Investigation of factors influencing construction site labour productivity in Nairobi County, Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

This thesis is dedicated to my wife, Rose and my children Hope, Faith and Victor for their continued support and love throughout the study.

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LIST OF ABBREVIATIONS/ACRONYMS

ASSIST Advisory Support Information Services and Training

CIDB Construction Industry Development board

GDP Gross Domestic Product

CPM Critical Path Method

GFCF Gross Fixed Capital Formation

ILO International Labour Office

IP Intellectual Property

KNBS Kenya National Bureau of Statistics

MBO Management by objectives

NCA National Construction Authority

NCAA National Construction Authority Act

NEMA National Environmental Management Authority

PERT Program Evaluation and Review Technique

PM Project Manager

SCB Solid Concrete Block

TVET Technical and Vocational Education and Training

ABSTRACT

The construction industry has been cited to have a multiplier effect in the performance of any economy. It is necessary to make the industry more efficient and effective in terms of better utilization of resources and the most important resource includes labour among others. Lack of archival information on labour productivity in Kenya has made planning and production estimation on construction sites difficult. The overall objective of the study was to establish the significant factors that affect labour productivity on construction sites. Ranking the factors that affect construction site labour productivity; assessing factors of labour productivity in the key trades of construction process; and evaluating management factors that can enhance site labour productivity would produce planning and estimating data that assist site labour productivity. The prioritization of the factors which affect productivity in labour intensive construction would be used as guide to onsite labour management. The research design used in this study was the survey methodology. 140 contractors from categories NCA4, NCA5, NCA6 and NCA7 were targeted for sampling. These categories of contractors were chosen because of their capacity to execute medium size construction projects and they are the ones who are mostly involved in labour intensive construction. The survey achieved a 70.72% rate of return. Questionnaires and interview schedules were used to collect data for the study using stratified sampling procedure. The results were presented in tables and pie chart diagrams. The findings indicate that lack of training, work planning and scheduling were the factors which were ranked highly as affecting labour productivity. These factors can be improved through skills training, work planning and scheduling. Further, monitoring work during implementation was found to be a key management strategy for it improves site labour productivity. The study recommends that policy makers should enhance project scheduling techniques and put in place strategic management structure that can enhance labour productivity. Further, NCA should come out with a rule on archival records so that construction works can have reference back-ups.

Key words: Construction industry, Construction sites, Labour productivity, Factors of productivity, NCA.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Labour productivity in the construction industry is the units of work accomplished for the unit of labour (Wilcox, 2000). Globally, the building section of the construction industry is mainly concerned with the assembly of building materials and components which are supplied by the manufacturing sector and delivered to the site by the transportation sectors. To a large extent in Kenya, many of the buildings construction works still relies heavily on manual labour in their assembly.Mbiti (2008),argues that the construction industry employs about 800,000 people who are required to deliver the constructed facilities to the clients' on time, within budget and meeting the specified standards of quality. It would be better if the predetermined levels of labour productivity are known by stakeholders in advance so that planning and scheduling can be effectively achieved.

In Kenya, there is an abundance supply of semi-skilled and unskilled labour which needs to be utilized (Mbiti, 2008). In order to provide social and economic advantage to the population, the construction industry has been under pressure to embrace best practices as one way of creating job opportunities for operatives in the job market. Construction process is an important means of expanding the job market in the economy and therefore every effort should be made to improve labour productivity. An improvement in labour productivity will lead to enhancing project productivity and making it attractive to project sponsors.

The labour productivity on site might be affected negatively by a variety of factors which include; extraneous reasons like adverse effects of the weather, NCA, NEMA, local authorities, stakeholders and legislation. Masu (2006) argues that Kenya being a developing country is not an exception to the trends in other countries which are at crossroads with the building teams due to the later not delivering the projects within the stipulated time.

Delays on site has caused losses on project's profit to the contractor; increased cost to the client and strained the working relationship between the parties in a project. This has been brought about by the lack of adequate information on labour productivity rates in the construction industry in Kenya (Wachira, 1999). The inaccurate determination of activity duration has in most cases led to the incorrect estimation of contract periods. Delays in completion of projects in the construction industry are indicators of productivity problems and hence a big challenge facing the construction industry. An improved labour productivity is one of the key determinants of projects prediction and therefore an important ingredient of construction delivery.

1.2 Statement of the problem

In the Kenya's construction industry, documented data on productivity is inadequate. The inadequacy of productivity data is one of the problems arising from undocumented archival information which has made planning and estimating of site activities unpredictable. Construction firms don't share the information from past completed projects with their competitors as this is considered as confidential information by contractors. To a greater extent the information and records from previous completed projects is only known by of the top management staff. The limited labour productivity data available are generalized and requires further manipulation by the cost estimators in the construction firms using their experiences and tacit knowledge (which are skills learned on or off the job).

The fluctuation in labour productivity rates on construction sites has remained unresolved to contractors in their decision-making processes over decades in respect to project success in terms of cost, time, quality and safety. Productivity, or lack of it, is considered as one of the main problems confronting the construction industry with respect to project close-up or success. To estimate correctly the required resources and time for a project, archival information on productivity rates would be necessary.

Despite the concerns on lack of adequate productivity information, little research attention and documentation has been undertaken on construction sites to establish labour productivity data for consideration in project planning, costing and budgeting

in the construction industry in Kenya. Therefore this study seeks to assess the problem of labour productivity on construction sites and identify possible strategies that can be used to enhance it.

1.3 Aim of the study

To develop ways of improving labour productivity on construction sites in the Nairobi County through identified management strategies. The prioritization of the factors which affect labour productivity would enable the project team to leverage the limited resources at their disposal to improve the onsite labour management, availability of tools and materials, in order to enhance labour productivity.

1.4 Research objectives

Main objective:

The main objective of the study is to establish the significant factors that affect site labour productivity.

Specific objectives:

The specific objectives in line with the main objective of the study are to:

a) Identify and rank the factors that affect construction site labour productivity.

b) Assess significant factors of labour productivity in the various trades of construction process in Nairobi County.

c) Evaluate management strategies that can enhance construction site labour productivity.

1.5 Research Question

The main question of the research is what could be the issues to improve labour productivity in the Kenyan construction industry?

1.6 Significance of the study

While higher labour productivity in the construction industry is essential it has been noted that the industry is working below capacity (Muchungu, 2012) . In Kenya, there has been no comprehensive study done on labour productivity in the industry and this is manifested by the widespread under – recording of labour outputs.

The findings from the study would be valuable in the construction industry as they will prioritize the factors that are associated with effective labour productivity on construction site. This would assist the planning for the resources to be used in the execution of the work and thereby improving labour productivity. The findings will further contribute to the pool of knowledge available in this area of construction project management and would form a useful archival material for reference to other researchers and institutional libraries which will be vital to the present and future scholars in regard to labour productivity.

1.7 Scope and delimitations

The study was relevant for evolving strategies for improving labour productivity in building projects within Nairobi and therefore the study was delimited to investigation on labour productivity on construction sites in Nairobi County. Nairobi County being the centre of all economic activities was generalized for building works in the Kenya construction industry as it has the highest concentration of building contractors in Kenya. The study looked at construction site labour productivity of contractors in categories NCA4, NCA5, NCA6 and NCA7 (NCA, 2013). These categories of contractors extensively employ manual labour in the execution of construction works as they have minimal equipment and capacity to get credit for heavy machines. It is in these categories where under – recording of productivity outputs are prevalent and inadequate financial resources is at their disposal. The scopes of the project value for contractors under consideration were those who execute works of contract sum of between Kshs 20 million and kshs.200 million. Further, the study on labour productivity outputs for construction workers were limited to the trades of masonry, plastering and painting which are predominantly found in labour intensive construction.

1.8 Assumptions of the study

The assumptions of this study are:

a) Most of the contractors engaged in formal and informal construction work are registered with the National Construction Authority.

b) The gang sizes for labour on construction sites vary from one type of operation to another. For the purpose of this study, it was assumed that construction sites engage more or less the same gang sizes for the similar operations.

1.9 Operational definition of terms

The following are the definitions of the basic technical terms used in this study:

1.9.1 Productivity

Productivity is often defined as a relationship between output produced by a system and quantities of input factors utilized by the system to produce that output. Here, the output can be any outcome of the process, whether a product or service, while input factors consist of any human and physical resources used in a process. It follows that, in order to increase productivity, the system must either produce more or better goods from the same resources, or the same goods from fewer resources. Productivity is concerned with the effective and efficient utilization of resources in producing goods or services (Hachey, 1992). Labour resource utilization and productivity is defined as input / output (i.e. 1hour/m^2 for walling operations).

1.9.2 Effectiveness

This is the leveraging of the resources to achieve the set objectives. This is described as doing the right thing. It refers to the extent to which client requirements are met (Hachey, 1992). Effectiveness indicators refer to the achievement of the organization's objectives both at the corporate level and project level at minimum cost. The most common approach to measuring the effectiveness of a job management is to compare job costs with the project budget. In the construction

industry activity and work-sampling techniques provides the logical means for measuring effectiveness in the utilization of resources on sites.

1.9.3 Efficiency

This is the utilization of the scarce resources in the implementation process in order to achieve the set objectives. Efficiency in the context of labour can be seen as doing things right so as to accomplish desired results. According to Lema (1995) the measure of efficiency of the labour is the speed at which a certain task can be carried out; it encompasses diligence, steadiness and continuity. Efficiency is an indicator to how strong the organization perceives the adherence to schedule, budget and specifications.

1.10 Outline of the study

The study report is organized in five chapters. Chapter 1 discusses the background of the construction industry and it describes the problem of labour productivity. Research objectives, research questions and significance of the research are stated. The need to identify possible strategies that can be used to of enhance labour productivity is highlighted.

Chapter 2 discusses the construction process and factors affecting labour productivity both globally and Kenya in particular. Research work previously done on labour productivity is discussed and the theories guiding the study are stated. Finally the literature gaps from studies are highlighted.

Chapter 3 discusses the methodology used in conducting the study. The research design, data collection procedures, research instruments and data analysis procedures are discussed.

Chapter 4 presents the data analysis and results obtained from the study on labour productivity factors. The response rate is discussed, the data from the study are analyzed and their implications are highlighted.

Chapter 5 covers conclusion and recommendations. With results from analyzing data collected in chapter 4, a conclusion as well as the objectives required is established. Finally, recommendations are made on how to improve labour productivity in construction sites and gives direction for areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explores several research findings related to construction project management productivity, labour productivity and construction productivity, which have been published on the subject of measuring and rating labour productivity and uncovers the knowledge gap that exist in literature with respect to factors negatively affecting labour productivity. This chapter deals with the construction process, inputs of construction, training and skills required in the construction industry, management of construction, labour management, strategies of managing labour, and highlights the management and motivational theories which have a direct bearing to the study.

2.2The production phase of the construction process

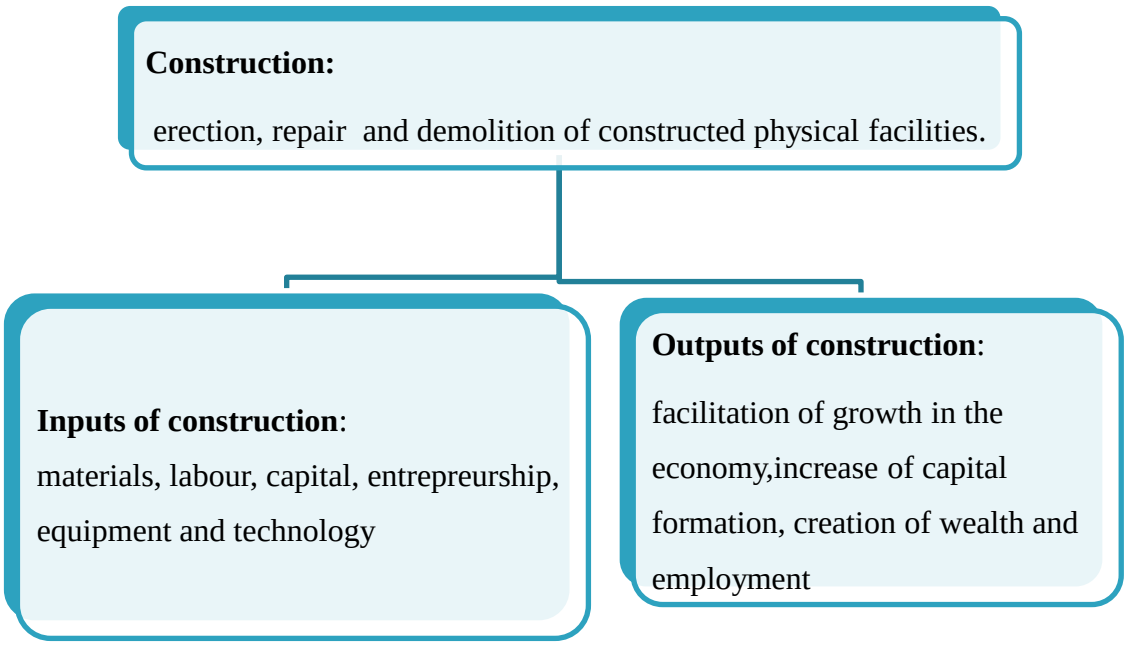

Figure 1: Production phase of the Construction process flow chart

Source: Field survey, 2014

The construction industry is the sector concerned with erection, repair and demolition of constructed physical facilities which provide space where other activities may take place (Hillebrandt, 2000). The building section of the construction industry is mainly concerned with the assembly of building materials which are supplied by the manufacturing sector and delivered to the site by the transportation sectors. To a large extent manual labour is used in the execution of construction works and this contributes to job creation (Mbiti, 2008).

2.2.1 Inputs of construction

Construction in most countries is more labour intensive so it generates employment directly in an economy (Hillebrandt, 2000). Hence, the construction industry in Kenya is a sector that can assist the government to develop the economy as well as generating employment opportunities to its rapid growing population. In practice, building may be constructed using a steel frame, a precast reinforced concrete frame, insitu reinforced monolithic concrete or load –bearing brickwork.

According to Enshassi (2007), the major inputs in the construction process are cited as: materials, labour, capital, plant and equipment, entrepreneurship and technology. These factors are critical to productivity outputs and represent the broad areas in which Project managers can take action to obtain better productivity (Heizer, 1990). Increased productivity in the construction industry can be viewed from two perspectives, the client and the contractor. From the client's perspective, increased productivity lowers costs, shortens construction schedules, offers more value for the money, and achieves better returns on investments. From the contractor's perspective, increased productivity leads to a more satisfied client, while also providing a competitive advantage, and in return leading to faster turnover and increased profits (Horner, 2001).

2.2.2 Outputs of construction

The major outputs in the construction process on site are: facilitation of growth in the economy, increase of capital formation, creation of wealth and employment. A reducing growth of construction output is unexpected of a construction industry in a developing country, of which Kenya is an example. According to Bon (1992), the

output growth trend that is expected of the construction industry of a developing country is the upward trend. This is because the production capacity of the construction industry is expected to grow proportionate to the national demand for physical infrastructure, which generally increases as the developing country progresses.

In Kenya, lack of sufficient investment in the skills development of the labour force has also contributed to poor productivity outcomes because of the mismatch that has developed between the supply of labour, which is predominantly unskilled, and the demand for labour, which has increasingly become focused on skilled workers (RoK, 2003). According to Kwakye (2000), a supervisor will be required to lead, coordinate and direct the work of the operatives in order to achieve group goals. He further emphasized that the quality of supervision would be dependent on several skills such as the supervision skills, human skills, management skills, leadership skills, motivational skills and communication skills. Adequate supervision skills of site activities results in productive and cost effective utilization of plant and the labour workforce performs optimally (Kwakye, 2000).

2.3 Productivity in construction sites

Researchers around the world have provided several contributions related to improving the various aspects of construction productivity. These researches centres include industry associations and academic institutions in: Palestine (Enshassi, 2007) United States of America (Schwartzkopf, 2004) and (Rojas, 2003), Ghana (Olomolaiye, 1998), Kenya (Wachira, 2001), Thailand (Makulsawatudom, 2001) Indonesia (Kaming, 1997), and Tanzania (Lema, 1995) among others.

Enshassi (2007) classifies factors effecting productivity in the Palestine construction industry to 10 groups, namely: factors associated with the internal workforce, factors associated with leadership, factors associated with work motivation factor associated with time, factors associated with materials and equipment, factors related to supervision, factors related to project characteristic, factors related to security, factors related to quality, and external factors.

Rojas (2003) studied many factors which affect labour productivity in construction sector in United State of America. The results of study indicated that management systems and strategies and manpower issues were the two areas with greatest potential to affect labour productivity. From the studies of (Rojas, 2003), it can be argued that the factors which affect labour productivity in developed countries vary considerably from those of developing countries. Whereas management factors are ranked highly in developed countries when it comes to labour productivity, lack of training/skills is the most significant factor which affects labour productivity in developing countries. The other researcher from United States of America Schwarzkopf (2004) also performed research work related to factors affecting productivity such as rework, workers performance and motivation. He stressed on the importance of labour productivity in construction as it is the units of work accomplished for the units of labour. Measuring productivity in construction is important as it provides accuracy in measuring the quantity of works performed and the cost per hour for labour. Greater productivity is an indication of greater output for the same level of input.

According to Olomolaiye (1998), managers of construction sites are crucial when it comes to factors affecting labour productivity as they are the decision makers. From the study it had argued that the efficiency of the worker would be greatly affected by the strategies adopted by the management when it comes to issues of: supervision of workers, motivation, timely delivery of material and equipment. These factors can be positively influenced by appropriate training of site management staff in skills like planning and scheduling activities.

Wachira (1999), cited the following as the key factors which negatively affect labour productivity in the construction industry in Kenya: management system and strategies; unfair wages; recruitment of unskilled personnel; poor communication; late deliveries of materials and equipment; poor welfare facilities; lack of motivation; lack of training/skills; lack of investment in research and development. She believes that listed factors can be positively influenced by appropriate training of site management staff including contractors, site managers, and foremen in management skills like planning and scheduling activities and resources, coordination,

supervision, control of projects, and motivation of workers. Motivation of workers may be realized fast if payments to workers are done promptly, preferably on weekly basis.

In the study conducted by Makulsawatudom (2001) it was observed that there were eight factors which according to the craftsmen affected labour productivity in construction industry in Thailand. These factors were as follows: lack of materials; lack of tools and equipment; incomplete drawings; overcrowding; poor site conditions; incompetent supervisor; rework; poor communication.

According to the study undertaken by Kaming (1997) in Indonesia, eleven factors influencing productivity in developing countries were identified. These factors were: lack of materials; lack of proper tools; equipment break down; rework; change crew members; workers interference; workers absenteeism; supervision delay; overcrowding; changing foreman; working overtime.

Lema (1995) studied factors affecting labour productivity in Tanzanian building construction. The investigation demonstrated that key productivity factors affecting productivity are: financial incentives; wages; other non-financial incentives; level of skill; level of mechanization; and quality of leadership on site.

Barrie (1992) found out that construction labour productivity may fluctuate widely due to numerous factors that affect it. Many of the factors are highly qualitative in nature and may include the effect of location and regional variations, the learning curve, work schedule and work rules, environmental effects, crew experience and management factors.

Productivity factors have been identified by Thomas et al. (2004) in their study of labour productivity comparison for various projects in seven countries. These included: manpower and labour pool; total quantity of a task; design features; environmental conditions and weather; construction methods; project organization; project features; management practices and control; and daily diary.

ASIST (2000) reported that labour productivity might be affected by many factors which are fortunately under the control of the project management. These factors

were: experience of the workforce; motivation; organization of the work; type and condition of tools and equipment; and continual monitoring of performance.

2.3.1 Labour resources productivity

Labour which is sometimes known as human resources is widely recognized as being vital in every organization and it has been found to account for a third of the total direct capital cost of construction projects (Jergeas, 2009). In construction, skilled labour is very important factor of production as it is the one that combines all other resources in order to produce the various construction products like roads, dams and buildings. (Thomas, 2004) pointed out that only a third to one and a half of operative's time is spent directly on work activities productive and the rest of the time they are idle waiting for the materials, plant and instructions from the supervisors to be received. Labour control provides the make or break of any organization as the production labour cost area is the most susceptible to fluctuation. This source of competitive advantage for organizations is known as 'Intellectual capital'.

In general, productivity is often defined as a relationship between output produced by a system and quantities of input factors utilized by the system to produce that output (Mbiti, 2008). Here, the output can be any outcome of the process, whether a product or service, while input factors consist of any human and physical resources used in a process. Increased productivity in the construction industry can be viewed from two perspectives, the consumer and the contractor. From the consumer's perspective, increased productivity lowers costs, shortens construction schedules, offers more value for the money, and achieves better returns on investments. From the contractor's perspective, increased productivity leads to a more satisfied customer, while also providing a competitive advantage, and in return leading to faster turnover and increased profits (Horner, 2001).

Labour productivity is defined by (Jergeas, 2009) as the ratio of actual labour employed to output produced in the process of providing services or producing products. Output is the total quantity of the products or services produced in a given period of time and measured in appropriate units for example the area plastered by a

mason in a day or per hour. Input is the total quantity of labour employed on specific activities over a given period of time and measured in appropriate units. According to Lema (1995), the formula for calculating productivity in labour intensive construction is as follows:

Labour productivity = input/output

Production labour will have an influence on construction projects in terms of delivery time, cost and quality of workmanship. Problems negatively affecting labour productivity have long been a concern of researchers. Based on previous studies, key factors that affect labour productivity in construction have been obtained from the works of Enshassi (2007), Olomolaiye (1998) and Kaming (1997) who observed that the critical factors negatively affecting labour productivity in developing countries differ from those in developed countries. They further argued that construction projects are generally unique and are built on sites with different work crews associated with different trades, level of education, religion and culture. The work is cyclical due to the weather, seasonal variations, and the economic climate. In a study by Heizer (1990), it was established that Labour productivity is generally affected by the following variables: educational levels, government policies, motivation and social overhead that make labour available.

As it will be explained later, operative with higher qualification and motivated generally tend to produce more than their counterparts with less education since rework is minimal. This may be due to the easy at which they can internalize instructions given to them by their supervisors. According to the studies of Burgess (1979), labour productivity may be negatively affected by re-work which on its own can have greater impact on productivity. Rework may stem from:

- Change of Instructions: When instructions are issued to the contractor to make changes when work is in progress this will call for the demolition of certain parts accommodate the changes.

- Unclear Instructions: Verbal instructions at times may lead to different interpretations. It is recommended that the instructions should be in writing to

make the communication clearer. Any instruction given on site verbally should be confirmed by the parties within the timelines spelt out in the conditions of the contract (Kwakye, 2000).

- Complex Specification: time will be wasted by the operatives when trying to figure out the correct interpretation of the wording.

- Poor workmanship: this will lead to the work being re-done by the operatives. This is as consequence of incompetent supervision by the line managers.

2.4 Labour productivity factors

The level of labour productivity in a country and the Construction industry in particular may be determined by a number of factors. According to Moremati (2011), Enshassi (2007) and Drucker (1986) the two significant factors which affect labour productivity in labour intensive construction are: entrepreneurship skills and techniques, management, training and specialization

2.4.1 Entrepreneurship

Drucker (1986), observed that entrepreneurship is about taking risk. An entrepreneur therefore will be the kind of person willing to put his or her career and financial security on the line and take risks in the name of an idea, spending much time as well as money on an uncertain venture. The management sources and organizes the required resources in order to realize the set targets. The successful firms are those that offer new models for working relationships based on collaboration and mutual value of team-building, leadership and management ability (Drucker, 1986). All the aforesaid abilities are the essential qualities of an entrepreneur.

Managers' skill and attitudes have a crucial bearing on productivity. Management is the catalyst to create both the ability and willingness for the employees to work. Management of labour in the construction industry is concerned not only with the efficiency of the labour but also its effectiveness. Although all construction projects are different, most construction activities have common parameters (Nagarajan, 2007). For example, the concreting activity for a basement wall involves delivery,

placement, vibration, and finishing work. These basic steps are fairly consistent with this type of activity, no matter where, when, and how the concrete is being placed. However, variations in actual production rates among various sites are common. In concreting activities, the most significant reduction in the production rate is due to delays in the delivery of concrete materials to the site. This type of delay is often attributed to unexpected occurrences that appear to be un-rectifiable, and therefore is of secondary concern (Enshassi, 2007). Many of the studies conducted on measurements of production rates on masonry and concrete works reveal that waiting time delays are extremely significant part of reduced labour productivity (Enshassi, 2007).

2.4.2 Skills and Techniques of construction

In developing countries like Kenya, there is inadequate formal training in the construction industry (Moremati, 2011). High employee turnover rates deter investments in employee training. Lack of training causes delays due to rework and overall low labour productivity. Many construction firms embrace the unsystematic method of learning on the job commonly referred to as 'Informal skilling' (Middleton, 1991). It is mainly involves learning via observing and doing and is largely confined to initial employment training with limited continuation of training and skills upgrading. Informal skilling is geared towards the transmission of existing practices without or with minimal external input. The implication of this is that that the master's ability to train is limited to his current skill and knowledge and this often results in low productivity (Ziderman, 2003). He further pointed out that informal skilling is the most prevalent mode of training in the informal sector. In Kenya, informal skill training is encouraged by the low level of formal craftsmen training because it is self-financing in that it takes place without any funding from the government (Mittulah and Wachira, 2003). However, craftsmen informally trained lack competency skills as they are not adequately trained.

Cross-training and multi-skilling can reduce unit labour cost. Contracts that create flexible work rules on the site enhance productivity benefits. Reduction in the percentage of the workforce comprised in the unionized labour and improved project

agreements with construction site workers plays a role in labour productivity. According to Singh (2004), technology provides the resources with which people work and affects the tasks that they perform. Advancement in technology allows people to do more and better work. However, in Kenya labour costs for most skills are relatively low and there is less motivation to automate tasks when the labour associated with the tasks is not expensive (Masu, 2006). On the other hand, lack of investment in research and development hinders improvement in labour productivity. Very little money is allocated for development of the individual and organization through training and education (Nyerere, 2009).

2.5 Human Resources Management

Management is a variable of production that ensures that labour and capital are effectively used to increase productivity. Effective Construction project managers build workforces and organizations that recognize the continuing need for education and knowledge. They ensure that technology, education, and knowledge are used effectively.

The manager as a productivity catalyst is charged with the task of making improvement in capital productivity within existing constraints. Such improvement requires training and education as well as dynamic organization (Rojas, 2003). He further observed that one of the factors with a great potential to affect labour productivity is the management system. Managers are responsible for productivity improvement and this can be achieved through planning, proper selection, control and utilization of resource, supply of information and feedback, motivation of operatives and must remain committed to productivity.

Management is responsible for insuring that labour and capital are effectively used to increase productivity. Its other function is to foresee problems well in advance and determine solutions before they arise. Proper management of construction projects requires knowledge of modern management techniques. Studies have revealed that poor management is responsible for over half of the time wasted on a jobsite. A construction project is unable to achieve profitability and success without the presence of good management (Tucker, 1999).

Good management skills include adopting a performance based management viewpoint. This involves setting priorities for improvements, provide cost efficient and easy to use methods, promote a supportive labour-management relationship, and cut costs while increasing profits (Kwakye, 2000).Further, sound labour management entails predicting the working method to be employed, resources to be utilized, when certain events should happen, duration of activity and so forth. As soon as the contract is awarded, the successful contactor will prepare a suitable programme to enable the works to be carried out in an orderly and efficient manner. The overall/ master project programme will be developed to show the sequence necessary for carrying out the works.

According to Kwakye (2000), the managers on a construction site often have severe time constraints and problems with time management. There are few in number generally resulting in lack of sufficient supervision on the site; this lowers productivity, and therefore increases overall project cost. Consequently, an increase in site supervision is needed in order to help increase labour productivity on construction project. Sound labour management is concerned at increasing both the efficiency and effectiveness of labourforce who are the most important resource in the project.

2.6 Labour management strategies or techniques

Labour represents the human factor in the organization that combines intelligence, skills and expertise that gives the organization its distinctive character. The human elements of the organization are those that are capable of learning, changing, innovating and providing the creative thrust which if properly motivated can ensure the long-term survival of the organization. According to Armstrong (2006, p.259), ‘strategic management involves introducing, eliminating, modifying, directing and guiding processes. This is done in such a way that all individuals and teams are equipped with the skills, knowledge and competences they require to undertake current and future tasks required by the organization’. Management strategies in the construction industry are geared towards increasing labour productivity by raising awareness of the need for a learning culture that leads to continuous improvement.

This can be achieved by developing the competence of managers through training that would lead to knowledge creation and expansion of learning capacity throughout the organization.

In a construction project, there are many parties involved such as contractors, sub-contractors, consultants, and client. Often, it may be difficult for these various separate parties to work in harmony without effective coordination. In the words of Assaf et al. (1996), difficulties in coordination between the parties is one of the factors that contributes to decline in labour productivity, for example in the situation that newly revised construction drawings of a project may be issued later by the contractors to the subcontractors. This leads to construction mistakes and the work requiring to be redone. Rework takes additional time, therefore impacting upon labour output of the project.

According to Sambasivan and Yau (2007), most of the workers in the construction industry in developing countries like Malaysia have little formal education and thus, coordination is very important to guide and instructing them to perform their work correctly. Without coordination, the project will have low productivity arising from rework.

2.6.1 Training

This is the use of systematic and planned instruction activities to promote learning (Armstrong, 2006). It involves the use of formal processes to impart knowledge and help people to acquire the skills necessary for them to perform their jobs satisfactorily. According to Pedler et al (1996), an organization that encourages reflection on lessons learnt attempts to understand the dynamics of its operating environment and anticipates likely changes to that environment so as to cope with opportunities and challenges thus becoming more competitive. Companies that fail fully to do so at best adapt to recent changes in order to survive but in doing so are possibly changing their context too late to be poised for the next round of challenges (Pedler, 1996).

Learning is an asset, comprising intellectual property, which can be reused to add competitive advantage. It is also an effective means by which innovation can be introduced to organizations. Innovation is often generated from team members' personal experiences brought with them from one temporary organization, or teams within them, to another (Pedler, 1996). They further argue that the building industry should not only initiate post-project evaluation but also enter a process of organizational learning during the entire life cycle of the project with a view of enhancing productivity.

In Kenya according to Nyerere (2009), enrolment in the traditional engineering and building courses of the Technical and Vocational Education Training (TVET) programmes have dwindled since the early 1990's with under-investment in skill training for institutions being experienced. This he further asserts that has resulted into a reduction of the skilled labourforce which is being channeled into the labour market and has further negatively affected labour productivity in the construction industry.

The conversion of many of the middle training Institutions in Kenya to Universities has seriously affected the middle cadre labourforce as the hands-on skills from Polytechnics and other Technical Institutions have been reduced (Nyerere, 2009). Traditionally the curriculum for Technical institutions and polytechnics emphasized on the practical component whereas Universities laid more emphasis on the theoretical components. He further observed that there have been negative chorus of complaints by employers in the industry about the quality of training in Kenya which is being criticized for being too general and doesn't fit what happens at job sites. The inadequate training of the operatives has negatively affected labour productivity and there is need of plugging the gaps in training and education in order to enhance productivity.

2.6.2 Specialization

This is the engendering a fragmentation of tasks that is compounded in a number of respects. The firm may specialize in certain works which lowers expense as there is greater skill level performance. Specialization normally encourages repetitive work

which the personnel hits a ceiling of performance and will execute faster the tasks as they are aware of the steps involved in undertaking the operation (Enshassi, 2007).
This views concur with concept of the learning curve which is as illustrated in figure1.The concept of the learning curve refers to the time it takes an inexperienced person to reach the required level of performance in a job or a task and it is sometimes called the experienced worker's standard (ESW). The initial part of the curve rises slowly as a person becomes familiar with basic components of a skill. The steep ascending phase occurs when there is enough experience with simple components to start putting it all together. Rapid progress follows until the skill gets to maximum ceiling of performance normally referred to as a plateau where stabilization occurs indicating maximum competence has been attained.

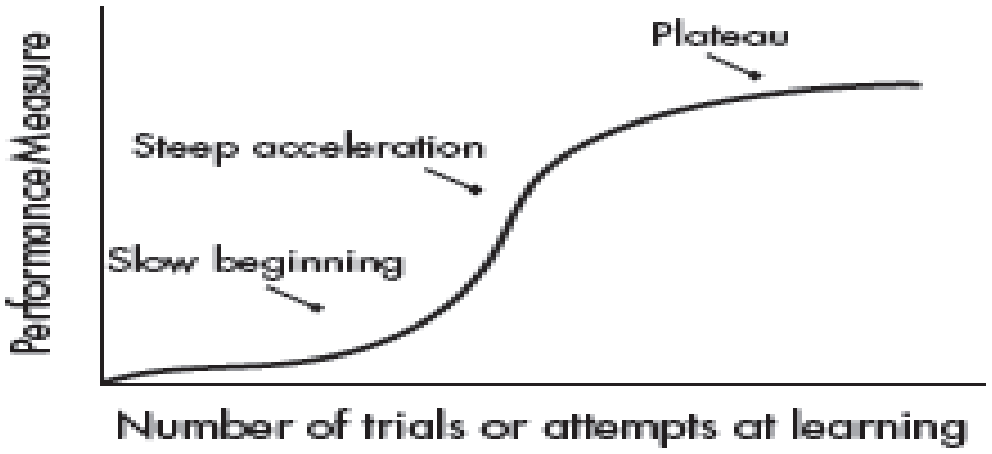

Figure 2: Standard learning curve

Source: http://www.intropsych.com/ch07/20th December, 2013

According to Maylor (2010), the assumptions of the learning curve can be summarized as follows:

- Repetition of any task leads to improvement in productivity as a result of the experience gained
- Operatives start with the necessary basic skills as well as the required support for the work to be accomplished.
- Production will continue without any major breakdowns.
- The reduction in time will follow a specific and predictable pattern.

Ganasen and Natarajan (1993) argues that experienced personnel will execute tasks faster than new entrants as they are aware of the steps involved in undertaking the works. Studies have shown that the change in cost associated with a change in productivity has, in many situations, a characteristic curve that can be estimated with reasonable accuracy. In the words of Ghemawat (1985), costs characteristically decline by 20-30% in real terms each time accumulated experience doubles.

According to Enshassi (2007), labourer experiences had high impact on labour productivity when experiences are less than five years while the impact of labourer experiences becomes low when five years are exceeded. This is acceptable because a labourer always has low productivity when starting the career and productivity increases rapidly with experiences till certain limit. After this limit, increase of experiences does not affect the productivity of the operatives remarkably.

2.6.3 Mentoring

The process of using specially selected and trained individuals to provide guidance, pragmatic advice and continuing support, which will help the person or persons allocated to them to learn and develop (Drucker, 1986). He goes further to stress mentorship is that 'Off-line help from one person to another in making significant transitions in knowledge, work or thinking.' Mentoring helps people to learn on the job and thereby acquiring the particular skills required by the trainee. Mentoring also complements formal training by providing those who benefit from it with individual guidance from experienced managers who are 'wise in the ways of the organization'. According to Ganesan and Natarajan (1993), mentors provide people with:

a) Advice in drawing up self-development programmes or learning contracts';

b) Guidance on how to acquire the necessary knowledge and skills to do a new job;

c) Advice on dealing with any administrative, technical or people problems individuals meet, especially in the early stages of their careers;

d) The corporate culture and its manifestations in the shape of core values and organizational behavior (management style);

e) A parental figure with whom individuals can discuss their aspirations and concerns and who will lend a sympathetic ear to their problems.

2.6.4 Outsourcing

This is the contracting out of the works to a third party organization. The practice of contracting a business process out to a third party rather than staffing it internally is common in the modern economy. Kwakye (2000) argues that firms outsource to avoid certain types of costs and avoidance of burdensome regulations. Among the reasons firms elect to outsource include avoidance of; high taxes, high electricity costs, labour union dues and taxes for government mandated benefits.

2.6.5 Sub-contracts for labour

Subcontracting is widely used in the construction industry, particularly in building construction where the production process is divided into a number of discrete activities (Muchungu, 2012). In the Construction Industry, subcontracting is permitted only in cases where a general contractor subcontracts some tasks to specialized contractors. A subcontractor is a person or a company hired by a main contractor to perform part of the work of a construction job (Forster, 1989). For example, a contractor might be building a house, but might hire a firm or a person specializing in electrical engineering to install the electrical systems needed in the house. Subcontracting creates an increasingly specialized focus of work and this practice of employing labour through intermediaries or labour subcontracting is a long established practice in the construction industry. It has brought some advantages from contractors' view point, such as flexibility in the use of labour and an opportunity to reduce labour costs

According to Muchungu (2012), labour-only subcontracting is a type of employment system whereby a contractor would hire, on a labour-only basis. Labour-only subcontracting is prevailing in construction as workers are recruited through subcontractors or other labour intermediaries. Labour subcontracting offers contractors and subcontractors flexibility in the recruitment of labour, which is particularly important in construction due to fluctuating labour requirements

(Nagarajan, 2007). It can be called 'hierarchical contracting-out' as general contractors shift the supply and management of labour and the risks involved onto subcontractors.

2.6.6 Performance contracting

Management by objectives (MBO) is a technique used to manage people based on documented work statements mutually agreed to by the manager and parties. MBO entails giving employees' goals/targets, measuring their performance against these targets and then ranking them against their peers or some other performance appraisal system (Ganesan & Natarajan, 1993). The objectives will be set towards expected results for all units in quantitative terms. In this process, the superiors and subordinates will jointly identify the objectives and define each individual's area of responsibility. This makes everyone to know what is expected of them and motivate for higher performance (Ganesan & Natarajan, 1993). Participative decision making and two way communication will influence the subordinates and result in better morale among the employees, hence greater productivity.

2.6.7 Work Scheduling

The purpose of scheduling is to organize and allocate the resources of, equipment and labour with the construction project's tasks over a set period of time. Benefits of good scheduling include, avoiding project bottlenecks, allowing for suitable procurement or necessary materials, and overall ensuring that the project is completed as quickly as possible. Poor scheduling can result in unnecessary waste of time caused by delays as labourers wait for materials of equipment to become available or proceeding tasks to be completed (Kwakye, 2000). In order to successfully schedule a project, there must be some methodology to the process. Many scheduling methods exist and for the basis of this study it will be assumed that computer based scheduling is applied. One of the most common scheduling techniques is the Critical Path Method (CPM), (Kwakye, 2000).

CPM is a deterministic technique that uses preset time estimates for each activity. CPM is very easy to understand; yet it lacks consideration for variations that can

have a large impact on the final completion time for more complex projects. Another scheduling method that allows for randomness in completion times for each activity is known as Program Evaluation and Review Technique (PERT). PERT involves six basic steps: Identify activities, place all activities in the proper order, construct a network diagram, make time estimates for each activity, determine critical path, continually update chart as project progresses (Hendrickson, 1998). Proper applications of scheduling techniques will help avoid unnecessary delays and in turn reduce project cost.

2.6.8 Constraints to high productivity

The shortage of skilled labour, tools, and equipment are the major challenges facing the construction industry. As the major player executing construction processes and activities, site workers have an important impact on labour productivity. Site workers are certainly in the ideal position to know where and how much of a site's productivity is lost or gained at the work site (Enshassi, 2007). However, site workers' input and their perception of the factors that influence their ability to be productive have rarely been sought by either practitioners or researchers in the construction industry. Workers crew size and participation has been proven to be one of the most successful approaches in boosting productivity. When for example workers are added or deleted from a crew, it breaks up the original team effort and rhythm of the crew and results in loss of productivity. Therefore, it is important to engage site workers in construction productivity improvement (Wilcox, 2000).

2.7 Advancement in human labour productivity theories

Research in construction organizations allows for the development of new and promising technologies. Construction organizations need to embark on research to increase their competitive potential through reducing work content and ineffective time. Work study techniques such as work measurement can be used to maximize productivity with existing resources (ILO, 1996-2013).

2.7.1 Work measurement

This is the application of techniques designed to establish the time for a qualified worker to carry out a specific job at a defined level of performance that is technique

aimed at finding out how long a job ought to take by means of time studies (ILO, 1996-2013). In work measurement, the total work content of any job may be divided into three classes: 'basic work content' defined as the absolute minimum time in which an operation can be theoretically completed; 'unnecessary work' caused by bad design, specification, bad operational methods, and shortcomings of management and workers; 'ineffective work' defined as time when man and machine are idle due to extraneous reasons like weather or material shortages, shortcomings of management like delay in provision of drawings and shortcomings of labour like lateness, idleness (ILO, 1996-2013). The attempt to maximize productivity, which will lead to optimization of activity duration and consequently contract period, is focused on the reduction of work content to as near the basic as possible and to eliminate ineffective work.

There are various stages involved in work measurement: select the work to be studied; record all relevant data, examine the data and the detailed breakdown critically, measure the quantity of work in each element in terms of time, and compile the standard time for the operation by including time allowances for relaxation, personal needs and contingency (ILO, 1996-2013).

2.7.2 Productivity theory and applications

Because the objective of the time study is to obtain a realistic time for the element, the time study observer must additionally make a judgment on the effective rate of working of the subject under observation since the elapsed time observed for one worker may be different from another doing an identical task (Harris, 1996). Work study by ILO (1996-2013, p.240) defines rating as "to assess the workers rate of working relative to the observer's concept of the rate corresponding to standard rating". Thus in addition to timing the observer should also assess the rate of working for each element. According to Forster (1989), rating scale is divided in four point graduations as operatives work at varying degrees of speeds (depending on whether they have been, or about to be, refreshed and revitalized with a break, etcetera). The rating scales graduation is corroborated by (Butler, 1990) who asserts that the assessment of how fast an operative is working should be classified as follows:

- 125%: *very quick; high skill; highly motivated* and effective
- 100%: *quick, qualified skill; motivated.*
- 75%: *not fast; average skill; disinterested, wasting time intentionally*.
- 50%: *very slow; clumsy; fumbling; unmotivated and ineffective.*

The factors which affect the rating are summarized as follows by (Olomolaiye, 1998):

a) *Effectiveness*: this implies application of correct methods and procedures, the good signs being correct choice of tools, shortest path of movement, adherence to the best method, avoidance of unnecessary activities, tidiness and systematic arrangement of tools and materials;

b) *Skill*: sureness of touch or sequence, intelligent application of movements and events and effective use of both hands.

c) *Speed*: this implies diligence, steadiness and continuity; the good signs being rhythm, speed of movement; steady effort and making the job look easy.

2.7.3 Standard time

Standard time is the total time required for a qualified worker working at standard rating to complete a task. If this is achieved then the worker is considered to have achieved standard performance (Olomolaiye, 1998). ILO (1996-2013, p.240) defines standard performance as "the rate of output which qualified workers will naturally achieve without over exertion as an average over the working day or shift provided they are motivated to apply themselves to their work".

ILO (1996-2013) goes on to explain that standard time is equals to: *basic time + relaxation allowances + contingency allowance*. Basic time is defined as the time for carrying out an element of work at standard rate and is calculated as; Basic time = observed time x (observed rating/standard rating). The process of converting observed time to basic time is normally referred to as *extension*.

For repeated elements, the basic times would be obtained through *abstracting*. According to Forster (1989. p. 149), '*abstracting* is the collection of the basic times for each repeated element in each cycle being recorded and then added together on

time study recording sheet'. He further goes on to explain, 'element totals are then divided by the number of cycles they have been repeated to arrive at an average basic rate'.

To this basic time a relaxation allowance is added to account for delays caused by an operative having to take care of his basic needs and to recover from the varying degrees of fatigue which will be experienced in different tasks under different conditions (work position, amount of physical effort, conditions of the work area, degree of mental concentration and monotony in repetitiveness). Further, a contingency allowance to cover the occasional random short lasting delays e.g. to receive instructions in the working day is added. In construction this is normally taken as 5%. The times obtained will then be abstracted and averaged in order to obtain a truly representative standard time. Because construction work is so variable the difference between standard time and basic time for a job can be quite large and as a consequence, most records or data banks are kept as basic times, with the user applying suitable contingencies as necessary (Harris, 1996).

2.7.4 Productivity assessment

Productivity assessment at project and crew levels has both immediate and long-term objectives. Schedule control, cost control, target setting, and motivating the workforce are some of the short term objectives. Employees need productivity data as a feedback on their performance and may be used for pay bargaining. The same actions will lead to the provision of a performance database for planning and evaluating performance at this level. Performance at this level provides management with information that can influence their strategic actions (Lema, 1995).There are several productivity measurement methods often used for measuring labour productivity in construction projects. The methods include time study, activity sampling, craftsman questionnaire, synthesis and analytical estimating. Productivity measurements provide an analytical basis for budgeting and controlling human resource costs. It is said to be an important aid for increasing productivity by providing standards against which performance can be planned, monitored and improved (Armstrong, 2006).

Labour productivity constitutes a significant part of production input for construction projects. The factors affecting labour productivity have been the subject of inquiry by many researchers. In order to improve productivity, a study of the factors that affect it, whether positively or negatively is necessary. The literature review on the subject of labour productivity had provided a pool of factors that were considered for productivity studies for this research.

In the study conducted by Wachira (1999) It was pointed out that the construction industry in Kenya had no standard manuals of productivity rates for estimation and contractors in most cases based their estimates for the required resources and duration for the project at the time of tendering on personal judgment. It was further noted that in a number of cases, estimates for duration of activities were very unrealistic resulting in gross delays as the source of the information on labour productivity rates were very subjective. .

2.7.5 Labour constants and productivity outputs

The average labour unit time for carrying out an operation by a qualified worker at normal speed are normally referred to as a labour constant. Labour outputs for operation vary considerably depending on a number of factors which may include; skill of operator, nature of site, weather conditions and many other factors outside the control of the builder. According to Atton (1978) and by Brook (2004), the labour constant for the operation of painting is as indicated in Table 1.

Table 1: Painting and decorating labour constants

Description	Skilled hours/ 100 m² (Atton, 1978)	Skilled hours/ 100 m² (Brook, 2004)
Preparing surface	4.35	6
Knotting and stopping	5.55	9
Priming	11.00	11
Undercoat	13.33	15
Gloss finish	18.20	14
Varnishing	18.20	14
Emulsion paint	7.70	10
Bituminous paint	22.00	20

Source: Atton (1978) and Brook (2004)

The discrepancy between the labour outputs rates for the operation of painting as given in indicated in Table 1 by the two authors is a manifestation that more research is required in establishing standard labour constants for operations in the construction industry which can be replicated on other sites with little effort. The variation in the labour constant might be as a result of the following:

- *Gang size:* the ratio of skilled to unskilled has not been indicated in the operations by the two authors. The unskilled will normally assist in the preparation work.

- *Materials:* formerly, timber in the market had very few knots and had matured in most cases before being put in use. Currently mature timber is very scarce and for those which are found in the market, they have a lot of knots, hence more time is required in the application of knotting paint.

- *Surface finish:* The final surface where gloss paint will be applied will have an effect on the labour constant.

- *Supervision:* Competent supervisors will ensure that the operatives get correct instructions on time and materials are delivered on site on time. This result in planned outputs and the contrary will happen when we have incompetent supervisors.

- *Date of data collection:* Difference of 26 years is a long period as new methods of constructions might have been adopted.

2.8 Project performance

According to Masu (2006) and cited by Muchungu (2012), construction project performance is evaluated by the scale of completion of a project within the original set budget or set cost target (contract sum), the set specification or the standard of workmanship, the contract period, client satisfaction and environmental sustainability. Muchungu goes on state the following factors as indicator of project performance:

- *Project time performance*: completion of the project on time as per the contract agreement.

- *Project cost performance:* completion of the project within the contract sum, or completion below the agreed contract sum.

- *Project quality performance*: the compliance to the specifications in the contract documents and the quality of workmanship by the contractor.

- *Client's satisfaction:* contentment of the project initiator based on expected results from the project.

- *Environmental sustainability*: acceptable levels of interference of the environment as a result of new structures and minimum destruction of natural environment as a result of material extraction.

2.9 Organization of site labour

This is the overseeing of operations on the construction site on a day-to-day basis, and ensures that work is done safely, on time and within budget and to the right quality standards. This is the degree of completion of a task within the original set budget or set cost target, the set specification or the standards of workmanship, the contract period, client satisfaction and environmental sustainability (Masu, 2006).

Before work starts, carefully planning the work and site should to be done in terms of the resources for construction. While work is taking place, the site management will be involved in monitoring progress, oversee delivery of materials and carry out safety checks and sort out any problems which could hold up work as they arise. Site management will ensure that work complies with building regulations and health and safety legislation as well as other legal requirements (Forster, 1989). He goes further to point out that safety legislation as well as other legal requirements relating to construction are of great concern to site management (as discussed later under safety at workplace) as accidents have significant impact on labour productivity. Currently in Kenya, the occupational safety and health act, 2007 provides the redress for the safety, health and welfare of workers and all persons lawfully present at workplaces.

2.9.1 Absenteeism and labour - turnover

There is a great deal of time and money lost associated with high turnover and absenteeism on projects. Construction projects in certain areas with low manpower and high demand for labour will usually be more impacted than others. Extreme weather conditions will also increase absenteeism and turnover. Replacement workers are usually not familiar with the work or area, and require experienced workers to stop work and show them what to do. The impact can be up to one week of lost work for each worker (Forster, 1989). Job security was also cited by Zakeri (1997) as a very important factor in increasing productivity. A firm that tries to retain its staff was perceived to have lesser problems with absenteeism and a higher level of employee loyalty. Retention of experienced staff is beneficial for improving productivity over time, given the fact that construction labour moves from project to project; such retention would appear to mitigate time loss due to re-orientation on a

new project (Zakeri, 1997). Further, for retention to be possible, it is important that the firms should depart from its notorious low level of training and invest heavily in training in order to improve productivity.

2.9.2 Safety at workplace

According to Thomas (2004), an unsatisfactory work environment can have an adverse effect on worker motivation that tends to make minimal effort towards work thereby lowering performance. This has contributed dwindling productivity that has been a major problem confronting the construction industry today which has led to the declining productivity every year for the past decades. Aggregate productivity measurements and studies have shown long-term decline with little improvement. Many benefits as well as losses exist through construction safety management. The construction industry is the leader in injuries and lost workdays due to injuries. Thus these injuries are very costly. The more visible benefits of construction safety include cheaper workers' compensation coverage that's comes with a lower experience modification rating, also increased quality, and owner satisfaction. The most prevalent hidden costs include worker replacement time, crew efficiency loss, costs incurred due to delays, costs due to rescheduled work, and safety personnel costs (Levitt & Nancy, 2007). They further stated the seven factors which may be considered under safety group in the construction industry as: accidents, violation of safety precautions, insufficient lighting, bad ventilation, working at high places, unemployment of safety officer in construction site and noise

In the construction industry, the working environment is constantly changing. The sites exist for a relatively short time and the inherent risks on construction activities keep on changing daily. Within a short time, hazard are being identified and dealt with, typically, the workplace has changed, bringing new hazards (Thomas, 2004). He further pointed out that accidents have significant impact on labour productivity and they fall in three categories:

a) Accidents resulting in the death of an injured worker, this type of accident lead to total stoppage of work a number of days.

b) Accidents which cause an injured labourer to be hospitalized for at least 24 hours, this type of accident decreases the productivity of gang in which this injured labourer was working.

c) Small accidents which result from nails and steel wires, they affect productivity only in few cases. Employing a safety officer helps labourers to recognize the required safety regulations and to follow them, which can reduce the number of accidents, thus increasing productivity.

2.9.3 Cultural factors

Organizational or corporate culture is the pattern of values, norms, beliefs, attitudes and assumptions that may not have been articulated but shape the ways in which people behave and things get done (Armstrong, 2006). Values refer to what is believed to be important about how people and the organizations behave. Organizational culture offers a shared system of meanings which is the basis for communications and mutual understanding. If these functions are not fulfilled in a satisfactory way, culture may significantly reduce the efficiency of an organization (Armstrong, 2006). When people join an organization, they bring with them the values and beliefs they have been taught (Singh, 2004). Organizational cultures are important in labour productivity studies as they affect the output in firms. According to Armstrong (2006, p.259) "A culture has the power and authority not only to determine lifestyle but also to form individual personality traits, behaviors and attitudes". Some of the cultural factors which affect labour productivity include:

- *Work ethics:* firms should publish statements of ethical values and set up internal procedures to handle misconduct.

- *Upbringing:* Some cultures designate certain jobs for men and other specific ones for women and this affects labour productivity.

- *Gender:* Construction workers are predominantly male as most of the work requires manual effort. Female workers on site are few and normally engaged in carrying out of lighter tasks.

- *Taboo:* In some cultures and religions, women are not expected to execute heavy manual work, climb on roofs or dig trenches for construction works or be in public carrying out joint tasks with men.

- *Age factor:* The turn-over for young workers particularly those with relatively impressive educational background is high due to their ambitions of career advancement as opposed to the workers in the advanced age group who tend to be more satisfied with their jobs. High turnover normally affects labour productivity as the new workers are required to acclimatize on the new site both physically and mentally (Forster, 1989).

2.9.4 Labour Unions Trade Unions

Labour unions are legally recognized as representatives of workers in many industries and their activities today centers on collective bargaining over wages, benefits, and working conditions for their membership, and on representing their members in disputes with management over violations of contract provisions. A trade union on the other hand is an association of workers in a particular industry whose principal purpose is to regulate relations between employees and employers including an employers' organization. The trade union, through its leadership, bargains with the employer on behalf of union member and negotiates labour contracts with employers. (Singh, 2004).

2.10 Management Theories

2.10.1 The scientific management

This was the first of the 'classical management' approach advocated by Taylor (!947) and emphasized increasing productivity of individual workers through the technical restructuring of work organization and the provision of monetary incentives as the motivator for higher levels of output. Taylor specifically linked pay to rates of output. His theories illustrated that monetary reward was the most important motivating factor. However, his view of motivation applied to people who worked within narrow job confines, such as on a production line. It was all about a fair day's pay for a fair day's work.

2.10.2 Henri Fayol's 14 principles of management

Fayol's 14 principles have been a significant influence on modern management theory together with the bureaucratic approach to organization as it has helped managers to organize their work. According to Natarajan (1993), the 14 principles include the following: division of work**,** authority**,** discipline, unity of command**,** unity of direction**,** subordination of individual interests to the general interest**,** remuneration centralization**,** scalar chain**,** order**,** equity**,** stability of tenure of personnel, initiative and *Esprit de Corps* which is the principle that advocates for team spirit and cohesiveness among the subordinates.

2.10.3 The Human Relations Approach

This followed a series of research studies conducted at Electric Hawthorne plant, where the results indicated that despite changes in the physical environment such as lighting, heat, noise, ventilation, and so on, output kept on improving (Roethlisberger, 1939). The researchers attributed the performance and productivity improvements to the involvement and participation of the workers in the management of their own job activities. It became generally accepted that the results obtained by the Hawthorne researchers were due primarily to the special treatment given to the workers. That is, because the workers saw themselves as part of a special experiment and because they received special treatment. This situation where the workers do exemplarily well because of special treatment is commonly called "the Hawthorne effect or Hawthorne experiments'. People like to feel important and have their work recognized as important Further, they like to work in an atmosphere of approval; being praised rather than blamed and they like feeling independent in their relations to their supervisors .Operatives like being consulted about issues and would like to participate in actions that will personally affect them.

Mayo's understanding of the workplace has great contribution to the people in the construction industry as it encourages team spirit. The human relations approach by Mayo emphasizes behavioural issues such as job satisfaction, group behavior, and leadership style (Enshassi, 2007).

2.11Motivation

Organizational success is dependent upon members being motivated to use their full talents and abilities, and directed to perform well in the right areas. Lack of employee motivation can be caused by many factors. Empowering employees is one way to encourage employee motivation. Unmotivated workers can cause loss of productivity associated with excessive down time and lack of concentration. Every organization is concerned with what should be done to achieve sustained high levels of performance through its workforce.

Motivation is defined by Cooper (2004)) as the process that directs the people's work energy; it is the drive behind the people's wish to satisfy workplace wants and needs. Most successful leaders consider motivational factors such as praise, recognition, and self-esteem. People's behavior is affected by motivation, which in turn results in a committed energy throughout the workplace. According to Cooper (2004), increasing motivation within the workplace may include the following: provide a safe work environment; recognize good behavior and work; show appreciation; developing team spirit by means of co-operation and co-ordination among the workers help to satisfy their egos; Job security of people which frees them from worries and hence making them with zeal; set attainable goals; develop a fair pay system; provide adequate training programs. Many motivational theories are used in the construction industry in an effort to increase productivity (Enshassi, 2007).

According to Borcherding (1978) five peculiar motivational problems encountered on large construction projects are: minimal knowledge about the project; lack of participation in decision-making; inadequate communication and coordination between crews and supervisors, detrimental changes in the work, as well as supervision and manpower.

As pointed out by Clarke (1980) in his study on U.S.A. workers to determine attitudes towards productivity as quoted by Rojas (2003), it was established that involvement in decision-making, recognition through financial rewards, and job security are important motivational factors for workers to work harder to give out their best.

In a survey of construction operatives in Iran carried out by (Zakeri, 1997), it was revealed that, fairness of pay, incentives or financial rewards, on-time wage payment, good working facilities, and safety were the most important motivational factors.

Kaming (1997), on the other hand researched into Indonesian construction operatives and revealed that, fairness of pay, good relation with workmates, overtime payments, bonuses, and good safety programs were the motivational factors that exist on Indonesia projects.

According to Thomas (2004), an unsatisfactory work environment can have an adverse effect on worker motivation that tends to make minimal effort towards work thereby lowering performance. This has contributed dwindling productivity that has been a major problem confronting the construction industry today which has led to the declining productivity in the last three decades.

In order to maximize productivity, it is necessary to enlist motivational schemes to maximize each worker's potential. The existence of demotivation factors could result in decline of workers' productivity, since workers feel they have no control over their work and what they produce. According to (Thomas, 2004), some of the demotivation factors that reduce workforce productivity are: lack of adequate planning and materials; improper scheduling; frequent delays; Constant disruption of job assignment; communication breakdown; unavailability of tools and equipment; overcrowded work areas and rework; unsafe working conditions; lack of recognition and training; disrespectful treatment; little participation in decision making; poorly trained foremen; poor supervision.

Motivation is an art targeted to getting people work willingly and inducing them to behave in a particular manner to achieve sustained high levels of performance a task or goal (Armstrong, 2006) Motivation theory examines the process of motivation. It explains why people at work behave in the way they do in terms of their efforts and the directions they are taking. It describes what organizations can do to encourage people to apply their efforts and abilities in ways that will further the achievement of the organization's goals as well as satisfying their own needs. It is also concerned with job satisfaction; the factors that create it and its impact on performance.

Armstrong (2006) noted that the aim of motivation theory was to obtain added value through people in the sense that the value of their output exceeded the cost of generating it. There are several theories which have attempted to explain how motivation works in management circles. The theories propounded for motivation include:

2.11.1 Instrumentality theory

It states that rewards or punishments (carrots or sticks) serve as the means of ensuring that people behave or act in desired ways. According to Armstrong (2006) , Instrumentality theory has its roots in the scientific management methods of F W Taylor who wrote: 'It is impossible, through any long period of time, to get workmen to work much harder than the average men around them unless they are assured a large and permanent increase in their pay.' Henri Fayol's 14 principles of management together with the bureaucratic approach to organization somehow incorporated a hybrid view of human nature and led to the contrasting human relations approach.

2.11.2 Content or Needs theory

It focuses on the content of motivation. It states that motivation is essentially about taking action to satisfy needs, and identifies the main needs that influence behaviour (Horner, 2001). Needs theory was originated by Maslow in 1954 while the two-factor model was developed by Herzberg (1957) and they listed the needs which they termed 'satisfiers'.

2.11.3 The Maslow's Theory of Hierarchy of Needs

Abraham Maslow's (1954) formed the hierarchy of needs theory framework of motivation. He defined need as a physiological deficiency that a person feels the compulsion to satisfy. This need could create tensions that could influence a person's work attitudes and behaviors. His premise was that only an unsatisfied need could influence behavior; a satisfied need is not a motivator as people act to satisfy deprived needs. The five needs he identified and which exist in a hierarchical order as shown in figure 2 are: physiological, security, affiliation social, esteems and self-actualization (ILO, 1996-2013).

At the bottom of the hierarchy is: *physiological needs*. These are the basic needs that must be met to sustain life itself. Satisfying ones physiological needs will be the primary concern of any person and until one has done so one will not be concerned with any other issues. However, once workers feel reasonably sure of fulfilling their physiological needs, they will seek to satisfy the next need in the hierarchy, that of *security*. Security is taken to mean a feeling of protection against physical and psychological harm, as well as security of employment. Safety and security needs include; personal security, financial security, safety net against accidents/illness, health and well-being. For workers who have already satisfied their physiological and their security needs, the next motivating factor is that of *affiliation*, that is wanting to belong to a group or an organization and to associate with others. In the absence of these elements, many people become susceptible to loneliness social anxiety and clinical depression. Next on the hierarchical scale is the need to be *recognized and valued by others or esteem*. People need to be respected, to have self –esteem, self-respect and have a sense of contribution to the organization. *Fulfillment* (also called "self-actualization") is the final need which manifests when lower level needs have been satisfied. The desire of people or workers to be given an opportunity to show their particular talents or maximum potential is considered to be the master motive in realizing an individual's ego.

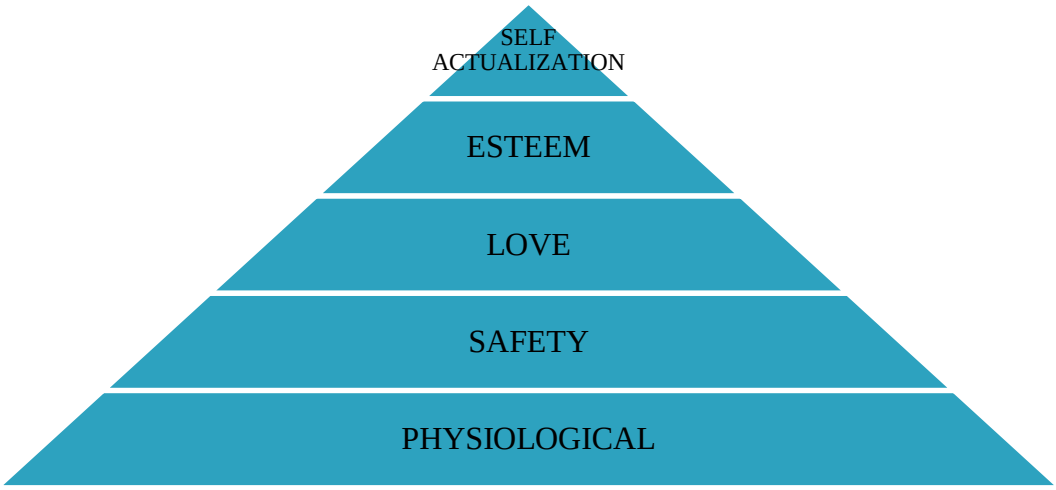

Figure 3: Maslow's theory of hierarchy of needs

Source: (ILO, Introduction to Work Study, 1996-2013)

2.11.4 Herzberg two-factor model

According to Herzberg (1957), two groups of factors affect job satisfaction: one consisting of the satisfiers or motivators, because they are seen to be effective in motivating the individual to superior performance and effort. These type of motivators include the following; achievement, recognition, challenging work, responsibility, advancement and growth (Armstrong, 2006). The other group of factors consists of the dissatisfiers, which essentially describe the environment and serve primarily to prevent job dissatisfaction, while having little effect on positive job attitudes. The latter were named the hygiene factors which include; company policy, job security, working condition, quality of supervision, interpersonal relationships, personal life, adequacy of pay and fringe benefits (Natarajan, 1993). These factors are extrinsic and when present produces a neutral feeling with realization that the basic maintenance needs are taken care of.

According to Herzberg, hygiene factors do not motivate; if present, they prevent employees from becoming dissatisfied. Herzberg theory suggests that to improve job attitude and productivity, managers must recognize and attend to both sets of job characteristics and not assume that an increase in satisfaction leads to a decrease in un-pleasurable dissatisfaction (Enshassi, 2007). Thus to effectively motivate employees in the construction industry, a manager must not only balance hygiene environment of a company, but ensure some motivators are available. Thus, if management wishes to increase satisfaction on the job, it should be concerned with the nature of the work itself, the opportunities it presents status, responsibility and achieving self-actualization.

The Kenyan construction industry is highly labour intensive and most of the workers are unskilled or semi-skilled and end up with jobs they do because they could not get other jobs (Muchungu, 2012).This is further compounded also by the fact that most workers are casuals and are engaged on a daily or weekly basis. He further asserts that many employers have no long term plans for their workers as the nature of the business in the construction industry keeps on fluctuating. Further, the number of casual labourers required will vary according to the task being undertaken for example more worker will be required during the construction of the structure and

few of them will be needed during the finishing stage. Therefore, the Kenyan construction industry poses a great challenge for the Hertzberg's theory of motivation to hold; hence it has to be looked at differently,

2.11.5 McGregor (Theory X and Theory Y)

According to McGregor (1960)**,** the view of the nature of human beings is based on a certain grouping of assumptions, (Theory X: people are generally lazy, dislike work and will avoid it if they can; and Theory Y: people do want to work and are creative), leading to either an 'authoritative' or a 'participative' type of management respectively (Natarajan, 1993). If the organizational goals are to be met, theory X managers rely heavily on threats and coercion to gain their employee's compliance. The theory X managers tend to lay blame on subordinates due to mistrust.

Theory Y is a modern approach of management where employees are allowed to assume more self control and encourages growth. Theory Y managers believe that employees will learn to seek out and accept responsibility and to exercise self control and self direction in accomplishing objectives to which they are committed (Muchungu, 2012). The theory Y school of thought managers believe that satisfaction of doing an excellent job is a strong motivation.

2.11.6 Process theory

This is the theory which focuses on the psychological processes or forces that affect motivation as well as on basic needs, by reference to motivation (Armstrong, 2006). It is also known as cognitive theory because it is concerned with people's perceptions of their working environment and the ways in which they interpret and understand it. The process theory encompasses the following:

- expectations (expectancy theory)
- goal achievement (goal theory)
- feelings about equity (equity theory)

(i) Expectancy theory

This theory which was formulated by Vroom (1964) and it encompasses of three ingredients; value, belief and probability. The concept of expectancy was defined

by Vroom as follows, '*Where an individual chooses between alternatives which involve uncertain outcomes, it seems clear that his behaviour is affected not only by his preferences among these outcomes but also by the degree to which he believes these outcomes to be possible. Expectancy is defined as a momentary belief concerning the likelihood that a particular act will be followed by a particular outcome'* (Armstrong, 2006, p.259).

The strength of expectations may be based on past experiences (reinforcement), but individuals are frequently presented with new situations like a change in job, payment system, or working conditions imposed by management. In these circumstances, motivation may be reduced. Motivation is only likely when a clearly perceived and usable relationship exists between performance and outcome, and the outcome is seen as a means of satisfying needs. Expectancy theory suggested that employees constantly predict likely future rewards for successfully completing tasks, and if the rewards seem attractive, people become motivated to do the job to get expected rewards and suggested that the opposite is true as well.

(ii) Goal theory

The basic premise of this theory is that people's goals or intentions play an important part in determining behaviour. Goals guide people's response and action by directing work behavior, performance and lead to certain feedback. Goal theory as developed by Latham and Locke (1979) states that motivation and performance are higher when individuals set specific goals, when goals are difficult but accepted and when there is a feedback on performance. Participation in goal setting is important as a means of getting agreement to the setting of higher goals. Difficult goals must be agreed and their achievement reinforced by guidance and advice. Finally, feedback is vital in maintaining motivation, particularly towards the achievement of even higher goals.

Erez and Zidon (1984) on the hand emphasized the need for acceptance of and commitment to goals by the workers. They found out that as long as the workers agreed, demanding goals lead to better performance than easy ones. Robertson (1992) pointed out that the goal's theory informs individuals to achieve particular levels of performance, in order for them to direct and evaluate their actions. Further,

they argued that performance feedback allows the individual to track how well he or she has been doing in relation to the goal so that necessary adjustments or possible strategies can be made in attainment of a goal and a valued reward.

(iii) Equity theory

Equity theory proposes that individuals who perceive themselves as either under rewarded or over rewarded will experience distress and this distress leads to efforts to restore equity within the relationship. Equity is measured by comparing the ratio of contributions to the benefits of each person within the relationship (Muchungu, 2012). According to Armstrong ((2006), people will be better motivated if they are treated equitably and demotivated if they are treated inequitably. Therefore, to effectively motivate employees, a manager must not only balance hygiene environment of a company, but ensure some motivators are available, hence the relevance of the application of the theory in the construction industry.

Equity theory is concerned with the perceptions people have about how they are being treated compared with others. As suggested by Armstrong ((2006), there are two forms of equity: distributive equity, which is concerned with the fairness with which people feel they are rewarded in accordance with their contribution and in comparison with others; and procedural equity, which is concerned with the perceptions employees have about the fairness with which procedures in such areas as performance appraisal, promotion and discipline are being operated. Interpersonal factors are closely linked to feelings about procedural fairness.

2.12 Conceptual framework

In order to improve labour productivity on construction sites, there was need to investigate the factors that influence labour productivity. Presented below in figure 2 is the conceptual framework for the study showing how productivity (dependent variables) is affected by six independent variables.

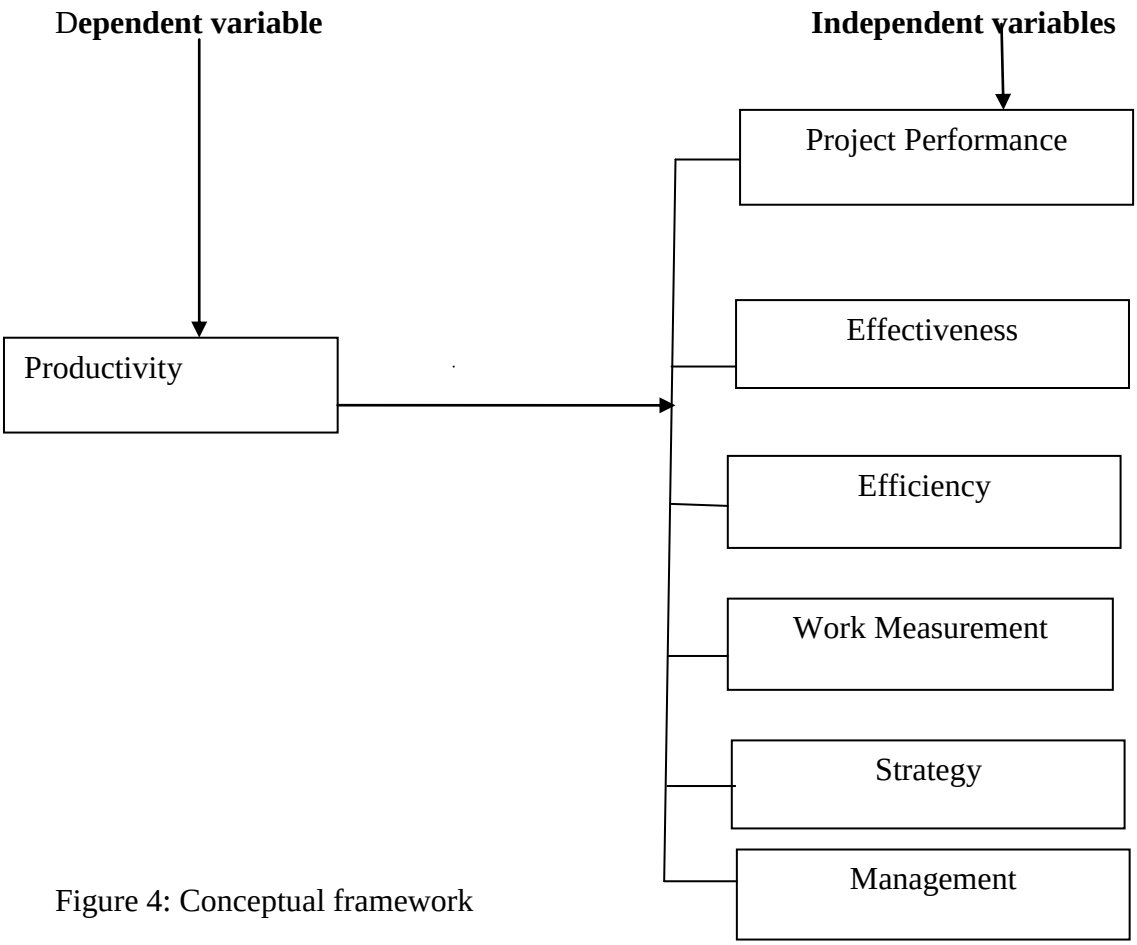

Figure 4: Conceptual framework

Source: Author, 2014

According to Lamka et al (2014**)**, the above can be stated mathematically as:

P= *P.P + E1 +E2 +W.M + ST + MA ±e*

Where;

P = Dependent Variable (productivity)

PP = Project Performance

E1 = Effectiveness

E2 = Efficiency

W.M = Work Measurement

ST = Strategy

MA = Management

e = is an error margin of other variables not in the equation.

2.13 Discussion

In this chapter, literature related to the study was reviewed. The chapter reviewed literatures in relation to its objectives, which include; ranking of labour productivity factors, assessment of significant factors in trades of masonry and painting and evaluation of management factors and strategies. The literature shed light on construction process, the inputs in production, human resource management, site management, productivity measurements and management strategies for enhancing labour productivity. From the literature in this chapter the following factors are considered appropriate for the study investigation:

a) Management system and strategies
b) Work planning and Scheduling
c) Incompetent supervisors
d) Poor site communication
e) Rework
f) Labour supply and work crews
g) Late deliveries of materials and equipment
h) Workers absenteeism and turnover
i) Motivation
j) Lack of training/skills
k) Poor site conditions (location, ground conditions, confinement)
i) Safety at workplace

The literature review further reveals that most of the labour productivity studies have been undertaken in other countries but not much has been done for the Kenya consumption, by previous researchers. The literature review therefore unearths areas on labour productivity which requires researching and which appear to have grown out from the review.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter describes the methodology used in collecting, analyzing and presenting data. It is organized around five sub headings namely: research design, study population and sampling, data collection instruments, data collection and data analysis.

3.2 Research design

The research design used in this study is the survey methodology which supports an explanatory design of the study. According to Cooper (2003) explanatory design method is useful where very few researches have been carried out and there is very little information available in the area of investigation. The researcher would need several explanations to learn something about the gaps facing the situation researched. The goal of all explanatory research is to answer the question of why. Explanatory research attempts to go above and beyond what exploratory and descriptive research to identify the actual reasons a phenomenon occurs. They include explaining things in detail and not just reporting.

The criteria for picking of the respondents in this study were their technical knowledge in the construction sector through the Bio-data obtained prior to the undertaking of the individual interviews and administering of questionnaires. Contractors on live projects that had activities in the trades of masonry, plastering and painting at the time of the inteview were picked and included in the sample. The above named trades were chosen because they are the predominant trades on construction sites where labour intensive construction is being practiced. To get labour data as determined by delivery times, foremen and operatives were used to collect information with respect to task and planning that would aid job productivity and policy matters.

Mugenda and Mugenda (2003) define survey as an attempt to collect data from members of a population in order to determine the current state of the population

with respect to one or more variables. The main advantage of survey studies is that they provide information on large groups of people, with very little effort, and in a cost-effective manner. Surveys allow researchers to mitigate information obtained from a sample rather than the entire population at one point or another

A questionnaire was used to collect primary data to fulfill the objectives of the study relating to practice and experiences as to the establishment of the factors. The questionnaires comprised of both structured and open ended questions and were administered to contractors and developers on live construction sites. This was in order to collect a detailed and all round data which provided a rich base for the descriptions of the variables under consideration. It also provided sufficient, complete and accurate information without bias which maximized the reliability of the data. .

3.3 Population

According to Mugenda and Mugenda (2003) the population refers to an entire group of individuals, events or objects having common observable characteristics. They further define a target population as that population to which a researcher wants to generalize the findings of the study. The studied population includes contractors who have a valid registration by the National Construction Authority within categories NCA4, NCA5, NCA6 and NCA7 located in Nairobi County. A population of 140 of contractors involved in site labour contracts or sites within Nairobi participated in the survey. The technical personnel of the contractors who participated in the survey on the site include; general foremen, construction managers, cost estimators, operatives and subcontractors.

3.3.1 Target Population

Generally, the building contractors in Kenya are classified with NCA according to the money value of work they can undertake and they are grouped in eight categories ranging from NCA1 to NCA8. For this study, general building contractors who have valid registration from category NCA4, NCA5, NC6 and NCA7 (NCA, 2013) in Nairobi County were sampled. This group of contractors was considered for the research as they were viewed to have a large proportion of their labourforce engaged

in sites where labour intensive construction is practiced in the trades of masonry, plastering and painting operations. Most of the contractors in the targeted categories don't own construction plant and when need arises they hire them. The total number of contractors in each of the above categories is as indicated in Table 2.

Table 2: Distribution of contractors in categories NCA4 to NCA7 in Kenya

S/NO	NCA CATEGORY	PROJECT COST CEILING(KSH MILLION)	Total No. of contractor
1	NCA7	20	515
2	NCA6	50	458
3	NCA5	100	282
4	NCA4	200	180
TOTAL			1435

Source: National Construction Authority, 2013

According to Mugenda and Mugenda (2003) for descriptive studies usually a sample of ten percent (10%) of the accessible population is enough to give satisfactory representation. The total number of contractors from category NCA4, NCA5, NC6 and NCA7 in Nairobi totals 1435.

Therefore the sample size = 10% of accessible population

$$= \frac{10 \times 1435}{100}$$

$$= 143.5 \text{ say } 140 \text{ samples}$$

Hence, by rounding-off, the targeted population of 140 contractors for the survey was arrived at. Further, according to (Tromp, 2009), a researcher would need a minimum of 30 subjects in each group for descriptive research to give a reliable conclusion that can be drawn from the research. From the foregoing, this research therefore targeted 35 contractors from each of the four categories.

Stratified random sampling technique was used in taking inventory of the active construction sites in Nairobi County. Stratified random sampling is a probability sampling technique in which the representative sample is obtained from a stratified frame which is divided into over-lapping groups like geographical areas (Mwituria, 2012). In the words of Mwituria (2012, p.42), 'a sample is taken from each stratum and when the sample is a simple random it is referred to as stratified random sampling'. Stratified random sampling is commonly used in survey research because it offers the advantage over completely random sampling of ensuring all groups of interest to the researcher are adequately represented. At the same time, it maintains a high degree of external validity and minimizes subjectivity in the sample selection. For this study Stratified random sampling technique enabled the researcher to target and administer questionnaires to small and medium size contractors in categories NCA4, NCA5, NCA6 and NCA7 so as to obtain reliable information that enhances and facilitates the reliability of the study.

3.4 Data collection

In the research, information was gathered from either primary or secondary sources. Primary data was gathered directly from the site through questionnaires and interview schedules in Nairobi County. Self- administered Questionnaires were used by the researcher to get the general view or perception of the required information from the targeted respondents whereas interview schedules were used to confirm the information.

3. 5 Data collection instruments

In this study, questionnaires were used as the main instrument for collecting data The questionnaire was preferred for its suitability to the study since it allowed the researcher to reach a larger sample within limited time. It also ensured confidentiality and thus gathers more candid and objective responses. Questionnaires were designed to collect information on factors influencing labour productivity from contractors and their key personnel arising from their experience on construction sites and the industry at large.

Further, for the research, Interview schedules were used for the interviewing. Interview schedules were set of questions typed in definite order that the interviewer asked when conducting face- to- face interviews on site with the respondents (Kothari, 2006). The schedules were filled by the interviewer. This was reinforced by Mugenda (2003) who was of the view that interviews are advantageous in that they provide in-depth data which is not possible to get through questionnaires. The interviewer could collect more information though probing questions which gave more complete answers. Kothari (2006) observes that questionnaires are often used to collect basic descriptive information from large sample while interviews are used to follow up the information from questionnaire responses in-depth with a smaller population.

3.5.1 Questionnaire

The questionnaires the researcher constructed comprised both open ended and closed ended questions; this was used to collect a detailed and all round data which provided a rich base for the descriptions of the variables under consideration. It also provided sufficient, complete and accurate information without bias which maximized the reliability of the data. The questionnaire covered the background characteristics of the respondents and those aspects which were likely to influence management strategy on productivity rates of construction sites. The background information covered in the questionnaire were: experience (years) in practice, professional background and status in the firm. In this research, frequency (percentages) was adopted as the method of analysis for the background information. For the other factors which affect labour productivity, the Relative Importance Index (RII) was adopted to analyze the data. The respondents were requested to rate on a likert scale of 1 to 5, the order of significance of each factor, from 'not significant' (rated 1) to 'extremely significant' (rated 5).

A likert scale normally provides a battery of perceptions and attitude statements in which the respondent then says how much they agree or disagree with each one. Likert scales may consist of any of the following points of scale; 1 to 3, 1 to 5 and 1 to 7. Considering the level of the research and background of the respondents, the 1 to 5 point scale was adopted. In the words of Mwituria (2012. p. 71) , 'when faced

with a semantic differential scale, some people will never, as a matter of principle, use the two end indicators of 1 to 7; effectively, therefore, they are using a five – point scale'. On the other hand, the 1 to 3 point scale was not adopted as assumed to be restrictive and would not bring out a representative result. The researcher and his assistants visited the sites and offices to deliver the questionnaires to the respondents. The respondents were asked to complete the questionnaires themselves and they were later collected by the researcher or his assistant improved the response rate to a great extent.

Questionnaires are used to quantify data that indicates the prevalence of particular beliefs or actions, or allow for statistical comparison of perceptions and behaviour amongst different groups across a representative sample. The use of self-administered questionnaires is less tedious compared to the researcher administered one, thus making it a very popular method of collecting social data (Mugenda, 2003). Furthermore, the anonymity and time alone to consider answers provides survey respondents with more opportunity to express their opinions without any coercion.

3.5.2 Interviews

The researcher developed an interview schedule with questions which were raised and discussed with lead persons in various construction sites within Nairobi County. The questions include the following: type of project, site accessibility, weather conditions, availability of services, project financing, contract programming and productivity. The researcher interviewed contractors and their key personnel in charge of the various sites who included foremen, construction managers and cost estimators. The interview schedules were particularly useful in the development of open-ended questions, and provided a pointer to the nature and causes of fluctuation of labour productivity in the construction industry. Unstructured or open-ended questions are questions which give the respondent complete freedom of response, hence permit an individual to respond in his or her own words.

3*.5.3 Primary data*

Primary data were collected from the field through personal interviews of selected sample respondents of contractors using standard questionnaires. The other method

was through guided interviews administered to identify representatives of the contractor's team.

3.5.4 Secondary data

Since conducting surveys with large samples would be expensive and labour intensive, the researcher incorporated existing information as a source of secondary data in the study. The information for secondary data was gathered from published documents which were already available. Sources of secondary construction- related data in Kenya included: Kenya Demographic Housing Survey; the Kenya informal settlements Improvement Programme, Kenya Bureau of Statistics (KNBS, 2012); United Nations Development Programme's Annual Housing Report; project records, textbooks, Internet, Journals articles, periodicals, conference papers, published thesis and research reports from reputable tertiary institutions. The secondary data was therefore used in the research to supplement information obtained from the field survey.

3.6 Pilot study

A pilot study was conducted before the start of actual data collection exercise to test the research instruments suitability and clarity. The pilot study provided a trial run for the questionnaire, which involved testing the wording of questions, identifying ambiguous questions and testing the techniques that were to be used to collect data Eight Questionnaires were distributed to a pilot sample of eight interviewees comprising two contractors from three categories of NCA4, NCA5, NCA6 and NCA7 of the National Construction Authority classification as a survey pretest. The chosen samples were invited to participate in the piloting so they received an explanation about the study and had been asked to complete the questionnaire. Some of them asked questions about the explanation of certain items. By the end, discussion with study sample about the meaning of questions took place to ensure the validity and reliability of questionnaire.

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. It is also the degree to which results obtained from the analysis of the data actually represent the phenomenon

under study (Mugenda, 2003). Validity for the study was achieved by ensuring representativeness of the sample which was obtained through purposive sampling of the targeted population On the other hand reliability is the extent to which results are consistent over repeated trials and an accurate representation of the total population under study. The test -retest method will be used to ascertain the reliability. Test-retest measures consistency from one time to the next through administering the same instrument under similar circumstances to the subjects (Mwituria, 2012).

The pretest showed the need to modify the wording of some questions, and deletion of some questions which were found to be repetitive or not relevant to the study. A number of phraseology changes were made to make the questions more clear and understandable. The pretest was useful feedback and formed the basis for redesigning the content and structure of the questionnaire hence ensuing improved level of the instruments 'validity and reliability.

3.7 Multiple regression analysis

Regression analysis is a statistical technique that attempts to explore and model the relationship between two or more variables .Usually, the investigator seeks to ascertain the causal effect of one variable upon another. To explore such issues, the investigator assembles data on the underlying variables of interest and employs regression to estimate the quantitative effect of the causal variables upon the variable that they influence.

In this study the multiple linear regression model formulated in the conceptual framework was used to show the relationship between the six independent variables of labour and the dependent factor. With the input from the secondary data, multiple regression analysis was conducted to reveal how independent factors impacted on labour productivity. That is regression analysis helped to understand how much the dependent variable changed, when one or more independent variables changed in the equation.

3.8 Ethical considerations

For purposes of the current study, the participants were informed through an introductory letter about the purpose of the study before hand. The study was undertaken taking into consideration the ethical concerns. The major ethical issues that were addressed by the study included informed consent, privacy and confidentiality, as well as anonymity and researcher' responsibility as outlined by Ritchie and Lewis *(2003)*.

Under informed consent, the respondents were provided with adequate information about the study. They were informed about the purpose of the study, the benefits of the study to them and the construction industry as a whole. This information was a basis for the selected participants to make an informed decision to participate in the study.

On privacy and confidentiality, the study respected the privacy of respondents and maintained confidential all data collected. Some of the data collected was private and confidential as it related the operations the organization used gain competitive edge. Thus all data collected and analyzed was used for the purpose for which the current study was undertaken and was not divulged to unauthorized persons.

For anonymity, the study refrained from collecting data that pertains to the identity of the participants. Where cases were discussed, real names of the participants were not used. For responsibility, the researcher only collected and analyzed data to fulfill the purpose of the study only.

3.9 Summary

In this Chapter, the research design, data collection and analysis procedures in the study were elaborated. The methodological procedures which were followed in the study of population, sample size and techniques of sampling among others provided a strong foundation for valid and reliable data The next chapter presents the results of data analysis obtained from the field was quantitatively analyzed using Statistical Packages. Specifically, Microsoft Excel 2007 windows version was used to draw graphs, tables and pie charts and for percentages of response frequencies for ease of

interpretation and understanding. The qualitative data was analyzed by describing, structuring, categorizing, and combining them under thematic areas. The data was then presented using frequency tables of percentage counts and various figures/charts.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

The purpose of this study was to investigate factors that negatively influence labour productivity on construction sites in Nairobi County. In order to achieve this, a methodology consisting of a review of literature and a survey of construction sites was employed. This chapter presents the findings of the data analyzed from the research instrument together with their interpretation in line with the objectives of the study.

4.2 The Response Rate

From the total sample of 140 subjects, 70.72% positively responded to the survey request. According to Babbie (2007), any response rate over 50% can be reported as statistically adequate as a whole to represent the total population; over 60% is good; and over 70% is excellent. These views are shared with Mugenda (2003) who asserts that in a questionnaire administration, a response rate of 50% is adequate for analysis and reporting. He further states that 60% is good response while 70% and over is very good. Therefore the response rate of 70.72% which was attained in the survey's response rate as indicated in Table 3 is excellent and sufficient for data analysis, reporting and drawing conclusions. 29.28% of the questionnaires were not returned and there was none which was rejected because of incompleteness.

Table 3: Response rate

Category of Contractor (NCA, 2013)	Questionnaires Sent	Questionnaires Returned	Response Rate %
NCA4	35	24	68.57
NCA5	35	25	71.43
NCA6	35	29	82.86
NCA7	35	21	60.00
Total	**140**	**99**	**70.72**

Source: Author, 2014

4.3 Background information

The first part of the questionnaire on labour productivity (questions 1, 2 and 3) was mainly designed to provide background information about the respondents in terms of the category classification and their working experience. The information was intended to set the framework for the questions in the subsequent sections of the questionnaire relating labour productivity on construction sites. The results from the study were as follows:

a**) Contractor's registration category**

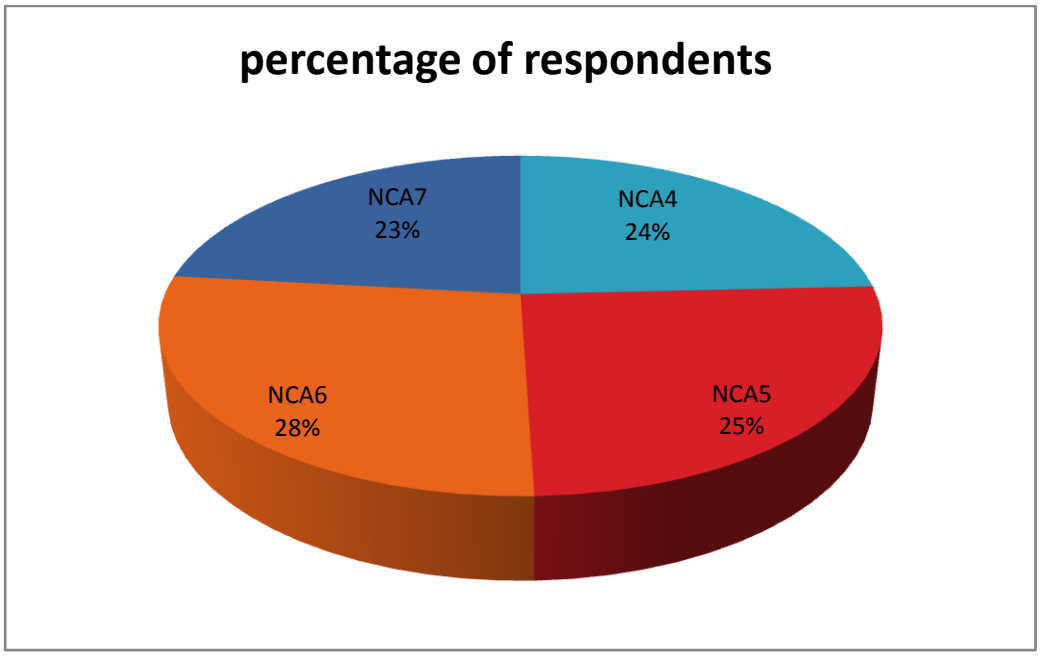

Figure 5: Registration categories of the respondents

Source: Field Survey, 2014

Figure 5 shows the this study the total number of respondents who participated in the questionnaire were 24 from category NCA4, 25 from category NCA5, 29 from category NCA6 and 21 from category NCA7,an indication that the distribution of the respondents was representative.

b) Employment status in the firm

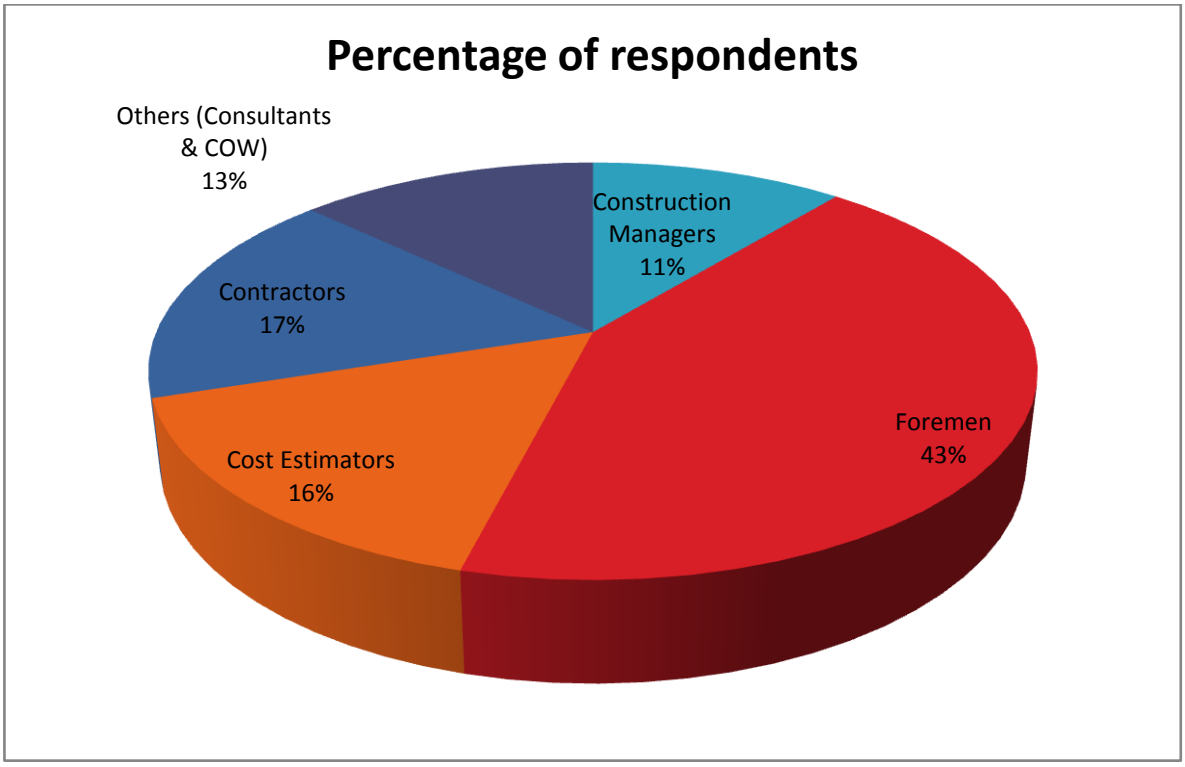

Figure 6: Employment status of the respondents

Source: Field Survey, 2013

Figure 6 shows total number of respondents who participated in the study. The results received indicated that the majority of the respondents (43%) were foremen. Site foremen are daily in touch with operative and are the ones who assign piece work and other duties on site on regular basis. It can therefore be deduced from the data obtained that the foremen were the ones who participated to a great extent to the study as this is part of their routine work and they are predominantly found on construction sites. On the other hand 16% per cent of the respondents were cost estimator while 11% were construction manager.

c) Working Experience

The aim of the question was to find out if there is any relationship between job experience and labour outputs.

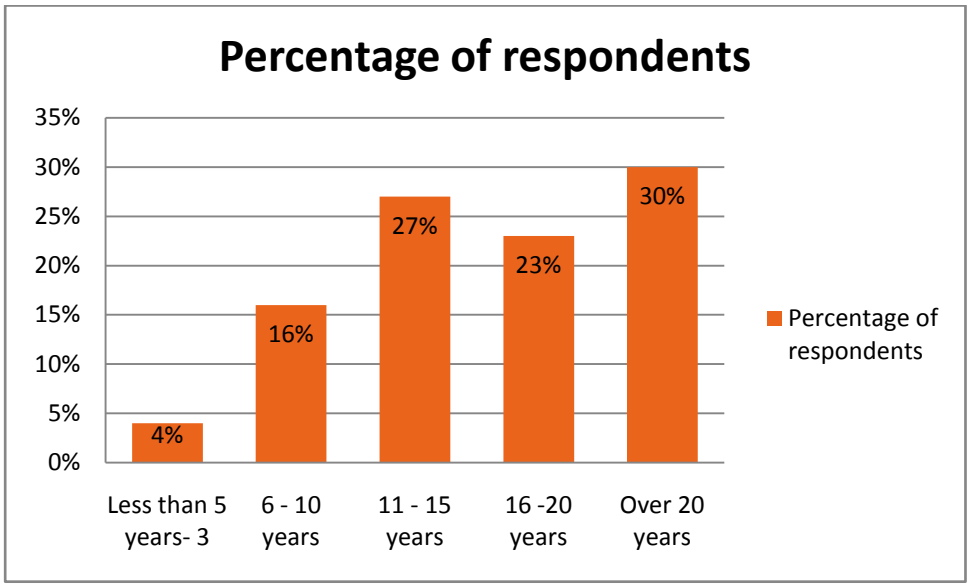

Figure 7: Working experience of the respondents

Source: Field Survey, 2014

The results from the study showed that about 80 % of the respondents had been involved in construction works for more than 10 years. The intention of getting to know the duration of experience with the respondents was foremost to test the suitability of each; in repetitive works, the longer the stay in an occupation, the more reliable will be the responses from the respondents. The implication of the findings from Figure 7 is that the majority (30%) of the respondents had over 20 years' experience in the construction industry and were very much experienced with information regarding the factors which influence labour productivity on construction sites. The respondents were therefore people in a position to provide or suggest ways in which to mitigate labour productivity outputs. The feedback from the findings therefore could be interpreted to suggest that the subjects who had the authority to make important decisions about productivity in their respective organizations took part in the study. This adds to the quality and credibility of the feedback from the study.

4.4 Data analysis for the research objectives

4.4.1 Objective 1: Ranking factors that affect site labour productivity

Objective one aimed at identifying what factors significantly affect labour productivity on labour intensive construction sites and to ascertain their level of importance. The factors were identified through thorough literature search and respondents were asked to rank the significance level of importance in the questionnaires. Table 4 depicts the twelve critical factors which negatively affect labour productivity on construction sites which were identified from the literature review and ranked by the respondents in the study. The factors were: management system, work planning and scheduling, incompetent supervisors, poor communication between parties in the building team, rework, labour supply and work crews, late deliveries of materials and equipment, workers absenteeism and turnover, motivation, lack of training/skills, poor site conditions (location, ground conditions, and confinement) and safety at workplace.

Table 4: Ranking of factors that affect labour productivity

S/ No	Factors	Responses per frequency of Ranking												Weighted Total for responses	Ranking
		1 *	**2 ***	**3 ***	**4 ***	**5 ***	**6 ***	**7 ***	**8 ***	**9 ***	**10 ***	**11 ***	**12 ***		
1	Management system and strategies	0	0	1	3	30	45	20	0	0	0	0	0	575	**6**
2	Work planning and Scheduling	21	41	9	20	8	0	0	0	0	0	0	0	250	**2**
3	Incompetent supervisors	0	18	58	13	10	0	0	0	0	0	0	0	312	**3**
4	(Bilateral) Poor communication	0	0	0	0	12	11	44	24	8	0	0	0	626	**7**
5	Rework	0	0	0	0	0	0	12	3	55	19	9	1	904	**9**
6	Labour supply and work crews	0	0	0	0	0	0	0	0	20	54	13	12	1007	**10**
7	Late deliveries of materials and equipment	0	28	0	57	1	13	0	0	0	0	0	0	335	**4**
8	Workers absenteeism and turnover	0	0	0	0	0	0	0	0	0	3	17	79	1165	**12**

9	Motivation	0	0	18	9	48	21	0	2	1	0	0	0	481	**5**
10	Lack of training/skills	69	21	9	0	0	0	0	0	0	0	0	0	138	**1**
11	Poor site conditions(location, ground conditions, confinement)	0	0	0	0	0	0	20	74	4	1	0	0	778	**8**
12	safety at workplace	0	0	0	0	0	0	0	0	15	22	53	13	1094	**11**

(*) Multiplication of Ranking by frequency of responses to get weighted total for responses

Source: Field Survey, 2014

Table 4 above presents the findings from the ranking by the respondents on the correct order of significance of the twelve core factors which influences the site labour productivity on construction sites. The frequency of the responses of each factor with respect to significance was multiplied by the ranking to arrive at the weighted totals for responses.

The results from the table suggest that lack of training/skills is the hindrance to labour productivity output that is perceived by the contractors strongly. The casual nature of employment of the construction workers has been cited as the negating factor in training employees since the contractors do not feel motivated to train non-permanent staff that can terminate their services without notice. All workers need continuous training and retraining in order to update their skills and keep abreast with new methods and emerging technologies in the construction industry.

Workers absenteeism and turnover was perceived to have low influence on productivity. This may be due to the casual nature of employment of the construction workers who are easily replaced (Moremati, 2011).

4.4.2 Objective 2: Significant factor in various trades in construction

Objective two aimed at assessing significant factors of construction site labour productivity in the various trades of construction process in Nairobi County.

a) Figure 8 shows the respondent ’assessment of the correct order of significance of how lack of labour experience and mentorship affect labour productivity.

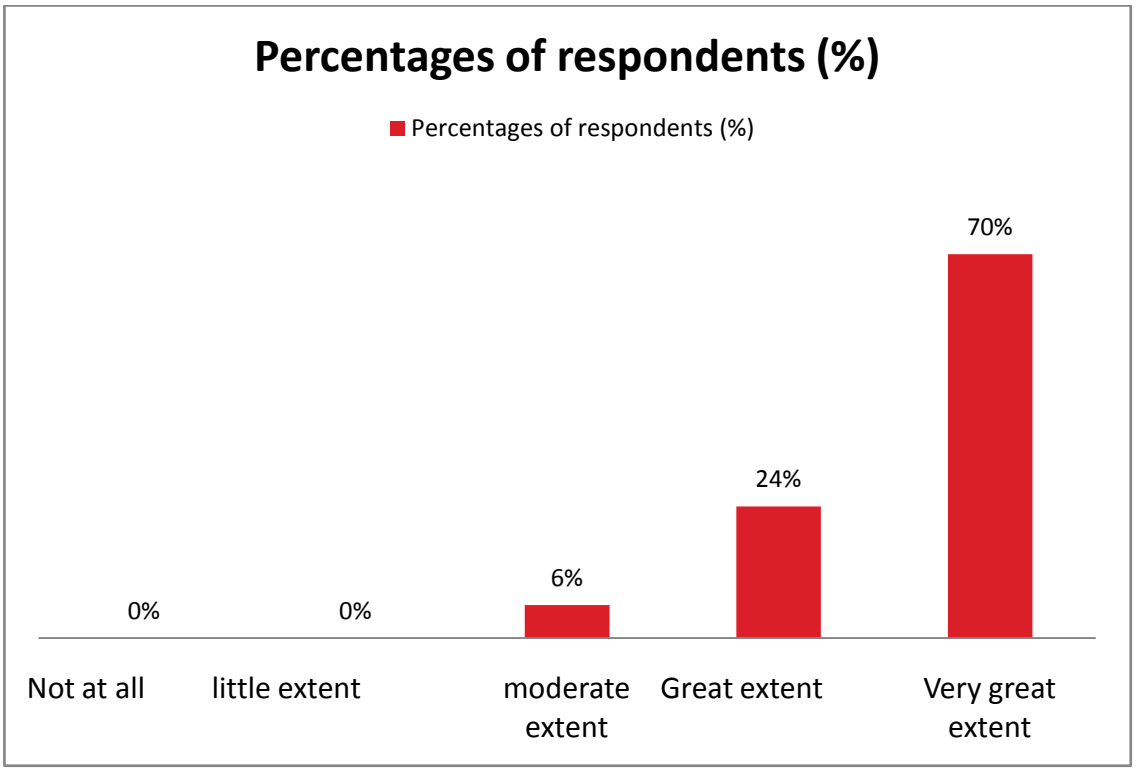

Figure 8: Experience rating

Source: Field Survey, 2014

From the figure, 6% of the respondents indicated that lack of labour experience and mentorship to a moderate extent affect labour productivity, 24% of the respondents indicated that lack of labour experience and mentorship to a great extent affect labour productivity, 70% of the respondents indicated that lack of labour experience and mentorship to a very great extent affect labour productivity and no respondent indicated that lack of labour experience and mentorship to a little extent/ not at all affect labour productivity, The findings from the study indicate that lack of labour experience has a very high effect on productivity. This result is justified, as experience improves both the intellectual and physical abilities of the worker as he gets accustomed to the system of operation.

b) Figure 9 shows the response of the respondents with respect to the correct order of significance of how increase in age affects labour productivity

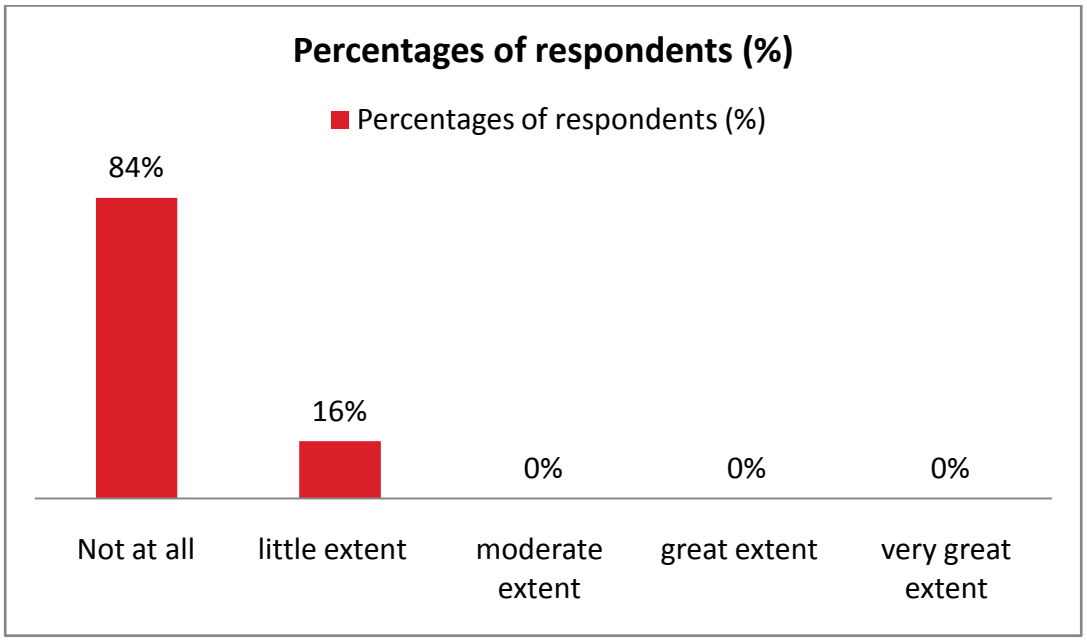

Figure 9: How age affects labour productivity

Source: Field Survey, 2014

From Figure 9, 16% of the respondents indicated that increase in age to a little extent affect labour productivity, 83% of the respondents indicated that increase in age does not at all affect labour productivity The findings from the study indicates that increase in age has very little effect on decline of labour productivity in the construction industry. By common wisdom, it can be pointed out that productivity increases in trades like painting with age as the individual becomes more experienced in the works.

c) Figure 10 shows the response of the respondents with respect to the correct order of significance of how crew/gang size negatively affects labour productivity

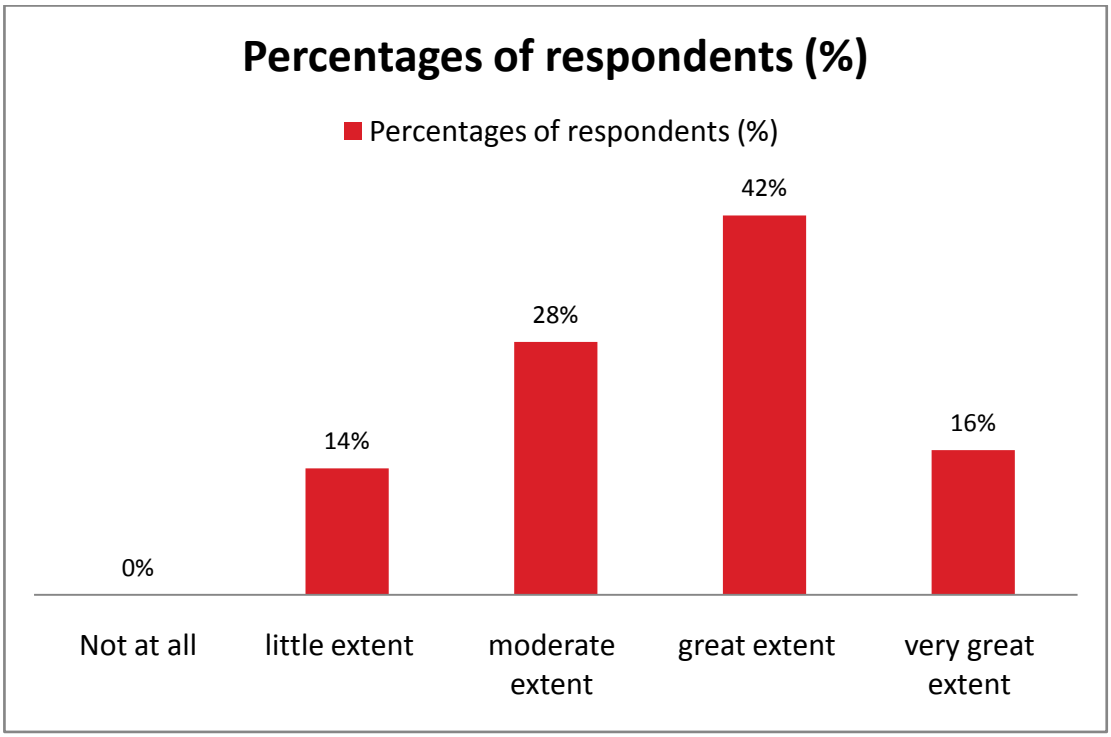

Figure 10: How crew/gang sizes affect labour productivity

Source: Field Survey, 2014

From figure 10, 14% of the respondents indicated that gang size to a little extent affecting labour productivity, 28% of the respondents indicated that gang size to a moderate extent affect labour productivity, 42% of the respondents indicated that gang size to a great extent affect labour productivity,16% of the respondents indicated that gang size to a very great extent negatively affect labour productivity and no respondent indicated that gang size does not at all affect labour productivity, The findings from the study indicate that gang size has a very high effect on increasing labour productivity. The results from the study is very significant to the construction manager as it puts pressure on him to ensure correct balancing of gang size for operations in order to remain competitive in the industry.

d) Figure 11 shows the respondents responses with respect to the correct order of significance of how Construction methods affect labour productivity.

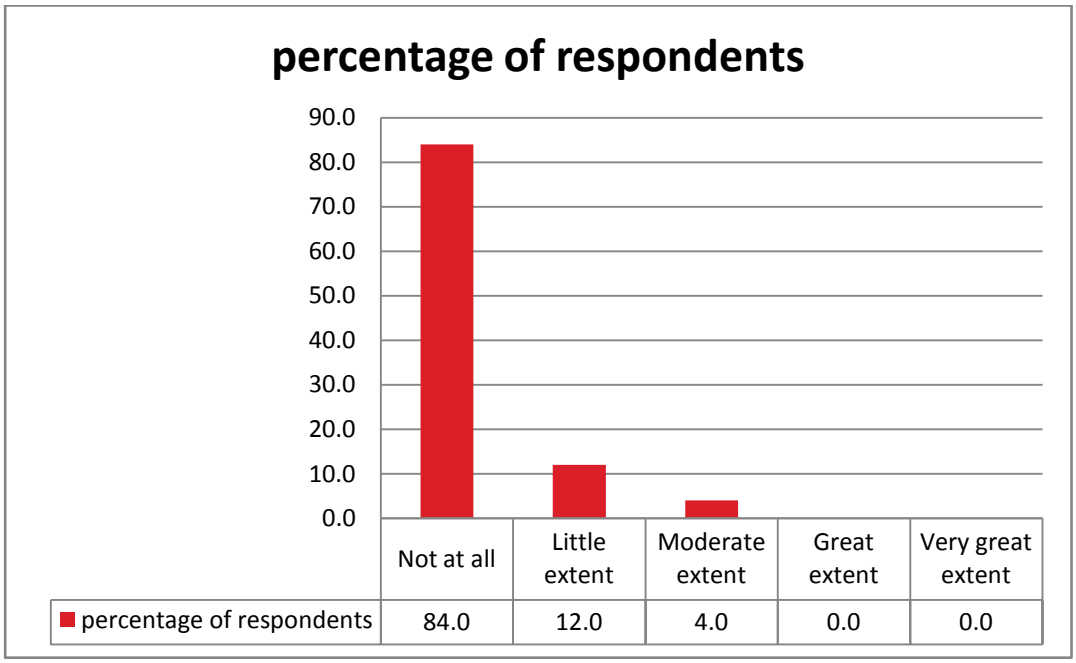

Figure 11: How construction methods affect labour productivity

Source: Field Survey, 2014

From the responses, 84% of the respondents indicated that Construction methods does not at all negatively affect labour productivity, 12% of the respondents indicated that construction methods to a little extent affect labour productivity, 4% of the respondents indicated that construction methods to a moderate extent negatively affect labour productivity. The findings from the study indicate that Construction methods have very little effect on decline of labour productivity in the construction industry. The results from the study can be interpreted to imply that construction method is not a significant factor of decline of labour productivity in Nairobi County.

e) Figure 12 shows the response of the respondents with respect to the correct order of significance of how cultural factors affect labour productivity.

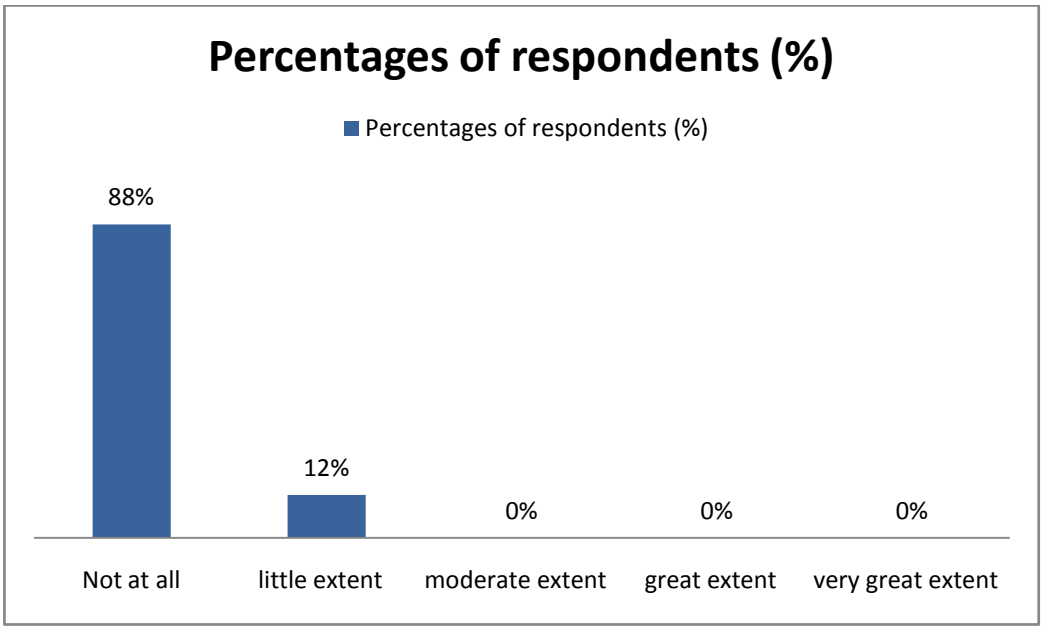

Figure 12: How cultural factors affect labour productivity

Source: Field Survey, 2014

From the response, 88% of the respondents indicated that Cultural factors does not at all affect labour productivity, 12% of the respondents indicated that Cultural factors to a little extent affect labour productivity, The findings from the study indicates that Cultural factors has very little effect on decline of labour productivity in the construction industry. The results from the study can be interpreted to imply that Cultural factors such as religion, taboos and gender don't play a significant role in labour productivity on construction sites.

f) Table 5 shows the results obtained from respondents responses through field survey

on labour productivity output for 13 operations in the basic trades of masonry and painting. The recommended gang sizes for skilled: Unskilled for best practices from experience and literature search are as indicated in the table:

Table 5: Labour productivity outputs

S/No	Activity	Gang size (skilled: unskilled)	Labour Productivity output (m^2/hour.) by respondents	No of respondents	% of respondents	Average Labour Productivity output (m^2/hour.)
1	15 mm thick Plastering on walls	2:1	3	12	12.12	**4.0**
			4	72	75.76	
			5	15	15.15	
2	20 mm thick Plaster on soffits of suspended slab	2:1	3	69	69.70	**3.0**
			4	23	23.23	
			5	7	7.07	
3	25 mm thick Floor Screeding	1 : 1	3	65	65.66	**3.0**
			4	29	29.29	
			5	5	5.05	
4	225mm thick natural stone/Solid Concrete Block walling	1 : 2	1.0	85	85.86	**1.0**
			1.5	14	14.14	
			2.0	0	0	
5	150mm thick natural stone/ Solid Concrete Block walling	1 : 1	1.0	2	2.02	**1.5**
			1.5	88	88.89	
			2.0	9	9.09	
6	100 mm thick natural stone/ Solid Concrete Block walling	1 : 1	1.0	6	6.06	**1.5**
			1.5	81	81.82	
			2.0	12	12.12	

7	215mm thick standard brick walling	2:1	1.0	74	74.74	**1.0**
			1.5	21	21.21	
			2.0	4	4.04	
8	102.5mm thick standard brick walling	2:1	1.0	2	2.02	**2.0**
			1.5	26	26.26	
			2.0	71	71.72	
9	300 x 300 mm Ceramic Floor Tiling	4:1	3.0	69	69.70	**3.0**
			4.0	26	26.26	
			5.0	4	4.04	
10	200 x 250mmGlazed Wall Tiling	4:1	3.0	11	11.11	**5.0**
			4.0	27	27.27	
			5.0	61	61.62	
11	Prepare and Paint 3 coats of emulsion to smooth surfaces of plastered walls	4:1	16	12	12.12	**20.0**
			20	69	69.70	
			24	18	18.18	
12	Prepare and Paint 3 coats of emulsion to smooth surfaces of plastered ceiling	4:1	16	75	75.76	**16.0**
			20	17	17.17	
			24	7	7.07	
13	Prepare, knot, stop, prime and paint 3 coats of gloss paint to general surfaces of wood	4:1	8	64	64.65	**8.0**
			12	23	23.23	
			16	12	12.12	

Source: Field survey, 2014

From the study with respect to the listed, painting on wall was conceived to have the greatest productivity rate when compared to other tasks based operations like brick walling and wall tilling which had lower productivity rates due to the higher manual and mental effort required. Panting work is applied in thin coats and will only require the unskilled labour in the initial preparation of the surface and at the end of the day for cleaning up. Consequently when costing such items some special consideration should be kept in mind to factor in the idle time for the unskilled during the execution of the activities.

The findings as indicated in the table 5 show that the labour productivity of constructing for both a 100mm thick block wall/stone wall and 150mm thick block wall/stone wall is the same. Though the 100mm thick block wall/stone are lighter, it is more difficult to make them plumb during erection when compared to the 150mm thick walling. Furthermore the number of courses to be constructed with the 100mm thick walling in a day will be limited due to their slenderness. The respondents further stressed that the average labour constants quoted should be adjusted progressively to take into account the shape and storey height of the building. With the increase in height in walls for example, there will be need to increase the unskilled in the gang to take care of the additional lifts in the materials to the upper levels (IQSK, 2014). It can therefore be argued that if production levels were to be maintained during the construction of the 9^{th} and 10^{th} courses of the walling shown in plate 1, an extra labourer would have to be added to the gang crew.

Plate 1: Stone walling construction in Kayole, Nairobi County

Source: Field survey, 2014

For labour productivity results for painting, it was observed that the number of coats and the type of paint applied (whether water or oil based) will give different outcomes.

Plate 2: Finishes to a recently completed building in Tassia II, Nairobi.

Source: Field survey, 2014

The meaning and implications of the findings are that large surfaces are the greatest beneficiary of natural labour input. This result might be justified as common wisdom that open large surfaces are straightforward to work on as there is free movement of the body and the ease of supervision which leads to increase in labour productivity. Further the results obtained from the study compares well with the data on painting highlighted in the literature search authored by Atton (1978) and Brook (2004). For example the results from the field survey on the application of 3 coats of emulsion to smooth surfaces of plastered ceiling per m^2 is $4m^2$/hour whereas the information from the literature search gives an average of $3.83m^2$/hour.

4. 4.3 Objective 3: Management factors for enhancing labour productivity

Objective three aimed at evaluating management factors that can enhance construction sites labour. The management strategies for improving labour productivity revolves around the following; monitoring work during implementation, training, Work planning and scheduling. Monitoring can improve site labour productivity through better supervision, training can enhance efficiency, work planning and scheduling can reduce on wastage arising from ineffective time.

a) Table 6 shows the respondents responses on how to evaluate management factors that can enhance construction sites labour productivity. The relative index of importance being attached to each of the factors was computed by assigning a minimum value of 1 and a maximum value of 5. This was with a view to enable a comparison of these factors. The Relative Importance Index (RII) was calculated using the following formula.

$$\textit{Relative Importance Index} = \frac{\textit{Weighted total for responses}}{\textit{5 x sample size}}$$

Table 6:Management strategies of enhancing labour productivity

S/N	Management strategies	Frequency per ranking					Weighted total for responses	Relative Importance Index (%)	Ranking
		1*	2*	3*	4*	5*			
1	Outsourcing	81	18	0	0	0	117	0.24	6
2	Monitoring work during implementation	0	0	0	45	54	450	0.91	1
3	Specialization	0	33	63	3	0	267	0.54	5
4	Training	0	0	11	45	43	428	0.87	2
5	Labour crew sizing	0	0	29	59	11	378	0.76	4
6	Work planning and scheduling	0	12	20	37	30	382	0.77	3

- Multiplication of Ranking by frequency of Responses

KEY

1* Not significant 2* Slightly significant 3* Significant 4* Very significant 5* Extremely significant

Source: Field survey, 2014

The findings indicate that most of the respondents were of the view that monitoring work during implementation as shown in Table 6 in this study came out strongly as a key management strategy for improving labour productivity. This was followed by the ranking of training. It had been argued by (Armstrong, 2006, p.259) that 'training should be systematic in that it is specifically designed, planned and implemented to meet defined needs. It should be provided by people who know how to train and the impact of training should be carefully evaluated'. Training involves the use of formal

processes to impart knowledge and help people to acquire the skills necessary for them to perform their jobs satisfactorily. Hence, training will enhance efficiency which in most cases leads to higher productivity. This will be as a result of the operatives using the correct procedures in undertaking the works as they understand the proper sequence of carrying out the works. The third most important management strategy was to ensure work planning and scheduling has been accorded great attention so that there are no delays in the execution of activities.

b) Figure 13 shows the response of the respondents with respect to the training levels of site labour on construction sites.

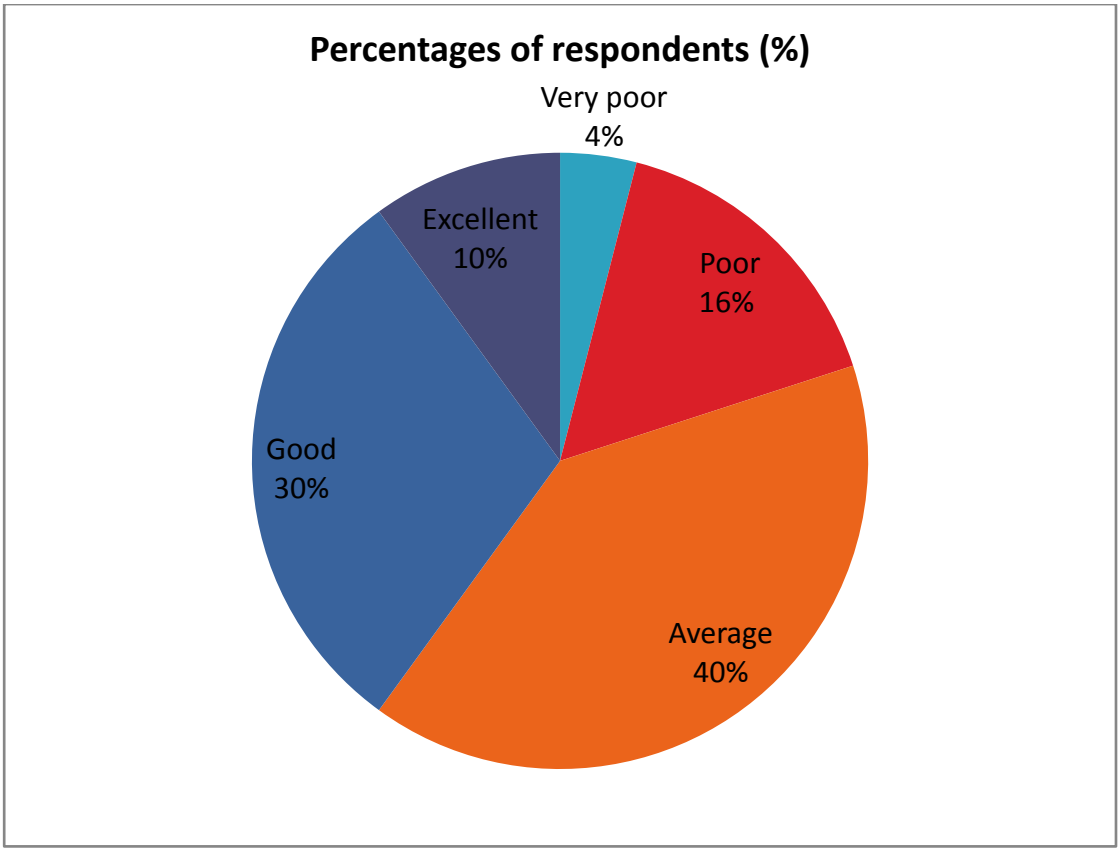

Figure 13: Skilled labour on productivity

Source: Field Survey, 2014

Figure 13 shows the response of the respondents with respect to the current productivity levels of skilled labour on construction sites. 4% of the respondents rated the training and skill levels as very poor; 16% of the respondents rated the training levels as poor; 40% of the respondents rated the training levels as average,

30% of the respondents rated the training levels as good, 10% of the respondents rated the training and skill levels as excellent overall.

The finding from the study shows that current labour productivity levels on construction site is not highly rated as 60% of the respondents were not happy with the productivity levels. The results compares well with the findings of (Ziderman, 2003) obtained in the literature review which had indicated that majority of the labourforce on construction site gains their skills through informal skilling which is the unsystematic method of learning on the job which does not ground the operative wholesome. High employee turnover rates deter investments in employee formal training in the construction industry. Lack of training leads to lack of skills and techniques. The deficiency in skills causes delays due to rework and overall capability levels among operatives.

c) Work planning and scheduling in contractors firms

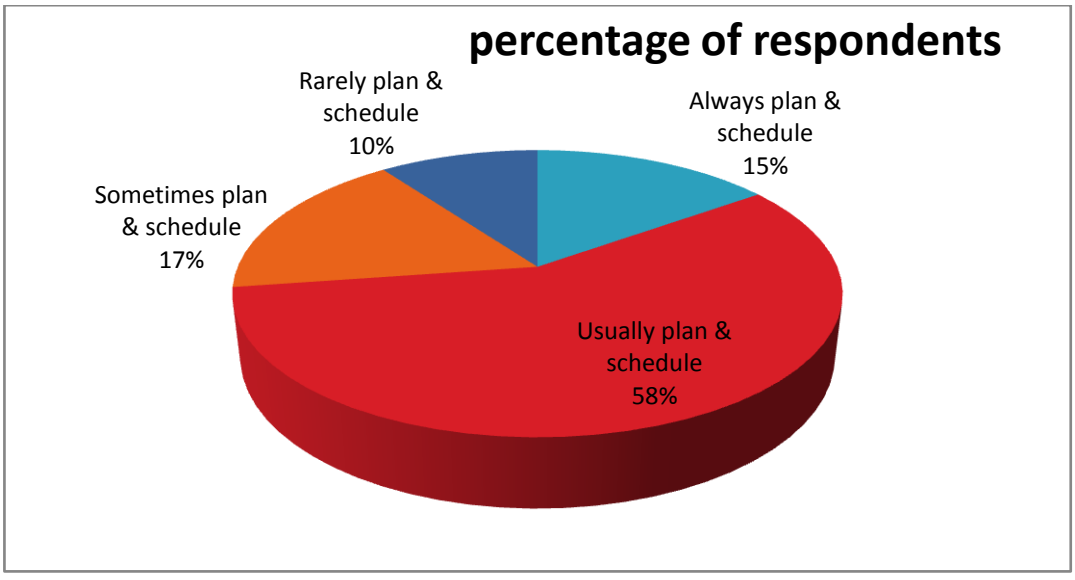

Figure 14: Work planning and scheduling in contractors firm

Source: Field Survey, 2014

Figure 14 shows the response of the respondents with respect to how planning and scheduling affect labour productivity by construction firms. 10% of the respondents indicated that their firms rarely plan and schedule for site labour productivity in their projects; 17% of the respondents indicated that their firms sometimes plan and

schedule site labour productivity in their projects; 58% of the respondents indicated that their firms usually plan and schedule site labour productivity in their projects, while 15% of the respondents indicated that their firms always plan and schedule site labour productivity in their projects. The results from figure 13 shows that work planning and scheduling for labour productivity has been taken seriously by most of the construction firms especially in categories NCA4, NCA5, NCA6 and NCA7 (NCA, 2013) in Nairobi County. The findings show that over 70% of the firms in the above quoted categories plan and schedule for site labour productivity on construction sites. The implication of the findings is that work planning and scheduling is a critical factor of enhancing site labour productivity on construction sites.

4.5 Relationship between factors influencing labour productivity

Correlation and multiple regression analyses were conducted to examine the relationship between productivity and various potential predictors in labour.

Table 7: Descriptive Statistics

	Mean	Std. Deviation	Number of respondents
q2	3.18	1.452	99
q1a	2.86	1.348	99
q1b	2.77	1.292	99
q1c	3.28	1.378	99
q1d	3.01	1.351	99
q1e	3.07	1.311	99
q1f	2.94	1.369	99

Source: Author, 2014

As indicated in Table 7 above, the mean value of the factors indicated for 99 respondents was between 2.77 and 3.18 with majority of them above 3; this indicated that majority of the respondents ranked all the factors as significant in the construction industry.

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.463[a]	0.214	0.163	1.329

a). Predictors: (Constant), q1f, q1e, q1d, q1c, q1b, q1a.

Source: Field Survey, 2014

The multiple regression model with all six predictors produced R^2 =0.463, F (6, 92) = 4.176, p < 0.001.The research findings indicated that there was a strong positive relationship (R= 0.214) between the variables. The study also revealed that 46.3% of the labour productivity factors can be explained by the independent variables.

Table 9: ANOVA[a] Test

Model		Sum of Squares (SS)	Degree of freedom (df)	Mean Square (MS)	F	Sig.
1	Regression	44.250	6	7.375	4.176	0.001[b]
	Residual	162.477	92	1.766		
	Total	206.727	98			

a). Dependent Variable: q2

b). Predictors: (Constant), q1f, q1e, q1d, q1c, q1b, q1a.

Source: Field Survey, 2014

Hypothesis testing

From the ANOVA Table 9 above, it is clear that the independent variables expressed they were statistically significant at 95% confidence level of significance i.e. (P < 0.05) hence we accept the null hypothesis and conclude that there was significant effect of labour productivity on construction industry in Kenya.

The regression results presented in the coefficient table below indicates that Project management, Efficiency, work measurement and Management factors were significant at 95% level with p-values < 0.05. The same factors can be proven in the real world of construction industry not only in Kenya but also in the other states. Most of the predictors are negatively related;

Table 10: Coefficients[a]

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig.
		Beta	Std. Error	Beta		
1	(Constant)	4.532	0.764		5.936	0.000
	q1a	-0.331	0.102	-0.307	-3.241	0.002
	q1b	0.112	0.105	0.100	1.067	0.289
	q1c	0.251	0.098	0.238	2.549	0.012
	q1d	-0.209	0.102	-0.195	-2.047	0.043
	q1e	-0.034	0.105	-0.030	-.320	0.749
	q1f	-0.274	0.101	-0.258	-2.720	0.008

a). Dependent Variable: q2

Source: Field Survey, 2014

In general a multiple regression was run to predict how productivity in the constructions industry is influenced by labour. These variables statistically and significantly predicted F (6, 92) = 4.176, p < 0 .0001, R2 = 0.214. All six variables added statistically and significantly to the prediction, p < 0.05.

This can be stated mathematically as:

P= 4.532 + (-0.331) PP + (0.112) E1 + (0.251) E2+ (-0.209) W.M+ (-0.034) ST + (-0.274) MA

Where;

PP (q1a) = Project Performance

E1 (q1b) = Effectiveness

E2 (q1c) = Efficiency

W.M (q1d) = Work Measurement

ST (q1e) = Strategy

MA (q1f) = Management

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction:

The problems addressed in the thesis were identified through literature review and investigation of the current estimating practices in the industry. The understanding of the real concerns of industry professionals on labour productivity was gathered through questionnaires and interviews in order to provide solid platform of integrated data for productivity analysis. This chapter summarizes the findings and conclusions of the study. The chapter further gives recommendation on how to improve labour productivity on construction sites and further areas of research.

The objectives of the study were threefold and included:

a) Identify and rank the factors that affect construction site labour productivity on labour intensive construction sites.

b) Assess significant factors of construction sites labour productivity in the various trades of construction process in Nairobi County.

c) Evaluate management factors that can enhance construction sites labour productivity.

5.2 Summary of the study

The first objective was to Identify and rank the factors that affect construction site labour productivity on labour intensive construction sites. The objective was achieved through extensive literature search and ranking of the factors done in accordance with their level of impact based on the views of contractors registered in categories NCA4, NCA5, NCA6 and NCA7 (NCA, 2013). The three major factors that affect labour productivity in Construction sites found from the study were namely; lack of training/skills, Work planning and scheduling, and incompetent supervisors. By addressing the identified factors in line with their relative levels of influence, labour productivity could be improved by monitoring work during implementation with the overall view of enhancing productivity performance in the construction industry.

Second objective was to assess significant factors of construction sites labour productivity in the various trades of construction process in Nairobi County. This objective was achieved from the result obtained through the field study on average labour productivity outputs for 13 operations in the basic trades of masonry and painting. The findings from the study could be used as archival data in improving labour productivity in construction sites as estimating labour productivity is one of the most challenging aspects of preparing an estimate for bidding, or cost control.

The third objective was to evaluate management factors that can enhance construction sites labour productivity. The findings indicated monitoring work during implementation came out strongly as a key management strategy for improving construction site labour productivity. The other strategies which were established included; training, carrying out work measurement. Labour crew sizing and outsourcing. It was argued that the training should be systematic in that it should be specifically designed, planned and implemented to meet defined needs. The training should be provided by people who know how to train and the impact of training should be carefully evaluated.

5.3 Management Trends

These are the contemporary best practices in the industry in improving labour productivity. In order to keep abreast with global trends in the construction industry there is need to invest in the acquisition of knowledge on labour productivity by the Kenyan government. In this study it has been argued that the sources of best practices can be obtained from productivity studies, research and development and through the interaction of stakeholders.

5.3.1 Opinions of stakeholders

The views of the stakeholders on how to improve productivity could be summarized as follows:

a) Change attitude and enhance training so that all the labourforce can have requisite technical and social skills. Improvement can be achieved through training of labour resource technically and socially through motivation techniques.

b) Outsource and subcontract for specialized tasks as this encourages people on targeted performance, hence more effective in labour and time management for better realization of production levels.

5.3.2 Productivity studies data

In the study, labour productivity output measurement for thirteen operations were assessed and the results obtained will be kept by construction firms as archival data of productivity study and will be used to improve the effectiveness and accuracy of cost estimation of future projects. The findings show that the average productivity outputs of skilled labour in plastering to walls as 2.5m² per hour while to soffits of suspended ceiling as 2.0m² per hour.

5.3.3 Research and Development

To support modern practice the study argues that in order to improve labour productivity greater investment in research is required. Further the findings from this study on the labour outputs for the thirteen operations should serve as a basis for further research on the improvement of labour productivity in the other trades of construction. The extensive research could be achieved through the two main techniques of work study: method study and work measurement. Further, information from archival material, research and development can be used by the management in decision making with respect to labour productivity improvement in the construction industry.

5.4 Conclusions

The study set out to investigate the factors influencing construction sites labour productivity in Nairobi County, Kenya. After analysis of the data it was evident that there are various factors which influence construction sites labour productivity. Of the three objectives set out in the study, all have been achieved as follows:

5.4.1 Objective One: Identify and rank the factors that affect labour productivity

Of the 12 critical factors identified from the literature review and studied, six factors which affect labour productivity on construction firm in accordance with their relative levels of impact were:

a) Lack of training/skills……at rank 1

b) Work planning and Scheduling……at rank 2

c) Incompetent supervisors……..…,..at rank3

d) Late deliveries of materials and equipment……...at rank 4

e) Motivation…….at rank 5

f) Management system and strategies……..….at rank 6

5.4.2 Objective Two: Assess significant factors of labour productivity

Prevailing labour productivity outputs for 13 activities from trades of masonry and painting were studied and the outcome from the findings was recorded including the incorporation of the strategy of crew sizing. The findings from the study could be used as archival material in the teaching and understanding the correct position in improving labour productivity in construction sites as estimating labour productivity is one of the most difficult aspects of preparing an estimate for bidding, or cost control.

5.4.3 Objective Three: Evaluate management factors that can enhance construction sites labour productivity.

Monitoring work during implementation came out strongly as a key management factor for improving construction site labour productivity. This was closely followed training and skill improvement of the operatives.

5.5 Recommendations

Based on the findings of chapter four of this study and a review of previous researches, the following recommendations in table7 are hereby suggested for

improving labour productivity in the Kenyan construction industry. The recommendations were done in line with the study objectives.

Table 11: Recommendations for improving labour productivity

S/NO	FINDINGS	RECOMMENDATIONS
1	Poor supervision	a) It is necessary to conduct training courses in vocational training and skill improvement in labour productivity for craftsmen especially those informal trained workforce to access formal training so as to acquire proper skills. This can be championed by the National Construction Authority, Kenya.
		b) There is a need to increase the number of TVET institutions that focus on teaching construction trades such as Masonry, Carpentry and Joinery, Painting, Plumbing and equip them with the necessary equipment and competent technical staff. The training should be module based.
		c) Adequate supervision should be undertaken during the Industry Based Learning so as to make the graduates of TVET have the required experience when they finally enter the job market. There should be scheduled visits by the training institutions to ensure that the trainees are exposed in their area of specialization.
		d)There is need to enhance project scheduling techniques such as MS Project and Primavera in each project to optimize the times of related activities and make sure that workflow is continuous so as to reduce the idleness of the labour force to a minimum. This was informed by the results which showed contractors planning and scheduling is wanting.
		e) There is need for Contracting firms to conduct on-sitelabour productivity measurements, in order to establish standard times for activities for the Kenyan consumption. The data can be used in

		future as historic data and yardstick for improving the effectiveness and accuracy of cost estimation of projects.
2	Lack of Motivation	Timely payment to workers and increase in pay commensurate to the output of work.
3	Outcomes of research	a) Need to put in place Strategic Management Structure that can improve labour productivity. b) There is need for contracting firms to conduct on-site labour productivity measurements, in order to establish standard times for activities which can be used in future as yardstick for improving the effectiveness and accuracy of cost estimation of projects. NCA should come out with a rule on archival records for construction works.
4	Strategy	a) Engaging employees and improving their attitudes towards job security and performance management b) Payments based on Productivity. c) Control system which set and predetermine labour productivity.

Source: Author, 2014

5.6 Areas of further research

The current research study was limited to identifying the key constraints to on-site labour productivity and assessing how improvement measures could influence the levels of productivity in construction. The labour productivity measurements were limited to the building industry trades of masonry and painting. As an explanatory study, the areas for further research could be focused on labour productivity measurement for other construction activities such as concrete work, finishes, carpentry and joinery works using both quantitative and qualitative methods including hypotheses to be tested in the next phases.

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APPENDICES

APPENDIX 1: INTRODUCTORY LETTER

Date: 21/3/2014

Dear Sir/Madam,

RE: MSc. THESIS TITLE 'INVESTIGATION OF FACTORS INFLUENCING CONSTRUCTION SITE LABOUR PRODUCTIVITY IN NAIROBI COUNTY, KENYA'

I am a student at the Jomo Kenyatta University of Agriculture and Technology in the Department of Construction Management undertaking a MSc. Research titled '***Investigation of factors influencing construction site labour productivity in Nairobi County, Kenya.***' The objective of this study is to establish the major causes of the decline on labour productivity on the Construction sites through the survey. The labour productivity data obtained will be documented with an overall aim to provide guidelines for future project costs.

Kindly answer the questions in the attached questionnaire as objectively as possible. Indicate your answer to each question by filling in the space provided or ticking in the correct answer as appropriate. All the information gathered here will be treated in confidence and will be used for academic purposes only.

Thank you in advance for your kind cooperation and time.

Yours faithfully,

Absalom H. V. Lamka (Reg. No: AB343-2018/2012**)** – Cell phone No. 0733825511

APPENDIX 2: QUESTIONNAIRE

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1. Kindly indicate your contractor's registration category

☐ NCA7 (10m -20m) ☐ NCA6 (20m-50m) ☐ NCA5 (50m -100m)

☐ NCA4 (100m – 200m)

2. What is your Employment status in the firm?

☐ Contractor ☐ Cost Estimator

☐ Construction Manager ☐ Other (Specify)

☐ Foreman ……

3. What is your working experience on the construction sites:

☐ Less than 5Years ☐ 6 – 10 Years

☐ 11 – 15 Years ☐ 16 - 20 Years

☐ Over 20 Years

SECTION B: FACTORS THAT INFLUENCE LABOUR PRODUCTIVITY ON CONSTRUCTION SITES IN NAIROBI COUNTY, KENYA

1. Please specify the number of employees in your organization

Area of specialization/ Title	No.

2. In the Table I below is a list of the key factors that affect labour productivity on construction sites. Please rank the factor which affects labour productivity as appropriately in their correct order of significance.

Table I: Factors that affect labour productivity on construction sites.

S/No.	**Factors**	**Ranking**
1	Management system and strategies	
2	Work planning and Scheduling	
3	Incompetent supervisors	
4	(Bilateral) Poor communication	
5	Rework	
6	Labour supply and work crews	
7	Late deliveries of materials and equipment	
8	Workers absenteeism and turnover	
9	Motivation	
10	Lack of training/skills	
11	Poor site conditions(location, ground conditions, confinement)	
12	safety at workplace	

SECTION C: LABOUR PRODUCTIVITY ASSESSMENT

1. Does your firm undertake labour productivity measurement on construction projects? Using the5-point measurement scale, please indicate by ticking as appropriate the correct order of significance.

Never Measure ☐ Rarely Measure ☐ Sometimes Measure ☐

Usually Measure ☐ Always Measure ☐

2. In your own assessment, what are the average labour productivity outputs for the listed activities when using the gang sizes indicated in Table II? Please indicate the correct values against each activity.

Table II: labour productivity outputs and gang sizes in trades of masonry/painting

S/ No	Activity	Gang size (skilled: unskilled)	Average Labour Output (m^2/hour)
1	15 mm thick Plastering on walls	2:1	
2	20 mm thick Plastering on soffits of suspended slab	2:1	
3	25 mm thick Floor Screeding	1 : 1	
4	225 thick natural stone walling/ solid concrete block walling	1 : 2	
5	150mm thick natural stone walling/solid concrete block walling	1 : 1	
6	100 mm thick natural stone walling/ solid concrete walling	1 : 1	
7	215mm thick standard brick walling	2:1	
8	102.5mm thick standard brick walling	2:1	
9	Ceramic Floor Tiling	4:1	
10	Glazed Wall Tiling	4:1	
11	Prepare and Paint 3 coats of emulsion to plastered walls	4:1	
12	Prepare and Paint 3 coats of emulsion to plastered ceiling	4:1	
13	Prepare, knot, stop, prime and paint 3 coats of gloss paint to general surfaces of wood	4:1	

SECTION D: MANAGEMENT FACTORS OF LABOUR PRODUCTIVITY

1. To the best of your understanding, how would you evaluate the following approaches of human resources management with respect to enhancing construction sites labour productivity? Please indicate by ticking as appropriate using the 5-point measurement scale the correct order of significance of each of the factors indicated in Table III.

1- Not significant 2 - Slightly significant 3 - Significant

4 - Very significant 5 - Most significant

Table III

	Approaches	**1**	**2**	**3**	**4**	**5**
1	Outsourcing					
2	Monitoring work during implementation					
3	Specialization					
4	Training					
5	Labour crew sizing					
6	Work planning and management					

2. How do the following factors affect labour productivity on construction sites? Please indicate by ticking as appropriate the correct order of significance of each of the factors.

1- Not at all 2 – little extent 3 – moderate extent

4 – Great extent 5 – Very great extent

Table IV

	Factors	**1**	**2**	**3**	**4**	**5**
1	Cultural factor (Gender, Taboo, work ethics etc.)					
2	Increase in Age					
3	Crew/Gang size					
4	Lack of Labour experience and mentorship					
5	Construction methods (framed, load bearing)					

SECTION E: OPINIONS OF STAKEHOLDERS

1. In your view, what do you think should be done to improve labour productivity on construction sites?

_____

_____

_____

2. What are your opinions of the stakeholders/ practitioner on labour productivity and how it can be improved?

_____

_____

_____

3. In your view, do you agree that outsourcing and sub-contracting improves labour productivity on construction sites?

Yes ☐ No ☐

Explai

_____

_____

_____

APPENDIX 3: INTERVIEW SCHEDULE

1. What is your job title?.....
2. How long have you been working on construction sites?.....
3. In your opinion, what are the main challenges people face in coming up with estimates for labour productivity in the construction industry

   ……..
4. Give your opinion on the reasons for fluctuation of labour productivity on construction sites in Nairobi County.

   ……
5. In your own opinion, what is the appropriate gang size for the following trades and there average labour productivity outputs (per M^2):

   (a) Masonry walling:

   (i) 100 mm thick SCB……

   (ii) 150 mm thick SCB ……

   (iii) 225mm thick SCB …….

   (iv) 100 mm thick Stone……

   (v) 150 mm thick Stone ……

   (vi) 225mm thick Stone …….

   (b) Brick walling

   (i) 100 mm thick……

   (ii) 150 mm thick……

   (iii) 225mm thick…….

   (c) Plastering:

   (i) 15 mm thick Plastering on walls……..

(ii) 20 mm thick Plastering on soffits of suspended slab …….

(d) Screeding…….

(f) Painting:

(i) Prepare and Paint 3 coats of emulsion to plastered walls……

(ii) Prepare and Paint 3 coats of emulsion to plastered ceiling…….

(iii) Prepare, knot, stop, prime and paint 3 coats of gloss paint to general surfaces of wood……

(g) Floor tiling

……

(h) Wall tiling…….

6. In your view what are the key management strategies for improving labour productivity?.....

7. What measures would you recommend to enhance labour productivity on construction sites?.....

THANK YOU

APPENDIX 4: NCA: Categories of Registration, 2013

1	**Contractors (Buildings)**		
		Category	**Value Limit (Kshs)**
	1.	NCA1	Unlimited
	2.	NCA2	Up to 500,000,000.00
	3.	NCA3	Up to 300,000,000.00
	4.	NCA4	Up to 200,000,000.00
	5.	NCA5	Up to 100,000,000.00
	6.	NCA6	Up to 50,000,000.00
	7.	NCA7	Up to 20,000,000.00
2	**Specialist Contractors**		
		Category	**Value Limit (Kshs)**
	1.	NCA1	Unlimited
	2.	NCA2	Up to 250,000,000.00
	3.	NCA3	Up to 150,000,000.00
	4.	NCA4	Up to 100,000,000.00
	5.	NCA5	Up to 50,000,000.00
	6.	NCA6	Up to 20,000,000.00
	7.	NCA7	Up to 10,000,000.00
3	**Roads and other Civil Works**		
	1.	NCA1	Unlimited
	2.	NCA2	Up to 750,000,000.00
	3.	NCA3	Up to 500,000,000.00
	4.	NCA4	Up to 300,000,000.00
	5.	NCA5	Up to 200,000,000.00
	6.	NCA6	Up to 100,000,000.00
	7.	NCA7	Upton 50,000,000.00