they always requested for suppliers’ catalogues. This occurred where the projects were complex in nature and large. The type of material was also a factor that affected the Architect’s frequency of requests of suppliers’ catalogues. Materials like tiles and other finishes required Architect’s Approval.
4.3.11 Involvement of Consultant Quantity Surveyor

Figure 4.17: Level of involvement of the Consultant Quantity Surveyor

Source: Field Survey, (March 2014)

Most contractors stated that the level of involvement by the Consultant Quantity Surveyor was average. 37% of contractors from NCA1 and 27% from NCA2 stated that the Consultant Quantity Surveyor was highly involved in procurement of building materials. It was high in NCA1 than in NCA2 due to the difference in sizes of project each category handles. Large projects required the Consultant Quantity Surveyor to be highly involved. During an interview, one of the purchasing agent claimed that the Consultant Quantity Surveyor was mainly involved in the procurement of expensive materials such as sanitary fittings. In rare cases they were involved in the preparation of Bills of Materials.
4.3.12 Involvement of the Engineer

**Figure 4.18: Level of involvement of the Engineer**

Source: Field Survey, (March 2014)

Most local contractors stated that the level of involvement by the consultant Structural Engineer in procurement was average. 40% from NCA1 and 33% from NCA2 stated that the consultant Structural Engineer was highly involved. During an interview, a purchasing agent claimed that the Engineer was mainly involved in the procurement of steel. He was also involved in inspection to ensure that the steel used was the right size.
4.4 Data from suppliers
4.4.1 Material unavailability

Figure 4.19: Material unavailability

Source: Field Survey, (March 2014)

All the cement suppliers stated that they rarely have situations where cement ordered by local contractors is unavailable. This is mainly due to the fact that Kenya produces large quantities of cement yearly and the increase in number of cement manufacturers in the country. However steel suppliers stated that they sometimes have situations where steel ordered by local contractors is unavailable. This is attributed to the fact that the country imports rare earth minerals, coal and iron ore to produce steel. 62% of the large scale timber suppliers stated that they rarely experience these situations. This figure is not as high as expected because of the government’s regulations on cutting down trees.
Figure 4.20: Actions taken if materials ordered are unavailable

Source: Field Survey, (March 2014)

50% of the cement suppliers stated that they borrow from other suppliers if the type of cement ordered is unavailable. This was attributed to the fact that most cement suppliers are of Indian origin and hence they have a good relationship. 25% of them stated that they recommend other suppliers. 16% of them waited until the materials are arrive from the manufacturers while 8% of the bought from other suppliers. 33% of the steel suppliers borrowed from other suppliers while 32% of them bought from other suppliers. One supplier stated that he waited until the steel became available while two stated that they recommended other steel suppliers. 37% of the timber suppliers stated they buy from other suppliers. This is because timber is not as expensive as cement and steel. 13% of the timber suppliers recommended other suppliers. Borrowing from other suppliers will consume a considerable amount of time especially if the other supplier is located far way. Time will also be consumed in carrying out the paper work involved. Buying from other suppliers will be more expensive and the cost will be transferred to the local contractors particularly for steel and timber.
4.4.2 Material transportation

Figure 4.21: Transportation

![Transportation services chart]

Source: Field Survey, (March 2014)

Most steel, timber and cement suppliers stated that they did not offer transportation services. Four steel suppliers, one timber supplier and five cement suppliers offered transport services to local contractors.

Figure 4.22: Problems in transportation

![Transportation problems chart]

Source: Field Survey, (March 2014)
Most suppliers who offer transport services stated that the major problem in transportation of materials was poor road infrastructure. The distance was not a problem to the suppliers. This was due to the fact that most suppliers are located in Industrial near Nairobi CBD and Mombasa Road. These areas are centrally positioned. Traffic jam was also a problem especially to the steel suppliers along Mombasa Road. One of the steel suppliers and one of the cement suppliers who offer transport services stated that traffic jam was a problem.

4.4.3 Delivery of wrong quantities of materials

Figure 4.23: Situations where materials delivered are not of the required quantity

Most suppliers of steel, timber and cement stated that they sometimes deliver materials that are of not the required quantity. One of the steel suppliers during an interview stated that this was mainly due to avoidable mistakes by the employees. In some rare case theft of the materials was another factor. Cement suppliers did not experience these situations as often as steel and timber. This was due to the fact that cement bags can be enumerated easily than timber. Steel suppliers experienced these situations more often because steel is sold per Kg and hence problems may arise during weighing.

Source: Field Survey, (March 2014)
4.4.4 Follow up

Figure 4.24: Follow up on delivered materials

Source: Field Survey, (March 2014)

Most suppliers of cement, timber and steel stated that they have measures to ensure that the materials ordered are delivered to the construction site as planned. However 33% of steel suppliers, and 50% of timber suppliers and 41% of cement suppliers stated that they had no measures to ensure that the materials ordered are delivered to the construction site. They said this was due to the following reasons

a) Inadequate staff
b) Poor management especially for the timber suppliers
c) Lack of a clear explication of the duties of the employee.
4.4.5 Replacement of damaged materials

**Figure 4.25: Replacement**

![Graph showing replacement of damaged materials](image1)

Source: Field Survey, (March 2014)

**Figure 4.26 Duration of replacement of damaged material**

![Graph showing duration of replacement](image2)

Source: Field Survey, (March 2014)

From the graph only one timber supplier replaced damaged material in one day. Most of the timber suppliers replaced the damaged material in two days. This is attributed to the fact that timber is less widely used in large projects than cement and steel. Therefore there will be few orders and so the supplier had time to replace the damaged materials in one day. Most cement
and steel suppliers replaced damaged material in one week. This is because these materials are widely used in most stages of construction from substructure to flat roofs. Therefore there were many orders from other local contractors and so the suppliers delayed in the replacement of the damaged materials.

4.4.6 Government’s effort in ensuring building materials are more available

Figure 4.27: Government’s effort

![Government's effort](image)

Source: Field Survey, (March 2014)

Most steel and timber suppliers stated that the level of government’s effort was low. The reason for the response by the steel suppliers was due to the fact that there is no manufacturing plant for steel in Kenya. Steel is imported mainly from Europe. The government regulation on cutting down trees resulted to the response made by the timber suppliers. Most cement suppliers stated that the level of government effort was high. This was attributed by the fact that there were few restrictions in setting up a cement manufacturing plant in Kenya.
4.5 Problems encountered

The study encountered the following problems during data collection

1) Some of the respondents especially from contractors refused to be administered with questionnaires complaining that they had filled too many questionnaires.

2) Some of the construction companies selected in the sample had relocated from their original office location and so tracing them was difficult, and so the researcher had to select another construction company to fill the questionnaire.

3) Some of the purchasing agents failed to respond claiming that they had too much office workload.

4) Some of the purchasing agents were not in their office so the researcher had to leave the questionnaire and come back after a few days. However on returning, most were still unanswered. Therefore due to time constraint, those questionnaires could not be waited for consideration.

5) Some suppliers were not cooperative especially timber suppliers. Most thought that the researcher was from the City Council of Nairobi inspecting permits for dealing with timber.

6) Some suppliers due to ethnicity were also uncooperative. Especially cement and steel suppliers.

4.6 Test of hypothesis

The research hypothesis was that the problem facing Kenyan local contractors in the procurement of building materials are mainly caused by factors which are beyond his control. From the analysis it was observed that most problems which Kenyan local contractors face were financial problems. 75% of NCA1 contractors and 89% of NCA2 contractors stated that they had challenges in acquiring sources of finance. 40% of NCA1 and 50% from NCA2 stated that the clients delay with interim payments was a major challenge. Another problem faced by the local contractors was poor road infrastructure. 55% from NCA1 and 56% from NCA2 stated that poor road infrastructure was also a major challenge they faced. Acquiring building material from the source was also a challenge the local contractors faced. 55% contractors from NCA1 and 73% from NCA2 stated that this was a challenge especially from suppliers mainly due to nepotism.
Suppliers default was also a major challenge especially on delivery of wrong quantities. More than 50% of all the suppliers stated that they sometimes deliver the wrong quantities of material. Other minor challenges included high interest rate from banks, traffic jam, architect delay, lack of enough involvement by the quantity surveyor and the structural engineer and finally suppliers default. However it is important to note that a few challenges were attributed to the local contractors especially financial problems. This was less than 30% from both NCA1 and NCA2. The challenges included mismanagement of funds used for procurement and poor financial planning. Nevertheless, the majority of the problems are beyond the local contractors control and therefore the hypothesis holds.
CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of findings of the study and the resultant conclusions and recommendations in line with the objectives of the study which included

1. To identify key challenges Kenyan local contractors face in the procurement of building materials
2. To identify the sources of these challenges
3. To suggest possible solutions to minimise the challenges ascertained.

5.2 Conclusion

The first objective of the study as stated earlier on was to identify key challenges local contractors face in the procurement of building materials. The study revealed that one of the problems local contractors face is obtaining finance that is to be used in the procurement of the building materials. The source of materials was also a problem they faced. For example the merchants required payment of building materials before they are delivered while the suppliers and manufacturers were also bias and practiced nepotism in selling building materials on credit.

Transportation was also a major challenge for the local contractors. This was due to poor road infrastructure and traffic jam in some parts of Nairobi County. Another challenge was lack of sufficient cooperation by suppliers in the follow up system if the materials delayed in delivery.

Architect’s delay in instruction on the use of alternative building materials was also a challenge faced by local contractors. It was found that the architect took 14 days to issue the instructions. This is a long duration and may lead to unnecessary delays. The frequency of requests for supplier’s catalogues by the architect was also a problem. Most contractors said that they sometimes asked for the supplier’s catalogues.

Lack of sufficient involvement by the quantity surveyor and the structural engineer was a challenge the local contractors faced. However these was not a major problem as it was found out that the level of involvement in the procurement of building materials was average.
Material unavailability by the local contractors was a concern to the local contractors particularly steel because it was imported. However this was not a major issue as there were no suppliers who stated that the frequency of material unavailability was often.

Some actions taken by the suppliers if materials ordered were unavailable was also a challenge. Borrowing from other suppliers will consume a considerable amount of time especially if the other supplier is located far way. Time will also be consumed in carrying out the paper work involved. Buying from other suppliers will be more expensive and the cost will be transferred to the local contractors particularly for steel and timber. Transportation of the building materials by suppliers was also a problem. This was because the cost of transportation will be transferred to the local contractors especially for timber and cement. Suppliers delivering materials that are not of the required quantity was a problem. However it was not a major issue since most suppliers stated they sometimes delivered materials that were not of the required quantities.

Some suppliers stated that they lacked measures to ensure that the materials ordered have been delivered as planned. This was the case for the timber suppliers. Another challenge was the duration for replacement of damaged material by the supplier. Most suppliers of steel and cement stated that they took one week to replace damaged materials. This is a long duration since these materials are used often during construction. Lack of adequate government effort was a major problem as most suppliers of steel and timber stated that the level of effort was low.

The second objective was to identify the sources of these challenges. The study found that the sources of these challenges included the client, the financial institutions, and professionals such as Quantity Surveyors, Architects and Structural Engineers, Suppliers, manufacturers, merchants and the government.

5.3 Recommendations

With respect to the findings as well as the conclusions drawn out from this study, several practical recommendations are worth forwarding for possible implementation.

1. Banks and other financial institutions should be advised by the government to ease repayment of loan conditions such as reducing interest rates they charge on loans to an affordable level so as to enable local contractors secure this as a source of finance.
2. The newly established National Construction Authority should help the local contractors by lending finance at lower rates.

3. The general obligations of the employer under the contract is to make adequate financial arrangements to ensure that all payments to the local contractors are made within the periods stipulated in the contract. During contract documentation, the days for the preparation of an interim valuation of the work done by the quantity surveyor should be reduced from seven days to four days. The days within which the architect should issue an interim payment certificate upon receipt of the quantity surveyor’s valuation should be reduced from seven days to four days. This will ensure that the employer makes payment in time.

4. During contract documentation it will be advisable to reduce the duration for the architect’s instruction on unavailability of materials from 14 days to 10 days.

5. The Quantity Surveyor and the structural engineer should be more involved in the procurement of building materials. This will only be possible if during contract documentation, involvement in the procurement of building materials is added to their general obligations.

6. The suppliers should come up with a delivery schedule so that they are able to deliver the materials on time. Preferably a computerized delivery schedule.

7. The government should take necessary steps to ensure building materials are more available. The government who should set up a manufacturing steel plant as soon as possible following the discovery of rare earth minerals, coal and iron ore. It should also ease the regulation on cutting down of trees. However punitive measures should be there for illegally cutting down trees.

5.4 Areas of further study

The following areas are recommended for further study

1. The use of E-procurement by local contractors as way to reduce delays in project completion.

2. A comparative study between nominated suppliers and domestic suppliers.
REFERENCES

Published work

12. Anyon G.J (1963), *Managing an integrated purchasing process*, University of Pennsylvania


Unpublished Work


Journals and Magazines

1. Environmental Resources Limited, 2007
3. Kenya Association of Manufacturers journal 2010
   Kenya NGO Earth Summit 2002 Form
4. 9TH Kenya Building Material Exhibition 22-25 Nov 2012
5. 10th Edition of Build Expo 04-06th May 2013
6. JBC (1999) *Agreement & conditions of contract for building works,* Nairobi

Internet

1. www.constructionkenya.com - construction business review
2. www.yellowpageskenya.com
3. www.knbs.or.ke
4. www.nca.go.ke
UNIVERSITY OF NAIROBI
Department of Real Estate and Construction Management
P.O. Box 30197, 00100 Nairobi, Kenya. Tel: No. +254-2-2724529
E-mail: dept-recm@uonbi.ac.ke

Ref: B66/0797/2010

7th March 2014

TO WHOM IT MAY CONCERN

GATHONI ANTHONY MBUGUA

We confirm that the above named student is in the Department of Real Estate and Construction Management pursuing Bachelor of Quantity Surveying Degree course.

He is carrying out his fourth year project entitled: "A Study On Effective Building Material Management By Kenyan Local Contractors: Emphasis On Procurement." in partial fulfillment of the requirements of the degree programme.

The purpose of this letter is to request you to allow him access to any kind of material he may require to complete his research. The information will be used for research purposes only.

Any assistance accorded to him will be appreciated.

[Signature]

Dr-Ing. Christopher M. Mbatia
Ag. Chair & Senior Lecturer
Dept. of Real Estate and Construction Management

CHAIRMAN
DEPARTMENT OF REAL ESTATE
AND CONSTRUCTION MANAGEMENT
UNIVERSITY OF NAIROBI
APPENDIX 1

LETTER OF INTRODUCTION

Anthony Mbugua

University of Nairobi

P.O. BOX 30197-00100

NAIROBI

14th March 2014

TO WHOM IT MAY CONCERN

REF: QUESTIONNAIRE ADMINISTRATION

I am a student in the University of Nairobi taking a Bachelors degree program in Quantity Surveying. Am carrying out a research project on “A Study on Effective Building Material Management by Kenyan Local Contractors: Emphasis on Procurement” for my final year thesis.

Your cooperation in filling the questionnaire attached will be highly appreciated.

Thank you for your time.

Yours sincerely,

..................

Anthony Mbugua
APPENDIX 2

A STUDY ON EFFECTIVE BUILDING MATERIAL MANAGEMENT BY KENYAN LOCAL CONTRACTORS: EMPHASIS ON PROCUREMENT.

QUESTIONNAIRE ADMINISTERED TO CONTRACTORS

I am carrying out a study on the problems encountered by contractors in procuring building materials. Please answer the following questions by ticking in the spaces provided (✓) and / or giving an explanation as may be necessary. The following given in this questionnaire shall be treated as confidential and shall be used for no other purposes other than this study. Your assistance in the completion of this questionnaire will be highly appreciated.

A. RESPONDENT’S PROFILE

1. Name of the organization (optional)…………………………………………………

2. What type of organization is the firm?
   ( ) Sole Proprietorship
   ( ) Partnership
   ( ) Company
   ( ) Other (please specify)

3. Is your firm registered with the National Construction Authority?
   ( ) Yes
   ( ) No

4. If yes, in which category is it registered?
   ( ) NCA 1   ( ) NCA 3 ( ) NCA 5 ( ) NCA 7
   ( ) NCA 2   ( ) NCA 4 ( ) NCA 6 ( ) NCA 8

5. When was the firm registered in this category?
   In the year………………

B. PROBLEMS FACED BY CONTRACTORS

6. a) What are the sources of money to finance the purchase of materials?
   ( ) Bank loans / overdrafts
   ( ) Personal Savings/ Retained profits
   ( ) Interim payments
   ( ) Trade credits
   ( ) Others (please specify) …………………………………………………………………..
b) Do you have any problems obtaining finance?

( ) Yes
( ) No

c) If yes, what kind of problems do you face?

( ) Late interim payments
( ) Lack of security
( ) Loans too expensive due to the high interest rates
( ) Others (please specify)……………………………………………………………

7. a) What is the source of materials you use?

( ) From manufacturers
( ) Through builders’ merchants
( ) From suppliers
( ) Others (please specify)……………………………………………………………

b) Do you face any problems with getting the materials from the sources?

( ) Yes
( ) No

c) If yes, please explain

…………………………………………………………………………………………

8. a) Who transports the materials to site?

( ) You (contractor)
( ) Supplier/manufacturer

b) What problems do you face in transporting the materials?

( ) Distance between supplier depots and construction sites
( ) Poor road infrastructure
( ) Traffic jam
( ) Others (Please specify)……………………………………………………………
9. a) Do you have an up to date chart of organization clearly defining the duties and responsibility of each officer in the purchasing department?
   ( ) Yes
   ( ) No
   b) If no, please explain……………………………………………………………………

10. What procedure do you use when ordering building materials?
   ( ) Written requisitions
   ( ) Verbal requests
   ( ) Both written requisitions and verbal requests
   ( ) Others (please specify)…………………………………………………………………

11. a) Do you have a procurement schedule or any other plan that you can use as a guide
   ( ) Yes
   ( ) No
   b) If no, please explain……………………………………………………………………

12. a) Do you have a follow up system when there is delay
   ( ) Yes
   ( ) No
   b) If yes, how can you rate the level of cooperation from the supplier when following up delayed materials?
   ( ) 1-Very Low (0-29%)
   ( ) 2-Low (30-49%)
   ( ) 3-Average (50-60%)
   ( ) 4-High (61-90%)
   ( ) 5-Very High (91-100%)

13. If the materials are unavailable in the market and the architect notified, how long does he take to issue any instructions on use of alternative available materials?
   ( ) 7 days
   ( ) 14 days
   ( ) 21 days
14. How many times does the architect request for trade catalogues or suppliers’ brochures to prove that the materials are procurable and are in accordance with the contract bills?

( ) Always

( ) Sometimes

( ) Never

( ) Others (please specify)………………………………………………………………

15. Various professionals have a role to play in procurement of building materials. Please rate the level of involvement by the following professionals.

Ratings are

1=Very Low (0-29%), 2=Low (30-49%), 3=Average (50-60%), 4=High (61-90%),
5=Very High (91-100%)

a) Consultant Quantity Surveyor ……………………

b) Consultant Structural Engineer…………………..

*THANK YOU*
APPENDIX 2

A STUDY ON EFFECTIVE BUILDING MATERIAL MANAGEMENT BY KENYAN LOCAL CONTRACTORS: EMPHASIS ON PROCUREMENT.

QUESTIONNAIRE ADMINISTERED TO THE SUPPLIERS

I am carrying out a study on the problems encountered by contractors in procuring building materials. Please answer the following questions by ticking in the spaces provided (✓) and / or giving an explanation as may be necessary. The following given in this questionnaire shall be treated as confidential and shall be used for no other purposes other than this study. Your assistance in the completion of this questionnaire will be highly appreciated.

C. RESPONDENT’S PROFILE

1. Name of the organization (optional)……………………………………………….

2. What type of organization is the firm?
   (  ) Sole Proprietorship
   (  ) Partnership
   (  ) Company
   (  ) Other (please specify)…………………………………………………………

3. What materials do you supply to the building contractors?
   (  ) Cement
   (  ) Steel
   (  ) Timber

D. PROCUREMENT

4. a) Are there situations where materials that are ordered by the contractors are unavailable?
   (  ) Often
   (  ) Sometimes
   (  ) Rarely
   (  ) Others (please specify)…………………………………………………………..
b) If materials are unavailable when ordered, what do you do?
( ) Recommend to other suppliers
( ) Wait until they are available
( ) Buy from other suppliers and then resell
( ) Borrow from other suppliers

5. a) Do you offer transport services to the local contractor?
( ) Yes
( ) No
b) If yes, what problems do you face?
( ) Distance from suppliers depot to construction sites
( ) Poor road infrastructure
( ) Traffic jam/accident
( ) Others (please specify)……………………………………………………………

6. Are there situations where you deliver materials that are not of the required quantity?
( ) Often
( ) Sometimes
( ) Rarely
( ) Others (please specify)…………………………………………………………..

7. Do you have measures to ensure that the materials ordered are delivered to the construction site as planned?
( ) Yes
( ) No
b) If no please explain……………………………………………………………..

8. a) Do you replace materials that were damaged when you were delivering to the site?
( ) Yes
( ) No
b) If yes, how long does it take to replace the damaged materials?
( ) One day
9. The government should ensure that building materials are more available. Please rate the level of the government effort in ensuring that building materials are more available.

Ratings are
1=Very Low (0-29%), 2=Low (30-49%), 3=Average (50-60%), 4=High (61-90%), 5=Very High (91-100%)

( ) 1
( ) 2
( ) 3
( ) 4
( ) 5

*THANK YOU*
Appendix 3

Steel Suppliers

Source: Google maps