LABOUR PRODUCTIVITY AND PERFORMANCE OF BUILDING PROJECTS IN
NAIROBI COUNTY, KENYA

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KENYATTA UNIVERSITY.

MAY 2017
DECLARATION

This Research Project is my own original work and I confirm that it has never been presented for award of degree to any other university.

Signature ………………………………………… Date --------------------------------------------------

Francis Ndegwa Kuruga – D53/CTY/PT/21573/2012

This research project has been submitted for examination with my approval as University Supervisor

Signature …………………………………………Date --------------------------------------------------

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DEDICATION

I dedicate this project report and the research work to my loving wife Mary and our three daughters Catherine, Karen and Claire as an inspiration to them to study hard. Above all to the Almighty God for His favour and provision that have enabled me to reach this level of education.
ACKNOWLEDGEMENT

I would like to express my deepest appreciation to my Supervisor, Ms. Gladys Kimutai for her great contribution and moral support which have enabled me to complete this project report.

I am also grateful to the entire staff at the Kenyatta University, especially City Campus Librarians for according me a very conducive learning environment while preparing this report.

My gratitude also goes to my collage mates, work colleagues, friends and acquaintances who in their small ways helped me in realization of my goal.

Thank you all.
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**OPERATIONAL DEFINITION OF TERMS**

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<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Project Management</td>
<td>Putting together all factors relating to a project; human and mechanical in such a way to effectively plan and execute a given project.</td>
</tr>
<tr>
<td>Labour Productivity</td>
<td>Is a measure of how efficiently the hired labour in a project works.</td>
</tr>
<tr>
<td>Project Performance</td>
<td>Is the degree to which the project meets its overall objectives as per the developer’s expectations.</td>
</tr>
<tr>
<td>Type of Labour</td>
<td>Either manual where only hand tools are in use or mechanised where rated machines are in use to carry out tasks in a project.</td>
</tr>
<tr>
<td>Source of Material</td>
<td>Primary Source of Building material for a project Local or imported</td>
</tr>
<tr>
<td>Method of hiring Labour</td>
<td>Method used to employ personnel in a project site; Either Permanent or Casual</td>
</tr>
<tr>
<td>Level of Education</td>
<td>Individual’s highest attained training relevant to the hired job in a building project</td>
</tr>
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# ABBREVIATION AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>PMI</td>
<td>Project Management Institute</td>
</tr>
<tr>
<td>KPDA</td>
<td>Kenya Private Developers Association</td>
</tr>
<tr>
<td>Independent Developers</td>
<td>Private property developers not under KPDA</td>
</tr>
<tr>
<td>NCA</td>
<td>National Contractors Authority</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>APM</td>
<td>Kenya Association of Project Managers</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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ABSTRACT

Labour productivity is a key measure of efficiency in production process especially those that are labour-intensive. An improvement in labour productivity is believed to lead to efficiency thus improving on the overall building performances. The general objective of this Study was to determine the influence of labour productivity underlying factors on the performance of building projects in Nairobi County. The specific objectives were to find out the influence of cost of labour, impact of the sources of building material, method of hiring labour and influence of training construction officers on the performance on building projects in Nairobi County, Kenya. Past relevant studies and theories on labour productivity and performance of building projects were reviewed with clear research gaps identified and which formed the basis for this research study. Descriptive survey research design was adopted. The target population was 594 comprising private developers registered with Kenya Private Developers Association (KPDA), Independent developers, Building contractors in class NCA 4 and above and Projects Managers registered with the Kenya Association of Project Managers (KAPM). Using Yamane (1967) formula, a sample size of 239 was arrived at and the researcher personally administered questionnaires with 169 successful returns or 71% of the respondent. Descriptive and inferential statistics were used to analyse the data. Demographically, the research revealed that female participation in building projects is lower than that of males, interest on labour productivity and performance issues increased with the age of the participants and majority of the projects are supervised by persons who had attained a diploma level of education. The study revealed that both mechanical and manual labour have a major influence on building projects and that mechanized labour is cheaper than manual labour. The performance in building projects in Nairobi County is also largely influenced by the source of building materials, the method of hiring labour for building and the level of training of construction workers. Overall the research revealed that building projects that had been undertaken for the last five years in Nairobi County had been within the projected budget on account of good labour productivity. The positive association between labour productivity variables and performance of building project measures implies that performance is largely dependent on labour productivity and findings suggests that stakeholders in building projects should prior to commencement of any project interrogate the labour productivity processes. The study concluded that the enhancements of; type of labour, the source of building materials, the methods of hiring labour and the improvement in the level of training of construction workers leads to positive performance of building projects in Nairobi County. This study recommends enhanced use of mechanized labour as opposed to manual labour. The developers interested in enhancing performance in building projects should use a mix of both local and imported materials in their projects, consider more the use of permanent labour as opposed to casuals and all participants in the projects should enhance their level of training. However further studies should be carried out to establish the influence of technology adoption in labour productivity and its influence on the performance of building projects in Nairobi County.
CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

According to Jana, Kristína & Rudolf (2012), Project management is as a set of principles, techniques and methods that people use to plan and control project work effectively. Through this, project stakeholders can plan, schedule, allocate resources, make decisions, control programs, and execute the project most effectively. This is critical since a project is a one off undertaking meaning whatever goes wrong hurts final expectations set out. Project management normally is accomplished by way of application and incorporation of the project management processes namely; project initiating, project planning, project executing, project monitoring, project controlling and closing (Duncan, 2000).

The Project Management Institute (PMI), also defines project management as “the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements” (PMI, 2013). Applying Project management principles and techniques helps the stakeholders complete the projects as per the schedule, and within the set budget and also meeting the project specifications. Similarly, project management helps in achieving the various organization goals, which include productivity, quality, and cost effectiveness.
Project management’s objective is to optimize project cost, project time, and overall project quality. Lewis (2007) acknowledges that project management involves the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Winsock (2009) identified the five parameters that every project faces in its life cycle as Scope, Quality, Cost, Time and Resources.

The performance of a building project is influenced by a number of factors (Fortune and White, 2006). Different researchers have classified these factors into different categories. In particular, Enshassi, Adnan and Al-Halaq (2011) classified the factors into four groups. These inter-related factors in the current study are classified as type of labour, source of materials, methods of hiring of workers and the level of training of construction officers. Although factors affecting labour productivity have been studied by many researchers there are still productivity problems that remain unknown and need to be further investigated in developing countries, Soekiman, Pribadi, Soemardi and Wirahadikusumah (2011). However, Durdyeu, Serdar and Mbachu (2011) observed that although major productivity factors may vary based on geographical areas and the companies undertaking projects, some similarities in issues obstructing productivity could be observed.
1.1.1 **Performance of Building Projects**

According to Xiao and Proverbs (2003) overall performance of the project requires assessment in terms of its final products, quality, total cost, Project time, and the sustainable development of construction firms profitability and their competitiveness. Because of this, labour productivity has become an important area of study in almost the whole world because of the great importance attached to management and control of costs in the projects. Hendrickson and Au (2003) maintained that for any good and successful project in construction, it must seriously pursue the efficient utilization of labour, material and equipment and that for good improvement of labour productivity there should be a major and consistent concern for those who are responsible for the cost control of facilities being constructed. This is true because the performance of a given project has to be looked through the utilization of the various inputs and set performance indicators. Cheung, Henry, Suen and Kevin (2004) noted that Project performance can be measured and evaluated using a large number of performance indicators that could be related to various dimensions (groups) such are cost of project, project time, overall quality, client’s satisfaction, client changes, business performance, health and safety.

According to Iyer and Jha, (2005) Project performance is influenced by many factors. These include: top management support, project manager’s competence, monitoring and feedback by the participants, project manager’s coordinating and leadership skills, coordination among
project participants, decision-making, owners’ competence, social condition, economic condition, and climatic condition. Performance also involves evaluating how well individual developers, groups of individuals or organizations have done in their respective projects relative to the specific objectives. Good performance measured in terms of the delivery of projects on time, to specification and within budget, providing good service and achieving reasonable life-cycle costs (Ankrah, 2005).

In developed countries and USA in particular, research has been pointing out that labour productivity in the building industry is stagnant and in some cases declining (Park, Thomas & Tucker, 2005). However, project performance is influenced by many other factors (Fortune & White, 2006). For optimal performance and to achieve good results, all construction projects rely on the productivity of equipment and workers. In addition, within the developed and also developing countries productivity especially in infrastructural projects is one of the most important issues. For instance, labour can cost up to 50% of the overall project budget, and reducing labourers’ cost can be achieved by improving labour productivity, Alinaitwe, Jackson, Mwakali and Hansson (2007). However, though the above studies contributed to improved project performance in the building industry the researched data on the influence of labour productivity on the performance of building projects is lacking.
1.1.2 Labour Productivity

Labour productivity is a key measure of efficiency production process especially those that are labour-intensive. According to Chigara and Tirivavi (2014) even with the high interest on the subject, there is still no compromise position among scholars and other practitioners on the actual measurement of labour productivity. Alwi (2003) noted that measuring productivity for construction projects is a complex problem. In Palestine, the construction productivity and the various factors that influence the output in a project have become a very important study subjects (Teicholz, 2001; Rojas & Aramvareekul, 2003). According to Park, Thomas and Tucker (2005), productivity of labour is very important in countries where manual labour is mostly in use like in most of the developing countries. Whether for the manual or mechanical type of labour, the overall influence of labour productivity on the performance is a critical issue that project managers and all other stakeholders in a building project must give maximum attention.

Enshassi, et al. (2007), classified factors influencing building construction productivity into 3 groups: labour characteristic factors; project work conditions factors; and non-productive activities. However, no attempt was made to determine the influence of such factors on the performance of building projects. Based on a study survey, Kazaz, Manisali and Ulubeyli (2008) identified factors that affect productivity in building construction labour grouping them in 15 groups relative to their characteristics. These factors are design, construction
equipment project execution plan, building material, project labour, health and safety, supervision, project working time, general project quality, financial, leadership and coordination, organization, owner/consultant, and external factors. In order to improve the performance in projects it is important to understand the various crucial factors that affect labour productivity where negatively or positively and in a way so that to create a detailed plan on how to promote the positivity and reduce on their negativity. However hard data supporting this hypothesis is largely unavailable (Khaled, Mostafa & Shehata, 2011).

Doloi (2012) identified that poor labour productivity is a major reason that cause delays in building projects. However despite the importance of productivity in building projects, labour productivity is rarely measured at Nigeria construction sites hence its influence on project performance as a result is never recognized. And although the poor productivity by the construction artisans is one of the major reasons for the time overruns in building projects in Uganda, its effect on the performance of building sector has not been studied. In Kenya, building projects are an important means of expanding the job market in the economy and therefore every effort should be made to improve labour productivity Absalom Habil (2015). An improvement in labour productivity will lead to enhancing project productivity and making it attractive to project sponsors thus improving on the building projects resources performances.
1.1.3 Building Projects in Nairobi County

Mitullah, and Odek (2002) established that the building industry in Kenya is facing challenges related to labour productivity. They cited the significant problems that affect labour productivity and in particular within Nairobi county as incompetent project supervisors, lack of good skills from the project workers, repeat works, lack of proper tools & equipment, poor construction methods, poor communication, inaccurate drawings, stoppages because of work being rejected by consultants, insecurity, tools/equipment breakdown, and harsh weather conditions. The failure of any construction industry is mainly related to the problems and failure in performance. Considering that labour component in building projects in Kenya constitute 30-35% of the total cost of a project, Gichuhi (2013), it therefore becomes a critical study point.

In September 2014, Kenya became a middle income country after ‘rebasing’ of the economy. Records from the Kenya National Bureau of Statistics (KNBS) show that this resulted to an increase in Kenya’s GDP up with 25.3% from a previous estimate of US$42.6 billion to about US$55.2 billion making it one of the largest economy in Africa, surpassing Ghana, Tunisia and Ethiopia. From this development the government’s requested and got an approval by the National Assembly to review external borrowing ceiling upwards from then 1.2 trillion shillings to 2.5 trillion shillings. The bulk of this borrowed money amount is being directed towards infrastructure projects across the 47 counties. With good
infrastructure, local and private investors have turned into investing in real estates. Besides, the County Governments are in the forming stage thereby increasing demand for more housing.

In Nairobi new building projects are coming up almost daily from every corner of the county. Upper hill, Westlands, Kilimani, Lavington, Karen among other up market have recorded unprecedented increase in construction of new buildings; commercial and residential. Notable on-going mega projects in these areas include but not remitted to Britam Towers, UAP towers- Upperhill, Montave complex, Hazina Trade Center, Prism Tower, Skynest Apartment- Westlands, FCB Tower Kilimani, and Le’Mac-Westlands among many more within the targeted sub counties for this research. However, the impressive growth has also given rise to serious challenges in the in adherence to building regulations which has seen several building collapse while under construction or defects sticking out almost immediate after hand over. The current study attempted to find out how performance can be enhanced in building industry in Nairobi County.
1.2 Statement of the Problem

Cheung, Suen and Cheung (2004) identified various key factors to consider when evaluating project performance. These are the human labour, project cost, project time, expected and attained quality of workmanship, safety factors and health, environment, client or user satisfaction, and communication. Chan and Kumaras Wamy (2002) stated that in evaluating the overall performance of a project the project time is a very critical point of review. These previous studies in building sector have identified factors affecting labour productivity in both developed and developing countries. In Kenya and Nairobi in particular, factors affecting construction labour productivity have been also been identified. The most important factors affecting labour productivity in building projects in Nairobi are delivery of materials, adequacy of supervision and motivation of workers, Gwaya, Masu, & Oyawa (2014). Others are design factors, material factors, equipment factors, labour factors, supervision factors, time factors, project factors, quality factors, financial factors and coordination factors. Despite such intensive investigations, researchers have not only failed to agree on a universal set of factors with significant influence on labour productivity but have also failed to connect such factors to building projects performances. Enshassi, et al. (2007), classified factors influencing building construction productivity into 3 groups: labour characteristic factors; project work conditions factors; and non-productive activities. However, no attempt was made to determine the influence of such factors on the performance of building projects. Kazaz, Manisali and Ulubeyli (2008) identified factors that affect productivity in building construction labour grouping them in 15 groups. They noted that in order to improve the
performance in projects there was need to detail plan on the said factors on how to promote their positivity and reduce on their negativity. However hard data supporting this hypothesis is largely unavailable. The purpose of the study therefore was to establish effects of labour productivity on the performance of building projects in Nairobi County, Kenya.

1.3. Research Objectives

1.3.1 General Objective of the Study

To establish the influence of labour productivity and its underlying factors on the performance of building projects in Nairobi County

1.3.2 Specific Objectives of the Study

The following were the specific objectives of the study.

i. To determine the influence of type of labour on the performance on building projects in Nairobi County, Kenya

ii. To determine the influence of source of building materials on Labour Productivity in performance of building projects in Nairobi County, Kenya

iii. To determine the influence of hiring method on the performance of building projects in Nairobi County, Kenya
iv. To determine how the level of training of construction workers influence the performance of building projects in Nairobi County, Kenya

1.4 Research Questions

The following research questions guided the research.

i. How does the type of labour influence the performance of building projects in Nairobi County, Kenya?

ii. How does the source of material influence labour productivity in performance of building projects in Nairobi County, Kenya?

iii. How does method of hiring labour influence the performance of project time in building projects in Nairobi County, Kenya?

iv. How does the level of training of construction workers influence performance of building projects in Nairobi County, Kenya?

1.5 Significance of the Study

The recommendations of this study may assist the building developers in choosing the most economical but efficient labour model in their projects, building consultants in advising their clients on the best ways of managing their projects for best performance especially by
employing good labour force, building contractors in employing the best labour practice that retains good staff and policy makers in planning and making appropriate decisions to strengthen construction labour services that improve performance in the building projects. The findings of this study could also assist the ministry of public’s works in crafting laws that regulate labour productivity in building construction sectors. It is anticipated that this study will create awareness on the relationships between labour productivity and performance of the building project thus be part of research to be reviewed by future researchers.

1.5 Scope of the Study

The subjects of the study were private developers, building contractors and the projects consultants doing or have done projects in Nairobi County in the last 5 years. These were considered appropriate subjects for the study because they possessed requisite information and knowledge in building sector. Specifically the research was carried out in the following sub counties, Dagoretti North, Dagoretti South, Kibra, Starehe, Westlands, Embakasi Central, Embakasi East, Embakasi South, Embakasi North, Embakasi West Kamukunji, Kasarani, Langata, Makadara, Mathare, Roysambu and Ruaraka sub-counties in Nairobi County. Whereas there are many factors in labour productivity that may influence performance in building projects, the study will focus on cost of labour, sources of materials, the type of labour (formal or informal) and levels of training of building Technicians. In Nairobi County, the rising construction activities have resulted to high demand of labour especially where most of the building works are still carried out on manual basis. This is
what informed the choice of the study area. In addition, no similar studies have been undertaken in this field in the selected sub-counties. Finally, the researcher is familiar with the study area which enhanced data collection.

1.7 Limitations of the study

Although this study was carefully planned, the researcher still faced some limitations and shortcomings. In data collection, the study relied on questionnaires. The items in the questionnaires might have asked questions that elicited subjectivity and hence distorted facts of the study. There might also have possible suspicion by respondents, making it challenging to collect data.

1.7 Organization of the study

This research project flows as follows: chapter one has the research background, the research objectives, the significance of this study, the scope (content and area) and the limitations of the study. Chapter two is literature review both theoretical and empirical on the influence of labour productivity on performance of building projects, and the conceptual framework. Chapter three is the methodology to be used in the study; the research findings and their interpretation which are presented in chapter four. Chapter five consists of the conclusions of the research study and their policy implications.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature of the theoretical and analytical studies on the influence of labour productivity and its underlying factors on the performance of building projects. This chapter also reviews literature relevant to the study including research findings in the area of study. Aspects of previous studies to which the present research can contribute greater understanding are discussed at its conclusion.

2.2 Theoretical Review

This research study was framed around the following theories; Labour theory of value (LTV), and Contingency theory. The theories explain why the research problem under study existed.

2.2.1 The labour theory of value (LTV)

The labour theory of value by Adam Smith suggests that value attached to commodity can be measured using the average number of the labour hours that are taken to complete the product or the project. Building projects are labour intensive. By this Theory the value of goods or services are determined by the total amount of valuable labour needed to produce it, as opposed to the use or pleasure owner gets from them. The theory has its relative share of
criticism but the concept of value has a logical bearing to this study as on the account of evaluating a project performance. Value relates to the measure of the benefits one gets from something in relation to the resources needed to develop it. In the context of building construction projects it would be expressed as the ratio between the functionality of the unit and the cost for that function. Thus, value of the finished project can be increased by improving its function or reduced cost of execution. In this study the cost of labour in the project execution was considered the major component of the projects’s whole life cost.

2.2.2 Contingency theory

This is an organizational theory which suggests that there is no single best way of organizing a corporation, to direct a company, or to make corporate decisions. The theory holds that the best choice of course of action depends on the internal and external situation prevailing at any particular time. According to the definition of a project by the Project Management Institute (PMI), a project is identified as being unique; that it is not a routine operation but it is a specific set of operations that have been designed to attain a singular goal. So the project team often includes people who don’t usually work together, sometimes from different organizations and across multiple geographies. The contingency theory thus makes sense in that for any particular project, the success on the workers was dependent on the specific project circumstances meaning the labour factors when reviewing this study was the bearing on the productivity and hence the performance of a building project.
2.2.3 Theory of Performance

The Theory of Performance (ToP) by Richard Schechner (1988) develops and relates six foundational concepts (italicized) to form a framework that can be used to explain performance as well as performance improvements. To *perform* is to produce valued results. A *performer* can be an individual or a group of people engaging in a collaborative effort. Developing performance is a journey, and *level of performance* describes location in the journey. Current level of performance depends holistically on 6 components: context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. Three axioms are proposed for effective performance improvements. These involve a performer's *mindset, immersion* in an enriching environment, and engagement in *reflective practice*.

2.3 Empirical Review

Previous studies and relevant literature on the dependent and independent variables for this study have been reviewed and the missing gaps identified upon which this research study was based on.

2.3.1 Building Project Performance

There is a strong relationship between project management and project performance because good performance is a reflection of good project management practices. This is because the
characteristics of the building industry are such that a project is often a major business
eendeavour representing a major investment by the developer (Hobday, 2005).

Performance can be considered as an evaluation of how well individuals, groups of
individuals or organizations have done in pursuit of a specific objective (Ankrah & Proverbs,
2005). According to Mullins (2005) performance relates to such factors as increasing
profitability, improved service delivery or obtaining the best results in the organizational
activities. He described performance in building construction projects as the production of
acceptable and quality projects. The accomplishment of construction projects or any other
task measured against present known standards of accuracy, completeness, cost, and speed.
Health and safety of the workers and the surrounding community is also a parameter for
measurement of the degree of success of achievement of expected outcome of a construction
project. Wangui (2015) noted that in spite of the great importance of individual performance
and the increasing use of job performance as an outcome measure in empirical research,
relatively not much effort has been spent on clarifying the performance concept.

Project performance thus can be said to be the degree to which the project meets its overall
objectives. This compares with project management performance which is the degree to
which the traditional objectives of cost, time and quality are met Bryde (2003). However,
these objectives may vary significantly, but they generally geared toward satisfying the
principal owner of the project, customers, employees and society as a whole.

2.3.2 Type of Labour and Performance

Building Construction performance is measured on various indicators, among them Labour Productivity. The American Association of Cost Engineers defines productivity as a “relative measure of labour efficiency, either good or bad, when compared to an established base or norm.” Hughes (2006) defined productivity by the following equation:

\[ \Psi = \frac{V}{L} \text{; Where:} \]

\[ \Psi = \text{average labour productivity} \]

\[ V = \text{value added} \]

\[ L = \text{labour employed} \]

The Building and Construction Sector Productivity Taskforce (BCSPT, 2009) sees productivity as a way to measure performance of construction labour. Durdyeu et al (2011) noted that Labour productivity is one of the most serious factors that affect the physical progress of any building project while Ailabouni, Gidado and Painting (2012) defined productivity as the ratio of output of required quality to the inputs for a specific production situation.
2.3.3 Type of Labour and the Performance of Building Projects

Labour costs are key consideration when evaluating the overall costs of a building project. Two major categories of labour are manual or mechanized. Direct manual labour costs are a bit hard to economise on as demand of additional workers increases as the project progresses. Using machines can be faster but then the amount paid as day wages to either of the two options ultimately would determine the labour cost impact on the value of the project.

According to Irene (2008), Construction is a very labour intensive industry as well as a craft-based activity and the behaviour of people who work here has an enormous influence upon the firm’s performance in the projects they are involved in. For construction industry to have sustainable development there has to be not only focus on sustainable innovation on construction materials and building technologies but also on good and objective labour management strategies. The employed Workers have to be treated as valuable un-reproducible resource with vulnerable and hardly predictable behaviour, Irene (2008). However this research finding does create a gap in as far as while material and building technology is advancing the choices for the project executing team to either use hand or mechanised labour increases, a decision which may make a huge difference in the performance of the project in various ways.
Wells & Jason (2010) noted a shift between how workers in the construction industry are enlisted compared to other sector. This because the majority of construction firms tend to favour casual labourers as opposed to permanent which then may complicate the use of machines with such weak engagements. According to Waris, Liew, Mohd and Idrus (2014), the utilization of mechanized equipment increases construction productivity and as well as reduces the dependency on foreign labour. Mechanisation has been described as the application of machines in carrying out a task. The level of mechanisation defined as the number of plants and equipment employed or the number of activities carried out by mechanical plants in an operation (Idoro, 2008). However, a large amount of Construction Company’s capital is also invested in procuring these equipment.

In Kenya due to high unemployment rate majority of the young people find day jobs as casual labourers in construction sites as means of survival. This thus provides cheap Labour to the project developers. However quality of work becomes a concern. Mitullah and Wachira (2003) noted that informal construction workers are exposed to machine methods only occasionally, when contractors and/or owners of development hire items such as concrete mixers and poker vibrators. With these findings it’s therefore needful to review the current choices between mechanised and manual and the overall influence of the choice of type of labour on the performance of a building project.
2.3.4 Source of Materials and Performance of Building Projects

The materials specified for a particular project will have an important bearing on the artisans and the general project execution in time and quality of finishes. Different manufacturers of building materials produce different specifications for similar materials thereby requiring of different expertise to work. Importantly, there is a growing interest in the building industry in Kenya to use imported materials as opposed to local.

The choice of methods of supply, either by holding stock or just in time is also important factors to consider since the type of material will obviously determine supply methods. According Kadir, Lee, Jaafar, Sapuan, and Ali (2005), material shortage at the project site and equipment shortage are major factors affecting labour productivity. In agreement with other researchers, Ghoddousi and Hosseini (2012) conducted a survey on the top ranked factors that affect labour productivity in Iranian construction projects. They categorized the factors into seven different groups namely, materials/tools, construction method, management/planning, supervision, rework, weather and job site condition. They noted that materials/tools includes materials that have not arrived on site yet, shortage of materials on the market, lack of proper tools and equipment on site and equipment breakdown due to poor maintenance. The choice of material source therefore becomes a critical concern considering the procurement processes especially on time for either local or imported. The studies did not put this into context which this study intends to determine study.
Durdyeu et al. (2012) identified factors that affect materials in labour productivity which material shortages, tools and equipment shortages, unsuitability of materials location, lack of material, delay in arrival of materials, low quality of raw materials, and high quality of required work and inefficiency of equipment. However materials for building projects vary greatly both in application and technology especially, especially in terms of tools needed to work on either local or imported materials. How these would influence the overall project performance is one of the objectives of this study.

2.3.5 Method of hiring Labour in Building Projects

In construction, labour is very important because it is the one that combines all the other resources in order to produce the various construction products. According to Mitullah and Njeri (2003) Labour in building construction in Kenya can be categorized into two major forms: formal or informal. They categorized Informal labour as those who are hired without any form of legal contract and their engagement is based only on available work to be done at any one time. These include those who organise small groups of various trades to undertake piece works within a project. Under this form, there exist no terms and conditions of employments so the workers take full liability of happenings while on duty and can be fired without any notice. On the contrary with the formal employment workers in a particular project are expected to enjoy all the listed rights and privileges.
Soekiman *et al.* (2011) stated that various factors affect the performance of labourers in projects which are usually linked to the performance of project cost, time, and quality. They divided these factors into 15 different groups namely, design, execution plan, material, equipment, labour, health and Safety, supervision, working time, project factor, quality, financial, leadership and coordination, organization and owner/consultant. Cunningham (2013) noted that when a contractor chooses to invest in improving the status of his or her workers by not only good pay but also working conditions normally gains through quality work and a reduced need for supervision. It was noted that temporary labour which comes at lower cost finally results to high supervision cost and can damage the firm’s reputation and incur considerable remedial costs if the quality of work is poor. Pheng (2004) noted that the average level of quality of construction industry is comparatively lower than other industries like the textile and clothing industries and the electronics industry. The low construction quality is mainly attributed to the practice of result-oriented quality management.

Studies in the Kenyan construction industry show that labour costs vary widely within the industry and that, labour management is the most significant factor affecting labour productivity and consequently firm profitability, Mitullah and Wachira (2003). Sound labour management aims at increasing both the efficiency and effectiveness of labour. Some of the shortcomings of labour management include: Unfair wages, Recruitment of unskilled personnel, Poor communication Negative influencing factors, Lack of motivation, Lack of training, Lack of investment in research and development, Mitullah (2003). However both
Soekiman et al. (2011) and Mitullah (2003) did not address how the required staffs are hired; on casual or permanent and the influence of this on the overall project performance.

2.3.6 The Level of Training and Performance of Building Projects

Building projects are on a large scale technical in nature with various construction trades required to put together the final product. The level of training for various workers in a particular project is of importance in evaluating the performance of the entire project. Sugiharto (2003) conducted a survey on large, small and medium construction companies in Indonesia on factors that relate to labour productivity and how they affect the project scheduled performance. He noted that the characteristics of a building construction firm that are most important include ownership, Quality systems and qualifications of the management. Durdyeu et al (2011) states that a research done on building labour productivity in New Zealand classified the factors in two groups: internal factors and external factors. Prominent among the internal factors are level of academic experience, past training and past experience.

Jarkas (2012) developed a survey with 45 previously studied factors to find which affected the Kuwaiti construction labour on construction projects. In the Human/labour category, he included skills of labour and shortage of experienced labour as important factors. Similar research was conducted by Soham (2013), where he identified and ranked the factors
affecting labour productivity in building projects. He stated that ranking as the most important among the 45 factors identified was the level of training of officers engaged in building projects (Jarkas, 2012). While these studies are very informing there is still need to find out the influence on the performance of the overall project performance based on various professional trade artisans and expert knowledge base within a building project especially in Kenya and Nairobi County in particular.

2.4 Summary of the research gaps

From the reviewed research studies, it’s evident that more research is needed to determine the effects and make recommendations on how to deal with high labour costs in relation to the expected project performance. On the other hand building materials are of various types depending on their cost and sources so besides Makulsawatudom, Emsley and Sinthawanarong (2004), Abdul Kadir et al (2005) and Durdyeu et al (2011) noting that lack of material as a key factor in labour productivity, the types also need to be investigated. The effect of casual or permanent staff and their level of relevant education on project performance need also be investigated.
2.5 Conceptual Framework

**Independent Variables**

**Labour Productivity**

- Type of labour
  - Manual
  - Mechanised
- Material source
  - Local
  - Imported
- Hiring method
  - Permanent
  - Casual
- Level of training of construction officers
  - Skilled
  - Unskilled

**Dependent Variables**

- Performance of building projects
  - Project Cost
  - Project time
  - Project quality
  - Clients’ satisfaction
  - Approval by the county building inspectorate

*Figure 2.1: Conceptual Framework*

*Source: Researcher (2017)*
CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the procedure that was followed in conducting the study. More specifically, the chapter includes a description of the following key aspects: the research design, target population, sample size and sampling procedure, data collection methods, the research instruments, the data collection procedure and finally the method of data analysis.

3.2 Research Design

The researcher used descriptive survey research design. Descriptive study is concerned with finding out the what, where and how of a phenomenon, (Creswell, 2012). This research design was chosen because it enabled the researcher to collect data from the larger population in a short time and economically. It allows one to collect quantitative data which can be analysed quantitatively using descriptive and inferential statistics.

3.3 Target Population

The target population comprised of 65 private developers registered with Kenya Private Developers Association (KPDA), 121 Independent developers with projects valued over 50 million as approved by the County planning department of Nairobi County and, 246 Building
contractors class NCA 4 and above registered with National Contractors Authority 162 Projects Managers registered with the Kenya Association of Project Managers (KAPM).

Table 3.1: Targeted Population

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Developers with KPDA</td>
<td>65</td>
</tr>
<tr>
<td>Project Contractors independent</td>
<td>121</td>
</tr>
<tr>
<td>Building Contractors NCA 4 and above</td>
<td>246</td>
</tr>
<tr>
<td>Project Managers</td>
<td>162</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>594</strong></td>
</tr>
</tbody>
</table>

Source: Researcher (2017)

3.5 Sample Size and Sampling Techniques

The researcher used both stratified and simple random sampling methods to select the list of the independent developers, contractors and project managers who were involved in the current study. Yamane (1967) formula as cited in GFK Polonia (2013) was used to determine the sample size from the population. As with most social sciences, a confidence level of 95% will be assumed (Creative Research System, 2003). For 95% confidence level, the level of significance will be $\alpha=.05$). Based on this assumption, the sample size was computed as follows:
\[
n = \frac{N}{1+N(e)^2} = \frac{594}{1+594(0.05)^2} = 239
\]

N= population, e = level of precision, n = sample. This formula was used to compute the sample presented in Table 3.2.

Table 3.2: Sample Size

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Developers with KPDA</td>
<td>26</td>
</tr>
<tr>
<td>Project Contractors independent</td>
<td>49</td>
</tr>
<tr>
<td>Building Contractors NCA 4 and above</td>
<td>99</td>
</tr>
<tr>
<td>Project Managers</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>239</strong></td>
</tr>
</tbody>
</table>

Source: Researcher (2017)

In this study, two hundred thirty nine respondents were included in the study while twenty respondents were randomly selected before the target population for pre-testing the validity and reliability of the instruments.
3.6 Data Collection Instruments

The researcher used self-administered questionnaires as the main tool for data collection. The selection of these tools was guided by the nature of data that was to be collected, time available as well as the objectives of the study. This enabled the researcher to collect the data over a short period of time (Fisher, 2007). The questionnaire comprised of both closed and open-ended questions drawn in accordance with the set objectives of the study.

3.7 Data Collection Procedure

The researcher collected an introductory letter from Kenyatta University which detailed the purpose of carrying out the study in Nairobi Sub-counties. A research permit was then sought from the Ministry of Science and Technology by the researcher. The researcher personally administered the questionnaires to all the selected Developers, Contractors and Project Managers. Where this was not possible, the researcher distributed the questionnaires to the respondents and collected them later on the agreed date, (Okumbe, 1998).

3.8 Validity

Validity is the extent to which an instrument measures what it is designed to measure. For this the researcher carried out two pilot Content validity tests by administering the questionnaires to a total of 20 randomly selected respondents within the targeted population.
Content-related evidence of validity comes from the judgments of people who are either experts in the testing of that particular content area or are content experts. Since the targeted respondents are knowledgeable stakeholders in building projects, then this test method was considered ideal.

3.9 Reliability

According to Orodho (2009), research instrument reliability is concerned with the how much the chosen instrument will repeatedly give almost same results after several trials on the intended area of study. In this study there was a time interval of two days between the two pilot tests. The scores from each pilot test were documented separately. The Pearson’s Product Moment Formula as shown here below was then applied in order to calculate the correlation coefficient between the tests.

\[ Q = \frac{R \sum fs - \sum f \sum s}{\sqrt{[R \sum f^2 - (\sum f)^2] [R \sum s^2 - (\sum s)^2]}} \]

\( Q = \) Pearson’s Coefficient Correlation

\( R = \) number of respondents that complete the questionnaires

\( f = \) The first administration scores

\( s = \) The second administration scores
A correlation coefficient of 0.83 was derived in this study and was considered high enough to judge the instrument as reliable for data collection (Orodho, 2009).

3.10 Data Analysis and Presentation

After collecting the filled up questionnaires, the researcher went through each one of them so as to check the numbering and confirm that all items were answered to accordingly. The data were checked out one by one, proof read to identify any gaps or unanswered items, checked the spelling and answers for mistakes arising from the respondents. The data were then classified and arranged according to the way they were responded to. According to the intended measurements, the data was then coded and presented accordingly.

Descriptive and inferential statistics was used to analyse the data. Using Central Tendency methods, the researcher was able to identify centrally which independent variable had an influence on the performance of a building project and by use of Standard Deviation the researcher computed the variability of the values around the central variable. The Bar graph and frequency distribution tables were used to present the data. To make the meaning out of the sample, the researcher used inferential statistics in form of a regression model.

According to John et al. (1998) the linear additive model for relating a dependent variable to ‘p’ independent variables is \[ Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_p X_{ip} + n_i. \]
\( i \) denotes the observational unit from which the observations on \( Y \) and the \( p \) independent variables were taken.

The second subscript designates the independent variable.

The sample size is denoted with \( n, i = 1, ..., n \), and \( p \) denotes the number of independent variables.

In this study the researcher used the following multiple regression model:

\[
Z_i = \beta_0 + \beta_1 L_1 + \beta_2 L_2 + \beta_3 L_3 + \beta_4 L_4 + \varepsilon_i \ldots
\]

Where:

\[
\begin{align*}
Z_i & \quad \text{Building project performance} \\
L_1 & \quad \text{Type of Labour} \\
L_2 & \quad \text{Sources of Building material} \\
L_3 & \quad \text{Method of hiring Labour in Building Projects} \\
L_4 & \quad \text{level of training of construction officers}
\end{align*}
\]

\( \beta_0 \) = Constant - the intercept, \( \beta_1, \beta_2, \beta_3 \) and \( \beta_4 \) are coefficients of partial regression coefficients that show how \( Z \) changes with every unit change in \( L \). This regression analysis helped the researcher in understanding how the dependent variable changed when the independent variables were varied (Saunders & Adrian, 2007). Statistical Package for Social Sciences (SPSS) version 21 aided in data analysis.
3.11 Ethical considerations

The sampled respondents were first informed through an introductory letter about the purpose of the study. The researcher also considered the following ethical concerns; informed consent, confidentiality, anonymity/privacy of the respondents and researcher’s ethical responsibility as outlined by Ritchie and Lewis (2003). About informed consent, the respondents were provided with adequate information about the study. They were informed about the benefits of this study to them and the building industry as a whole. On confidentiality, the researcher observed the privacy of information given by respondents and maintaining confidence of all data collected since some of the data was confidential relating to the operations of various organizations under the study. The data collected was analysed and only used for the purpose of this study. For anonymity, real names of the participants or their organization were not recorded. For responsibility, the researcher only collected and analysed data to fulfill the purpose of the study and not shared with any third party.
CHAPTER FOUR

PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the data of the research, followed by analysis, discussions and finally interpretations. The general objective of this study was to establish the influence of labour productivity and its underlying factors on the performance of building projects in Nairobi County. The specific objectives were to: determine the influence of type of labour on the performance on building projects, determine the influence of source of building materials on labour productivity on performance of building projects, determine how method of hiring labour influence the performance of building projects and determine how the level of training of construction workers influence the performance of building projects in Nairobi County, Kenya. The research was also guided by four research questions.

4.2 Response Rate

Of the 239 questionnaires issued to the selected sample, 169 were returned and responded to, yielding a response rate of 71%. Based on the recommendations by Mugenda and Mugenda (2003), the response rate of 71% is good as it is above 70% which is the minimum threshold for analysis to progress. Among specific categories of the respondents the breakdown is as follows: Project Developers with KPDA (73%), Project Contractors independent (71%), Building Contractors NCA 4 and above (74%) and Project Managers (65%). As indicated in
the study results, response rate was not 100%. A random sample of non-respondents reported the major reason for not responding to the questionnaire as being too busy in their work schedules. This information is presented in Table 4.1.

Table 4.1: Questionnaire Response Rate

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Number Issued</th>
<th>Number Returned</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Developers with KPDA</td>
<td>26</td>
<td>19</td>
<td>73%</td>
</tr>
<tr>
<td>Project Contractors independent</td>
<td>49</td>
<td>35</td>
<td>71%</td>
</tr>
<tr>
<td>Building Contractors NCA 4 and above</td>
<td>99</td>
<td>73</td>
<td>74%</td>
</tr>
<tr>
<td>Project Managers</td>
<td>65</td>
<td>42</td>
<td>65%</td>
</tr>
<tr>
<td>Total</td>
<td>239</td>
<td>169</td>
<td>71%</td>
</tr>
</tbody>
</table>

Source: Research Data (2017)

In this study, the overall response rate was above the minimum threshold of 70%, Mugenda and Mugenda (2003) because the majority of respondents (71%) felt that the findings of the study would ultimately benefit the building industry in Nairobi County.

4.3 Demographic Information

In order to gather demographic information from the participants who were selected for the current study, data concerning gender, age, level of education and length of service of participants were collected. The results of findings are presented in the ensuing sub-sections.
4.3.1 Gender of Respondents

Gender information indicates that there were more male respondents (87%) than there were females (13%) in building projects in Nairobi County. This indicates that female participation in building projects is lower than that of males despite their important contributions in the County’s economy. This information is presented in Figure 4.1.

![Figure 4.1: Gender of Respondents](image)

Source: Research Data (2017)

Although gender issues were not the focus of the current study, the trend of non-participation of women in building projects is generally observed in most Africa countries and Kenya in particular. In particular, according to Ngcuka (2015) the empowerment of women and girls is a crucial element in Africa’s quest for inclusive, sustainable growth and development. In Kenya, Gakure (2003) observed that women form the majority of the population, yet they are
not equitably represented in economic activities, either as employees or managers of businesses. For instance, according to Economic Survey of 2005, men accounted for 70% of the wage employment in Kenya. This is above the maximum threshold of two thirds of any gender as stipulated by the constitution.

4.3.2 Age of respondents

Descriptive results as presented in Figure 4.2 indicate that the current age of participants ranged from 18 years to 56 years. It can be noted from the Table that participants with 35-44 years of age were the majority (30.8%) followed by 45-5 years of age (27.1%). This information is presented in Figure 4.2.
Participants with age above 56 years were represented by 19.5% of respondents. Only 5 participants (3.0%) were of age bracket 18-24 years. The findings suggest that age is a factor in building projects with old aged participants showing keen interests. In addition, comparison in the means of ages of both females and males participants using independent T-Test showed significant results at .05 levels (t=.438, d=167, p=.015). The results are presented in Table 4.2.
Table 4.2: Independent Samples Test

<table>
<thead>
<tr>
<th>Age of respondents</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
<th>95% Confidence Interval of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td>.240</td>
<td>.625</td>
<td>.438</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>.145</td>
<td>26.550</td>
<td>.021</td>
</tr>
</tbody>
</table>

Source: Research Data (2017)

These results show that in addition to more male participants engaging in building projects, more males than females will continue to engage in building projects at older age than females.

4.3.3 Length of Service of Participants

The questionnaire utilized with participants in building projects sought information about their length of service in building industry in Nairobi County. This item was intended to enquire about job experience as measured in the number of years worked and to establish whether the acquired experience could influence labour productivity and consequently enhance the performance of building projects in Nairobi County in Kenya. This information is presented in Figure 4.3.
Figure 4.3 Length of Service of Participants

Source: Research Data (2017)

Figure 4.3 shows that a majority of participants (40%) in the building projects in Nairobi County had worked in the industry for more than six years. Only 21.3% of the respondents had worked for less than two years in the building projects. These results imply that majority of the participants, who are all persons at a decision making levels in building projects had worked for an adequate period of time, thus gaining the necessary experience required to enhance labour productivity and consequently their performance.
4.3.4 Level of Education

Regarding the level of education, majority of participants (n=89, 52.7%) had attained a diploma level of education. This level was followed by participants with university education having a bachelor’s degree (n=63, 37.3%). The participants with masters degree were few (10.1%). This information is presented in Figure 4.4.

![Figure 4.4 Level of Education](image)

**Source: Research Data (2017)**

Ch-square test of independent between gender and level of education did reveal significant results at .05 levels ($\chi^2=92.456$, d=2, p =.000). This information is presented in Table 4.3.
Table 4.3 Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>92.456</td>
<td>2</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.633</td>
<td>2</td>
<td>.000</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.656</td>
<td>1</td>
<td>.000</td>
</tr>
<tr>
<td>No. of Valid Cases</td>
<td>169</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Research Data (2017)

These results imply that participants did not spread proportionally across gender and levels of education. More males than females achieved higher levels of education in building projects.

4.4 Descriptive Analysis

The main objective of this study was to establish the influence of labour productivity and its underlying factors on the performance of building projects in Nairobi County. The study analysed descriptive statistics involving the following variables: type of labour, source of building materials, method of hiring labour and the level of training of construction workers and their influence on performance on building projects in Nairobi County, Kenya. A variety of statistical tools were used in the analyses of the data beginning with simple descriptive statistics to complex analyses such as the correlations between the independent and dependent variable, followed by multiple linear regression. The descriptive analyses involved frequency distribution measures, measures of central tendency such as means and measures
of dispersion such as standard deviation. Chi-square were used to test the significance of findings. The chi-square test is a non-parametric statistic that tabulates a variable into categories and computes a chi-square statistic to test the hypothesis that the observed frequency do not differ from their expected values.

4.4.1 Influence of Type of Labour on the Performance on Building Projects

The participants in building projects in Nairobi County were asked to indicate whether type of labour influence the performance of building projects. The responses were measured on a Likert Rating Scale with responses ranging from strongly Disagree to Strongly Agree. The results of findings are presented in Table 4.4
Table 4.4: Type of Labour and Performance in Building Projects

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD 1</th>
<th>D 2</th>
<th>N 3</th>
<th>Agree 4</th>
<th>SA 5</th>
<th>Mean</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Mechanical And Manual Labour Have A Major Influence on Building Project</td>
<td>3%</td>
<td>5.3%</td>
<td>7.1%</td>
<td>37.9%</td>
<td>46.7%</td>
<td>4.201</td>
<td>.99151</td>
</tr>
<tr>
<td>Mechanized Labour Is Cheaper than Manual Labour In Building Projects</td>
<td>10.7%</td>
<td>4.7%</td>
<td>6.5%</td>
<td>35.5%</td>
<td>42.5%</td>
<td>3.946</td>
<td>1.2829</td>
</tr>
<tr>
<td>Mechanized Labour is Faster Than Manual Labour In Building Projects</td>
<td>7.1%</td>
<td>5.3%</td>
<td>5.3%</td>
<td>37.5%</td>
<td>44.4%</td>
<td>4.071</td>
<td>1.1627</td>
</tr>
<tr>
<td>Mechanized Labour Gives Quality Finishes Than Manual Labour In Building Projects</td>
<td>8.3%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>30.2%</td>
<td>54.4%</td>
<td>4.189</td>
<td>1.2000</td>
</tr>
<tr>
<td>Mechanized Labour Satisfy Clients More Than Manual Labour In Building Projects</td>
<td>7.2%</td>
<td>4.7%</td>
<td>1.2%</td>
<td>17.2%</td>
<td>69.8%</td>
<td>4.212</td>
<td>1.184</td>
</tr>
<tr>
<td>Mechanized Labour Makes Projects Approvals Easier Than Manual Labour In Building Projects</td>
<td>9.5%</td>
<td>7.2%</td>
<td>4.1%</td>
<td>32.5%</td>
<td>46.7%</td>
<td>4.000</td>
<td>1.2863</td>
</tr>
<tr>
<td>Average</td>
<td>8%</td>
<td>5.13%</td>
<td>4.63%</td>
<td>31.80%</td>
<td>50.75%</td>
<td>4.1031</td>
<td>1.1845</td>
</tr>
</tbody>
</table>

**Source:** Research Data (2017)


Table 4.4 shows that 84.6% of the respondents agreed that both mechanical and manual labour have a major influence on building project while 78% supported the view that mechanized labour is cheaper than manual labour. These findings concur with studies undertaken by Park, Thomas and Tucker (2005) who noted that whether for the manual or
mechanical type of labour, the overall influence of labour productivity on the performance is a critical issue that project managers and all other stakeholders in a building project must give maximum attention.

A majority of participants (79.9%) as per Table 4.5 also agreed that mechanized labour is faster than manual labour in building projects. According to Waris, Liew, Mohd and Idrus (2014), the utilization of mechanized equipment increases construction productivity and as well as reduces the dependency on foreign labour. In addition, 84.6% of participants agreed that the employment of mechanized labour in building projects in place of manual labour results in better quality work. Unfortunately in Kenya and Nairobi County in particular, due to high unemployment rate majority of the young people find day jobs as casual labourers in construction sites as means of survival. However according to a majority of the respondents, quality of work becomes a concern, Mitullah and Wachira (2003). As a result of such refined work from mechanized labour, more clients get satisfied with such products and this assertion was attested by 87% of respondents.

Finally, 72.2% of participants agreed that because the use of mechanized labour enhances quality of products more than manual labour, mechanized labour makes projects approvals easier than manual labour in building projects. The mean score for responses for this section was 4.1031 which indicate that majority of respondents agreed that the type of labour is key
driver of building project performance. Reason given prominence from the comments in the open ended part of the questionnaire also supported the views that clients are preferring machinery to manual labour since it has two fold advantages: it’s both quick and cheap.

The mean scores for the six items in the Likert Rating Scale ranged from 3.946 to 4.212 with an average mean of 4.1031. Means greater than 3.5 and less than 4.0 implies that the type of labour applied in building projects influenced performance to a moderate extent. Means greater than 4.0 implies that the type of labour influenced performance to a very great extent. Thus, it can be concluded that all the individual items mentioned in the literature influences performance to a very great extent. The standard deviation describes the distribution of the responses in relation to the mean. The standard deviation ranged from .99151 to 1.2863 with an average of 1.1845. A standard deviation of more than one indicates that the responses are evenly distributed. An average of 1.1845 for all statements on type of labour indicated that the responses were evenly distributed in relation to the mean.

4.4.2 Influence of Source of Building Materials on Labour Productivity

The questionnaires contained a Likert Rating scale which consisted of five statements. The responses were measured on a Likert Rating Scale with responses ranging from strongly Disagree to Strongly Agree with SD scoring 1 and SA scoring 5. The respondents were instructed to tick the number which best represented his/her feeling about each statement in
of interest was to seek responses in support or not to the hypothesis that building projects have continued to perform well due the constructs presented in Table 4.5

Majority of participants (66.2%) indicated that the performance in building projects in Nairobi County is to a large extent influenced by the source of building materials. These findings are similar to those of Ghoddousi and Hosseini (2012) who conducted a survey on the top ranked factors that affect labour productivity in Iranian construction projects. They noted that materials/tools includes materials that have not arrived on site yet, shortage of materials on the market, lack of proper tools and equipment on site and equipment breakdown due to aging or poor maintenance. The choice of material source therefore becomes a critical concern considering the procurement processes especially on time for either local or imported. In using imported materials, a majority of participants (86.6%) indicated that artisans charged cheaper for labour, contrary to what they charged in using local materials in building projects. As can be seen in Table 4.6 project artisan are able to work faster with imported materials than local materials and this enhances the performance of building projects. This view was supported by 85.8% of respondents from the comments in the open ended part of the questionnaire.
Table 4.5 Views of Participants on Source of Building Materials

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD 1</th>
<th>D 2</th>
<th>N 3</th>
<th>Agree 4</th>
<th>SA 5</th>
<th>Mean</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Source of Building Materials Has a Major Influence on the Performance of Building Projects</td>
<td>11%</td>
<td>9.7%</td>
<td>13.0%</td>
<td>33.7%</td>
<td>32.5%</td>
<td>3.6686</td>
<td>1.32162</td>
</tr>
<tr>
<td>The Project Artisan Charge Cheaply For Imported Materials Than Local Materials In Building Projects</td>
<td>4.2%</td>
<td>4.7%</td>
<td>4.7%</td>
<td>23.7%</td>
<td>62.9%</td>
<td>4.6509</td>
<td>3.96142</td>
</tr>
<tr>
<td>The Project Artisan Work Faster With Imported Materials Than Local Materials</td>
<td>4.1%</td>
<td>4.8%</td>
<td>5.3%</td>
<td>21.3%</td>
<td>64.5%</td>
<td>4.3728</td>
<td>1.06210</td>
</tr>
<tr>
<td>The Project Artisan Make Best Finishes With Imported Materials Than Local Materials</td>
<td>4.3%</td>
<td>4.7%</td>
<td>4.7%</td>
<td>26.0%</td>
<td>60.4%</td>
<td>4.3373</td>
<td>1.05157</td>
</tr>
<tr>
<td>Clients Are Satisfied With Projects Done Using Imported Materials Than Local Materials</td>
<td>4.0%</td>
<td>4.8%</td>
<td>4.9%</td>
<td>27.1%</td>
<td>59.2%</td>
<td>4.3254</td>
<td>1.04966</td>
</tr>
<tr>
<td>Projects Done Using Imported Materials Meet The Authorities Specification Than Those Done Using Local Materials</td>
<td>6.0%</td>
<td>9.1%</td>
<td>4.9%</td>
<td>21.9%</td>
<td>48.1%</td>
<td>4.3787</td>
<td>1.05718</td>
</tr>
<tr>
<td>Average</td>
<td>6%</td>
<td>6.30%</td>
<td>6.25%</td>
<td>25.62%</td>
<td>54.60%</td>
<td>4.28895</td>
<td>1.583925</td>
</tr>
</tbody>
</table>

Source: Research Data (2017)


Table 4.5 shows that 86.4% of the respondents agreed that project artisans make best products with imported materials than local ones. As a consequence, clients are satisfied
more with projects build with imported materials than the local materials. This opinion was indicated by 87.3% of participants. In addition, it was also revealed from the Table that 70% of respondents indicated that projects done using imported materials meet the authorities’ specification than those done using local materials. The mean score for responses for this section was 4.28895 (STD =1.583925) which indicated that majority of the respondents (80.2%) strongly agreed that source of materials greatly influenced building project performance in Nairobi County. This agrees with Mojekwu et al. findings that the Nigerian Government curtailed activities in cement business when it banned the importation of Portland cement in the country between 2003 and 2007. The found out that although the restraining of the importations was done to protect local manufacturer but then the local manufacturer were not able to produce enough cement that could measure to the demand and as such, the action contributed to the rising cost of the product.

4.4.3 Method of Hiring Labour in Building Projects

An analysis of items presented in the open-ended section of the questionnaires revealed that application of varying methods of hiring labour enhances building project performances. In addition, closed-ended questionnaires utilized with participants endeavored to find out whether methods of hiring labour can influence the performance of building projects in Nairobi County. On average, majority of participants (75.62%) strongly believed that the method of hiring labour greatly influenced the performance of building projects in Nairobi.
County. According to Mitullah and Njeri (2003) methods of hiring labour in building construction in Kenya can be categorized into two major forms: formal (permanent) or informal (casuals). This information is presented in Table 4.6

Table 4.6 Method of Hiring Labour and the Performance of Building Projects

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD 1 (%)</th>
<th>D 2 (%)</th>
<th>N 3 (%)</th>
<th>Agree 4 (%)</th>
<th>SA 5 (%)</th>
<th>Mean</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Method Of Hiring Labour For Building Projects Has A Major Influence On Performance Of Building Projects</td>
<td>3.0%</td>
<td>4.1%</td>
<td>6.5%</td>
<td>36.7%</td>
<td>49.7%</td>
<td>4.2604</td>
<td>.96530</td>
</tr>
<tr>
<td>Use Of Permanent Labour Is Cheaper Than Casuals When Developing A Project</td>
<td>10.7%</td>
<td>5.9%</td>
<td>7.1%</td>
<td>27.8%</td>
<td>48.5%</td>
<td>3.9763</td>
<td>1.32716</td>
</tr>
<tr>
<td>Use Of Permanent Labour As Opposed To Casuals Enhances Speed Of Work And Building Project Time</td>
<td>20.7%</td>
<td>17.2%</td>
<td>7.1%</td>
<td>29.6%</td>
<td>25.4%</td>
<td>3.2189</td>
<td>1.50969</td>
</tr>
<tr>
<td>Use Of Permanent Labour As Opposed To Casuals Enhances Quality Work In Building Project</td>
<td>12.4%</td>
<td>6.5%</td>
<td>6.6%</td>
<td>34.2%</td>
<td>40.2%</td>
<td>3.8343</td>
<td>1.35260</td>
</tr>
<tr>
<td>Use of permanent labour as opposed to casuals satisfies clients more in building project</td>
<td>8.3%</td>
<td>7.7%</td>
<td>65%</td>
<td>43.8%</td>
<td>33.7%</td>
<td>3.8698</td>
<td>1.20301</td>
</tr>
<tr>
<td>Projects with permanent labour as opposed to casuals are easily certified and approved by the approving authorities</td>
<td>15.4%</td>
<td>11.8%</td>
<td>5.9%</td>
<td>25.4%</td>
<td>41.4%</td>
<td>3.6568</td>
<td>1.49223</td>
</tr>
<tr>
<td>Average</td>
<td>11.75%</td>
<td>8.87%</td>
<td>16.37%</td>
<td>32.92%</td>
<td>42.70%</td>
<td>3.80275</td>
<td>1.308332</td>
</tr>
</tbody>
</table>

Source: Research Data (2017)

Table 4.6 shows that majority of respondents (86.4%) agreed that the method of hiring labour for building projects has a major influence on performance of building projects. When cost of labour using permanent labour was compared with cost of labour using casuals, 76.3% of participants agreed that the former is cheaper to adopt. One important aspect of using permanent labor is the project completion time. In this regard, majority of participants (55%) indicated that the use of permanent labour as opposed to casual labour enhances speed of work and thus reduces building project completion time. However, others (37.9%) of respondents had conflicting opinion and did not thus support the fact that permanent labour enhances the speed of work in building projects.

A key indicator of performance in building projects is quality of work. Majority of participants (74.4%) agreed that use of permanent labour as opposed to casuals enhances quality work in building project and as a result, 77.5% of the respondents believe that more clients feel satisfied with the building projects. It was also indicated in Table 4.7 that 75.6% of respondents agreed with the assertion that projects fine tuned with permanent labour as opposed to casual labour are easily certified and approved by the approving authorities. This too was the general observation from the majority of comments to the open ended questionnaires. This concurs with the findings of Pheng (2004) that Quality should be perceived as a critical success factor and be analysed from a new perspective that considers the relationships with traditional key success factors in the construction industry.
4.4.4 Level of Training of Construction Workers in Building Projects

One of the variables that influence the performance of building projects in Nairobi County is the level of training of construction workers. This view was supported by a majority of respondents (81.1%) who indicated that the level of training of construction workers have had a role to play in enhancing performance in building projects (see Table 4.7). These findings are supported by Sugiharto (2003) who conducted a survey to determine the factors related to labour productivity that affect the project schedule performance in Indonesia. He concluded that the most important characteristics of contractors include qualification, quality systems of companies, and ownership. In the current study, the level of training of construction workers was measured by academic level achieved by employees. As presented in Table 4.7 a majority of respondents (79.3%) felt that a project whose workers have good relevant training will cost less. A research conducted by Soham (2013), identified and ranked the factors affecting labour productivity in building projects. He stated that ranking as the most important among the 45 factors identified was the level of training of officers engaged in building projects (Jarkas, 2012).
## Table 4.7 Level of Training of Construction Workers

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD 1</th>
<th>D 2</th>
<th>N 3</th>
<th>Agree 4</th>
<th>SA 5</th>
<th>Mean</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Level Of Training For Workers In A Building Project Has A Major Influence On The Performance Of Projects</td>
<td>5.9%</td>
<td>6.5%</td>
<td>6.5%</td>
<td>23.7%</td>
<td>57.4%</td>
<td>4.2012</td>
<td>1.18311</td>
</tr>
<tr>
<td>A Project Whose Workers Have Good Relevant Training Will Cost Less In Building Projects</td>
<td>5.3%</td>
<td>6.4%</td>
<td>10.0%</td>
<td>35.5%</td>
<td>43.8%</td>
<td>4.0710</td>
<td>1.11042</td>
</tr>
<tr>
<td>A Project Whose Workers Have Good Relevant Training Will Spend Less Time In Building Projects</td>
<td>4.7%</td>
<td>4.7%</td>
<td>4.7%</td>
<td>42.7%</td>
<td>43.2%</td>
<td>4.1479</td>
<td>1.03883</td>
</tr>
<tr>
<td>A Project Whose Workers Have Good Relevant Training Will Have Best Quality Finishes In Building Projects</td>
<td>5.0%</td>
<td>8.8%</td>
<td>6.2%</td>
<td>34.6%</td>
<td>45.4%</td>
<td>4.1775</td>
<td>1.04845</td>
</tr>
<tr>
<td>A Project Whose Workers Have Good Relevant Training Will Best Satisfy Clients In Building Projects</td>
<td>5.3%</td>
<td>8.2%</td>
<td>5.6%</td>
<td>42%</td>
<td>38.9%</td>
<td>4.1006</td>
<td>1.07817</td>
</tr>
<tr>
<td>A Project Whose Workers Have Good Relevant Training Will Easily Meet Authorities Approval In Building Projects</td>
<td>5.3%</td>
<td>4.7%</td>
<td>10.1%</td>
<td>26.6%</td>
<td>53.3%</td>
<td>4.1775</td>
<td>1.13041</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>5.25%</strong></td>
<td><strong>6.55%</strong></td>
<td><strong>7.18%</strong></td>
<td><strong>32.48%</strong></td>
<td><strong>47.00%</strong></td>
<td><strong>4.14595</strong></td>
<td><strong>1.098232</strong></td>
</tr>
</tbody>
</table>

**Source:** Research Data (2017)


As presented in Table 4.7 majority of respondents (85.9%) felt that high level of training of construction workers ensures that projects are completed within the projected time frame as envisaged in the proposed project plan. In addition, 80% of participants were of the opinion
that a project whose workers have good relevant training will have best quality finishes for building projects. Further, as noted by 80.9% of respondents, quality finishes for building projects as result of high level of training is responsible for attracting and satisfying a larger number of clients in building industry. A majority of participants (79.5%) felt that projects whose workers have good relevant training easily meet authorities’ approval in building projects a position also reflected from the comments to the open ended questions by a majority of the respondents.

4.4.5 Building Project Performance Indicators

Cheung, Suen and Cheung (2004) identified various key factors to consider when evaluating project performance. These are the human labour, project cost, and project time, expected and attained quality of workmanship, safety factors and health, environment, client or user satisfaction, and communication. In the current study, performance of building projects was measured using four items: projected budget, projected timelines, projected quality and level of clients’ satisfaction. This information is presented in Table 4.8.
Table 4.8 Building Project Performance

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD 1</th>
<th>D 2</th>
<th>N 3</th>
<th>Agree 4</th>
<th>SA 5</th>
<th>Mean</th>
<th>STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Projects in Nairobi County Done In Last 5 Years Have Been Within The Projected Budget On Account Of Good Labor Productivity</td>
<td>17.8%</td>
<td>15.8%</td>
<td>8.5%</td>
<td>26.6%</td>
<td>31.4%</td>
<td>3.3609</td>
<td>1.51379</td>
</tr>
<tr>
<td>Building Projects In Nairobi County Done In Last 5 Years Have Been Within The Projected Time On Accounted of Good Labour Productivity</td>
<td>24.3%</td>
<td>26.6%</td>
<td>5.3%</td>
<td>25.4%</td>
<td>18.3%</td>
<td>2.8698</td>
<td>1.49032</td>
</tr>
<tr>
<td>Building Projects In Nairobi County Done In Last 5 Years Have Been Within The Projected Quality On Account of Good Labour Productivity</td>
<td>11.8%</td>
<td>7.1%</td>
<td>7.1%</td>
<td>35.5%</td>
<td>38.5%</td>
<td>3.8166</td>
<td>1.33478</td>
</tr>
<tr>
<td>Building Projects In Nairobi County Done In Last 5 Years Have Reduced Client Dissatisfaction On Account Of Good Labour Productivity</td>
<td>12.8%</td>
<td>11.1%</td>
<td>5.3%</td>
<td>30.3%</td>
<td>40.5%</td>
<td>3.8166</td>
<td>1.33478</td>
</tr>
<tr>
<td>Building Projects In Nairobi County Done In Last 5 Years Have Increased Authorities Approval On Account Of Good Labour Productivity</td>
<td>23.7%</td>
<td>23.1%</td>
<td>5.3%</td>
<td>24.9%</td>
<td>23.1%</td>
<td>3.0059</td>
<td>1.53722</td>
</tr>
<tr>
<td>Average</td>
<td>19.65%</td>
<td>16.74%</td>
<td>6.30%</td>
<td>28.54%</td>
<td>30.36%</td>
<td>3.37396</td>
<td>1.442178</td>
</tr>
</tbody>
</table>

Source: Research Data (2017)


Majority of respondents (58%) indicated that building projects that had been undertaken for
the last five (5) years had been within the projected budget on account of good labor productivity. However, 33.6% of participants said that building projects went far beyond the projected budget on account of labour productivity and this affected their performance. In terms of projected time of completion of building projects, participants expressed conflicting opinions. 43.7% of respondents were of the opinion that building projects were completed within the projected time periods. But majority (54%) of respondents indicated that projects are completed within the set deadline of five years after having been subjected to an enhanced labour productivity. These findings are supported by Bryde (2003) who said that Project performance can be said to be the degree to which the project meets its overall objectives. This compares with project management performance which is the degree to which the traditional objectives of cost, time and quality are met.

Although some projects were said not to have been completed within the projected time frame, majority (74%) of participants said building projects undertaken in the last 5 years have been done within the projected quality on account of good labour productivity. Mullins (2005) described performance in building construction projects as the production of acceptable and quality projects. The accomplishment of construction projects or any other task measured against present known standards of accuracy, completeness, cost, and speed. This assertion was however opposed by 19.8% of respondents. This view was shared by Wangui (2015) who noted that in spite of the great importance of individual performance and the increasing use of job performance as an outcome measure in empirical research,
relatively not much effort has been spent onclarifying the performance concept in relation to quality. Furthermore, majority (70.5%) of participants agreed that building projects in Nairobi County done in last 5 years have reduced client dissatisfaction on account of good labour productivity.

4.5 Measurement Model of Performance in Building Projects

When using multiple linear regression models, part of the process involves checking whether there exist a linear relationship between any independent variables (labour productivity variables) and the dependent variable (performance of building projects).

In this study, correlation analysis was used to establish the degree of relationship between two variables with the Pearson correlation coefficient (r), which yields a statistic that ranges from -1 to 1. The correlation coefficient assumes that there is a linear relationship between two variables; one of the variables is the independent and the other the dependent variable. The independent variables of the current study are labour productivity of: type of labour, source of building materials, method of hiring labour and level of training of construction workers. The dependent variable was performance of building projects. Results of correlation analysis between labour productivity variables and performance of building projects variables show positive and significant results. The ensuing sub-sections show this information.
4.5.1 Correlation analysis for Relationship between type of Labour and Performance of Building Projects

To assess the nature of inter-relationships between Labour Productivity Variables and performance of building projects, Pearson correlation was performed. The correlation matrix produced is shown in Table 4.9.

Table 4.9 Correlation Analysis

<table>
<thead>
<tr>
<th>Labour Productivity Variables</th>
<th>Performance Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Labour</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>169</td>
</tr>
<tr>
<td>Source of Building Materials</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>169</td>
</tr>
<tr>
<td>Method of Hiring Labour</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>169</td>
</tr>
<tr>
<td>Level of Training of Construction Workers</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td></td>
<td>.013</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>169</td>
</tr>
</tbody>
</table>

Correlation is significant at .05 levels

Source: Research Data (2017)

Pearson correlation coefficient between the type of labour and performance of building projects ($r=.754$, $p=.000$) shows positive and highly significant results at .05 levels. Table 4.9
also shows the correlation results which indicate that there was a positive and significant relationship between source of building materials and performance of building projects. This was evidenced by the p value of .040 obtained which is less than the critical value (.05). Positive correlations between methods of hiring labour and performance of building projects ($r=0.611, p=.000$) are also found at .05 significant levels. Pearson correlation coefficient between the level of training of construction workers and performance of building projects ($r=0.714, p=.013$) shows positive and highly significant results at .05 levels. This implies that the ability to enhance performance of building projects highly depends on the level of training of construction workers.

The positive association between labour productivity variables and performance of building project measures implies that performance is largely dependent on labour productivity. These findings suggest that stakeholders in building projects in Nairobi County should prior to commencement of any building planning interrogate the labour productivity processes.

4.5.2 Correlation Analysis for Relationship between Sources of Building Materials and Performance of Building Projects

Whilst correlations are a useful research tool for examining the relationships between variables, they provide little information about the predictive power of the independent variables. Thus multiple regression modelling provides the means of testing the predictive ability of independent variables. This information is shown in Table 4.10.
Table 4.10: Regression Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized</th>
<th>Standardized</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficients</td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td>Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>21.146</td>
<td>3.867</td>
<td>12.25</td>
<td>.000</td>
</tr>
<tr>
<td>Type of Labour</td>
<td>.377</td>
<td>.253</td>
<td>.113</td>
<td>1.150</td>
</tr>
<tr>
<td>Sources of Building Materials</td>
<td>.423</td>
<td>.123</td>
<td>.231</td>
<td>.625</td>
</tr>
<tr>
<td>Methods of hiring Labour</td>
<td>.234</td>
<td>.412</td>
<td>.012</td>
<td>.877</td>
</tr>
<tr>
<td>Level of training of officers</td>
<td>.322</td>
<td>.613</td>
<td>.029</td>
<td>.320</td>
</tr>
</tbody>
</table>

Significant at p=.05 levels; $R^2$=66.9%; $F=.835, p=.000$

Source: Research Data (2017)

The multiple regression models results as per Table 4.10 are summarized as:

$$Z_1 = 21.146 + .377 L_1 + .423 L_2 + .234 L_3 + .322 L_4 + \varepsilon_0...$$

The Unstandardized coefficients indicated how much the dependent variable varies with an independent variable when all other independent variables are held constant. The unstandardized coefficient, $\beta_1$, of type of labour is equal to .377. This means that for unit enhancement in the type of labour chosen, there is an increase of performance by a factor of
According to Irene (2008), Construction is a very labour intensive industry as well as a craft-based activity and the behaviour of people who work here has an enormous influence upon the firm’s performance in the projects they are involved in. In addition, for a unit enhancement of the source of material variables, there is an increase project performance by a factor of .423. According Kadir, Lee, Jaafar, Sapuan, and Ali (2005), material shortage at the project site and equipment shortage are major factors affecting labour productivity. Finally, a unit enhancement methods of hiring labour and level of training of construction workers, results to an increase of project performance by a magnitude of .234 and .322 respectively.

The findings also concur with Cunningham (2013) who noted that when a contractor chooses to invest in improving the status of his or her workers by not only good pay but also working conditions normally gains through quality work and a reduced need for supervision. Jarkas (2012) in addition, stated that the most important factor in building projects was the level of training of officers. The results show that the building projects with enhanced type of labour, cheap and quality sources of building materials, improved methods of hiring labour and higher level of training of construction officers all resulted to a positive effect on building project performance. The study findings are consistent with findings of Durdyeu et al. (2011) who noted that Labour productivity is one of the most serious factors that affect the physical progress of any building project.
4.5.3 Correlation Analysis for Relationship between Method of Hiring Labour and Performance of Building Projects

The study further computed the proportion of the total variance on the performance of projects ($R^2$) that was due to the labour productivity variables. From Table 4.14, $R^2 = 0.669$ or $R^2 = 66.9\%$; implying that 66.9% of the variability in the effect on the performance of building projects can be explained from the labour productivity variables. The $R^2$ value (called the coefficient of determination) is the proportion of variance in the dependent variable that can be explained by the independent variables - the proportion of variation accounted for by the regression model. To obtain a better approximation of $R^2$, the researcher determined the adjusted R-square. This information is presented in Table 4.11.

**Table 4.11 Coefficient of Determination**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.817</td>
<td>.669</td>
<td>.653</td>
<td>.323556</td>
</tr>
</tbody>
</table>

*Source: Research Data (2017)*

The inclusion of Adjusted R-square which is an adjustment of the R-squared penalized the addition of extraneous predictors to the model. From Table 4.11, the Adjusted R –Square is .653, which means that 65.3% of the variability on the performance of building projects can be explained from the labour productivity variables.
4.5.4 Regression Analysis for Building Projects Performance - Analysis of Variance (ANOVA)

The $F$-ratio in the ANOVA analysis Table tests whether the overall regression model is a good fit for the data. The result shows that the independent variables statistically and significantly predict the dependent variable ($F = .835, p = .000$) (i.e., the regression model is a good fit of the data). This information is presented in Table 4.12.

Table 4.12 Analysis of Variance

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>46.614</td>
<td>4</td>
<td>11.653</td>
<td>.835</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>2288.523</td>
<td>164</td>
<td>13.954</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2335.136</td>
<td>168</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Performance In Building

Source: Research Data (2017)

From the analysis of variance, there is strong evidence ($F = .835, p = .000$) against the null hypothesis that all the slopes and intercepts are not equal to zero. This implies that there is a significant effect of labour productivity factors on performance of building projects in Nairobi County. The study concluded that all the independent variables have a positive influence on performance building projects. From Table 4.12, the $t$-test values also indicate that the four test variables have a significant effect on building projects performance. Further, it can be seen that the variables were significant at $p = .05$ levels.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The current chapter contains a summary of the findings, conclusions and recommendations of the study. The general objective of this study was to establish the influence of labour productivity and its underlying factors on the performance of building projects in Nairobi County. The study contained four predictor variables namely; type of labour, source of building materials, method of hiring labour and the level of training of construction workers. The outcome or criterion variable was the performance of building projects. The summary, conclusions and recommendations of the study are based on the specific objectives of the study.

5.2 Summary of Findings

5.2.1 Sample Characteristics

The study sampled total of 239 participants. Of the 239 questionnaires issued to the selected sample, 159 were returned and responded to, yielding a response rate of 71%. Among specific categories of the respondents, the breakdown was as follows: Project Developers with KPDA (73%), Project Contractors independent (71%), Building Contractors NCA 4 and above (74%) and Project Managers (65%). The study collected background information concerning the performance of building projects in Nairobi County. The data that were
included in this section comprised of data on gender, age, length of service, and level of education of respondents.

First, gender characteristics revealed that males were more than females indicating that females’ participation in building projects was lower than that of males. Secondly, the findings suggest that age is a factor in building projects with old aged participants showing keen interests. Comparison in the means of ages of both females and males participants using independent T-Test showed significant results at .05 levels (t=.438, d=167, p=.015). Findings of the study showed that majority of participants (40%) in the building projects in Nairobi County had worked in the industry for more than six years. Only 21.3% of the respondents had worked for less than two years in the building projects.

Finally, regarding the level of education, majority of participants (2.7%) had attained a diploma level of education. This level was followed by participants with university education having a bachelor’s degree (37.3%). The participants with masters degree were few (10.1%). Ch-square test of independent between gender and level of education did reveal significant results at .05 levels (χ²=92.456, d=1, p =.000).
5.2.2 Influence of Type of Labour on Building Projects

To explore this variable, six items were used and analysis carried out using descriptive statistics to establish the Influence of type of labour on the performance on building projects. Results of finding shows that majority (84.6%) of the respondents agreed that both mechanical and manual labour have a major influence on building project while 78% supported the view that mechanized labour is cheaper than manual labour. Also a majority of participants (79.9%) also agreed that mechanized labour is faster than manual labour in building projects. In addition, 84.6% of participants agreed that the employment of mechanized labour in building projects in place of manual labour results in better quality work. Finally, 72.2% of participants agreed that because the use of mechanized labour enhances quality of products more than manual labour, mechanized labour makes projects approvals easier than manual labour in building projects. In addition, Pearson correlation coefficient between the type of labour and performance of building projects ($r = 0.754, p = 0.000$) shows positive and highly significant results at .05 levels. In the multiple regression model, the unstandardized coefficient, $\beta_1$, of type of labour is equal to .377. This means that for unit enhancement in the type of labour chosen, there is an increase of performance by a factor of .377. The result also shows that the independent variable statistically and significantly predict the dependent variable ($F = 0.835, p = 0.000$).
5.2.3 Influence of Source of Building Materials on Labour Productivity

To explore this variable, six items were used and analysis carried out using descriptive statistics to establish the influence of source of building materials on labour productivity as a factor in performance of building projects. The results of findings show that majority of participants (66.2%) indicated that the performance in building projects in Nairobi County is to a large extent influenced by the source of building materials. In using imported materials, a majority of participants (86.6%) indicated that artisans charged cheaper for labour, contrary to what they charged in using local materials in building projects. According to 85.8% of respondents, project artisans are able to work faster with imported materials than local materials and this enhances the performance of building projects. The study showed that 86.4% of the respondents agreed that project artisans make best products with imported materials than local ones.

In addition, it was also revealed that 70% of respondents indicated that projects done using imported materials meet the authorities’ specification than those done using local materials. The mean score for responses for this section was 4.28895 (STD =1.583925) which indicated that majority of the respondents (80.2%) strongly agreed that source of materials greatly influenced building project performance in Nairobi County. The correlation results indicated that there was a positive and significant relationship between source of building materials and performance of building projects. This was evidenced by the p value of .040 obtained which is less than the critical value (.05). In the multiple regression model ,the unstandardized
coefficient, $\beta_2$, of Sources of Building materials is equal to .423. This means that for unit enhancement in the Sources of Building materials, there is an increase of performance by a factor of .423. The result also shows that the independent variable statistically and significantly predict the dependent variable ($F = .835, p = .000$).

### 5.2.4 Method of Hiring Labour and Its Influence on the Building Projects

An analysis of five items presented in the questionnaires revealed that application of varying methods of hiring labour enhances building project performances. On average, majority of participants (75.62%) strongly believed that the method of hiring labour greatly influenced the performance of building projects in Nairobi County. When cost of labour using permanent labour was compared with cost of labour using casuals, 76.3% of participants agreed that the former is cheaper to adopt. In this regard, majority of participants (55%) indicated that the use of permanent labour as opposed to casual labour enhances speed of work and thus reduces building project completion time. Also majority of participants (74.4%) agreed that use of permanent labour as opposed to casuals enhances quality work in building project and as a result, 77.5% of the respondents believe that more clients feel satisfied with the building projects. It was also indicated that 75.6% of respondents agreed with the assertion that projects fine tuned with permanent labour as opposed to casual labour are easily certified and approved by the approving authorities.
There was a positive and highly significant result at .05 levels. This shows that the method of hiring labour in building projects is directly related to their performance i.e. building projects’ ability to meet project budget, project time and project quality. In the multiple regression model, the unstandardized coefficient, $\beta_3$, of Methods of hiring Labour is equal to .234. This means that for unit enhancement in the Methods of hiring Labour, there is an increase of performance by a factor of .234. The result also shows that the independent variable statistically and significantly predict the dependent variable ($F = .835, p = .000$)

5.2.5 Level of Training of Construction Workers and Its Influence on Building Projects

The study findings showed that majority of respondents (81.1%) indicated that the level of training of construction workers enhances performance of building projects. A majority of respondents (79.3%) felt that projects whose workers have good relevant training will cost less. In addition, majority of respondents (85.9%) felt that high level of training of construction workers ensures that projects are completed within the projected time frame as envisaged in the proposed project plan. Further, 80% of participants were of the opinion that a project whose workers have good relevant training will have best quality finishes for building projects. Nevertheless as noted by 80.9% of respondents, quality finishes for building projects as result of high level of training is responsible for attracting and satisfying a larger number of clients in building industry. Finally, a majority of participants (79.5%) felt that projects whose workers have good relevant training easily meet authorities’ approval in building projects.
In addition, Pearson correlation coefficient between the level of training of construction workers and performance of building projects ($r=0.714$, $p=0.013$) shows positive and highly significant results at .05 levels. In the multiple regression model, the unstandardized coefficient, $\beta_3$, of level of training of construction officers is equal to .322. This means that for unit enhancement in the level of training of construction officers, there is an increase of performance by a factor of .322. The result also shows that the independent variable statistically and significantly predict the dependent variable ($F = 0.835$, $p = 0.000$)

### 5.3 Conclusions

First, from the results of findings, majority of respondents strongly agreed that both mechanical and manual labour (84.6%), cheap manual labour (78%), high speed of mechanized labour (79.9%), and better quality of mechanized labour (72.2%) all enhanced the type of labour. In addition, Pearson correlation coefficient between the type of labour and performance of building projects ($r=0.754$, $p=0.000$) shows positive and highly significant results at .05 levels. The study can conclude that the enhancement of the type of labour leads to positive performance of building projects in Nairobi County.

Secondly, in the summary of findings, the results showed that majority of participants indicated that in using imported materials, artisans charged cheaper for labour and are able to work faster with results of best products. The correlation results indicated that there was a
positive and significant relationship between source of building materials and performance of building projects. The study can conclude that the enhancement of the source of building materials leads to positive performance of building projects in Nairobi County.

Thirdly, results also show that methods of hiring labour determines the cost of labour, either by using permanent labour was compared with cost of labour using casuals. It was also found out that the use of permanent labour as opposed to casual labour enhances speed of work and thus reduces building project completion time. The results also show that the method of hiring labour in building projects is directly related to their performance. The study can conclude that the enhancement of the methods of hiring labour leads to positive performance of building projects in Nairobi County.

Finally, the study findings showed that majority of respondents indicated that high level of training of construction workers ensures that projects are completed within the projected time frame and with best quality finishes, and satisfies customers more. In addition, Pearson correlation coefficient between the level of training of construction workers and performance of building projects ($r=.714, p=.013$) shows positive and highly significant results at .05 levels. The study can conclude that the improvement in the level of training of construction workers leads to positive performance of building projects in Nairobi County.
5.4 Recommendations

The study findings revealed that the type of labour greatly influences the performance of building projects. In particular, it was observed in the study that mechanized labour is cheaper than manual labour. However, a sizeable number of participants were still applying manual labour as a popular type of labour. This negatively affected performance of building projects in Nairobi County. This study recommends enhanced type of labour i.e. mechanized labour as opposed to manual labour.

The results of findings showed that the performance of building projects in Nairobi County is to a large extent influenced by the source of building materials. For instance, by using imported materials, participants indicated that artisans charged cheaper for labour, contrary to what they charged for in using local materials in building projects. However, there are a number of participants with a quest of using local materials in place of imported material only. The study therefore recommends that those developers interested in enhancing performance in building projects should use a mix of both local and imported materials.

The study findings indicated that the method of hiring labour greatly influenced the performance of building projects in Nairobi County. The study has in particular concluded that the use of permanent labour was preferred to using casuals. The study also established that use of permanent labour reduced the cost of labour and enhanced quality. This study
recommends that developers should thoroughly interrogate the methods of hiring and in specific consider more the use of permanent labour as opposed to casuals. The study findings showed that the level of training of construction workers enhances performance of building projects. However, majority of participants had only attained diploma level of training. The study recommends that all participants should enhance their level of training.

5.5 Suggestions for Further Studies

The study attempted to establish the influence of labour productivity and its underlying factors on the performance of building projects in Nairobi County. Another study should be carried out establish the influence technology adoption in labour productivity and its influence on the performance of building projects in Nairobi County.
REFERENCES


Measurement SIG American Educational Research Association, Vol. 21


PhD Thesis, Department of Building, University of Uyo, Nigeria.


APPENDICES

APPENDIX 1: INTRODUCTION

This questionnaire is designed to collect data that will attempt to determine how labour productivity factors affect the performance of building projects in Nairobi County. Please answer the questions to the best of your knowledge. I do appreciate that the questionnaire will take some of your valuable time. However, without your input, this research project will not be complete. I would like to thank you for your kind consideration.

Yours faithfully

Kuruga Francis Ndegwa

D53/CTY/PT/21573/2012
LABOUR PRODUCTIVITY AND PERFORMANCE OF BUILDING PROJECTS IN NAIROBI COUNTY, KENYA

Building projects are a major investment for all involved stakeholders and especially the developer. In the project’s execution the labour factor is key in achieving the best results against the planned and expected outcomes. This research aims at gaining best management practice for labour related factors so as to attain best project performance on all relevant aspects of the finished units.

Section A: General Information

1. Gender of the respondents  Male [  ]  Female [  ]

2. Age Bracket  18-24 [  ]  25-34 [  ]  35-44 [  ]  44-56 [  ] Above 55 [  ]

3. How long have you worked in Building Projects?
   - Less than 2 year [  ]
   - 2-6 year [  ]
   - Above 6 years [  ]

4. What is your highest level of education?
   - Diploma [  ]
   - Bachelor’s degree [  ]
   - Masters and above [  ]
Section B: Type of Labour and Performance on Building Projects

To what extent do you agree with the following statements on the influence of type of labour on building projects in Nairobi County? Indicate with (√) in the appropriate box.

Key: 1=strongly disagree; 2=Disagree; 3=neither agree nor disagree; 4=Agree; 5=strongly agree

5. A) In building projects, both mechanized and manual labour have a major influence on project performance in Nairobi County

6. To what extent do you agree with the following statements?

<table>
<thead>
<tr>
<th>Statements</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Mechanized labour is cheaper than manual labour in building projects at Nairobi County.</td>
<td></td>
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<tr>
<td>(b) Mechanised labour is faster than manual labour in building projects at Nairobi County.</td>
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<tr>
<td>(c) Mechanised labour gives better quality finishes than manual labour in building projects at Nairobi County.</td>
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<tr>
<td>(d) Mechanised labour satisfies clients’ more than manual labour in building projects at Nairobi County.</td>
<td></td>
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<tr>
<td>(d) Mechanised labour makes project approvals by the approving authorities easier than manual labour in building projects at Nairobi County.</td>
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</tbody>
</table>
7. In your own words how does the type of labour influence Building Project performance in Nairobi County?

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Section C: The Source of Material and Labour Productivity

To what extent do you agree with the following statements on the influence of source of materials on labour productivity in performance of building projects in Nairobi County?

Indicate with (√) in the appropriate box

Key: 1=strongly disagree; 2=Disagree; 3=neither agree nor disagree; 4=Agree; 5=strongly agree

8. The source of building material has a major influence on the performance of building projects in Nairobi County.

1 □ 2 □ 3 □ 4 □ 5 □
9. To what extent do you agree with the following statements?

<table>
<thead>
<tr>
<th>Statements</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a). The projects’ artisan charge cheaply for imported materials than local in building projects in Nairobi County.</td>
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<tr>
<td>(b) The projects’ artisan work faster with imported materials than local in building projects in Nairobi County</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(c). The projects’ artisan make best finishes with imported materials than local in building projects in Nairobi County</td>
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<tr>
<td>(d). Clients are satisfied with projects done using imported materials than local.</td>
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<tr>
<td>(e). Projects done using Imported materials meet the authorities’ specifications better than those done using local materials</td>
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</table>

10. In your own words how does the choice of source of materials influence Building Project performance in Nairobi County?

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Section D: Method of hiring Labour and the Performance of Projects Project Building

To what extent do you agree with the following statements on the influence of Method of hiring Labour on building projects in Nairobi County? Indicate with a (√) in the appropriate box.

Key: 1=strongly disagree; 2=Disagree; 3=neither agree nor disagree; 4=Agree; 5=strongly agree

11. The method of hiring labour for a building project in Nairobi County has a major influence on the performance of that project

1 2 3 4 5

12. To what extent do you agree with the following statements?

<table>
<thead>
<tr>
<th>Statements</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a). Use of permanent labour is cheaper than casuals when developing a project at Nairobi County.</td>
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<tr>
<td>(b). Use of permanent labour as opposed to casuals enhances speed of work and building project time at Nairobi County.</td>
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<tr>
<td>(c). Use of permanent labour as opposed to casuals enhances quality of work in building projects at Nairobi County.</td>
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<tr>
<td>(d). Use of permanent labour as opposed to casuals satisfies clients more in building project time at Nairobi County.</td>
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<tr>
<td>(e). Projects which have permanent labour as opposed to casuals are easily certified and approved by the approving authorities</td>
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</tbody>
</table>
13. In your own words how does the Method of hiring Labour influence Building Project performance in Nairobi County?

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Section E: The Level of Training and Performance of Building projects

To what extent do you agree with the following statements on the influence of level of training of workers on building projects in Nairobi County? Indicate with a (√) in the appropriate box.

Key: 1=strongly disagree; 2=Disagree; 3=neither agree nor disagree; 4=Agree; 5=strongly agree

14. The level of training for workers in a building project at Nairobi County has a major influence on the performance of that project

1  2  3  4  5
15. To what extent do you agree with the following statements?

<table>
<thead>
<tr>
<th>Statements</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a). A project whose workers have good relevant training will cost less in building projects at Nairobi County</td>
<td></td>
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<tr>
<td>(b). A project whose workers have good relevant training will spend less time in building projects at Nairobi County</td>
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<tr>
<td>(c). A project whose workers have good relevant training will have best quality finishes in building projects at Nairobi County</td>
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<td></td>
</tr>
<tr>
<td>(d). A project whose workers have good relevant training will best satisfy clients in building projects at Nairobi County</td>
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<tr>
<td>(e). A project whose workers have good relevant training will easily meet authorities’ approval in building projects at Nairobi County</td>
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</table>

16. In your own words how does the level of training for workers influence Building Project performance in Nairobi County?

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Section G: Performance of Building Projects

17. To what extent do you agree with the following statements on performance of building projects in Nairobi County? Indicate with a (√) in the appropriate box.

**Key:** 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree

<table>
<thead>
<tr>
<th>Statements</th>
<th>1</th>
<th>2</th>
<th>3</th>
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</tr>
</thead>
<tbody>
<tr>
<td>(a) Building projects in Nairobi County done in last 5 years been within the projected Budget on account of good labour productivity</td>
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<tr>
<td>(b) Building projects in Nairobi County done in last 5 years been within the project time on account of good labour productivity</td>
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<tr>
<td>(c) Building projects in Nairobi County done in last 5 years been within the project quality on account of good labour productivity</td>
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<tr>
<td>(d) Building projects in Nairobi County done in last 5 have reduced client dissatisfaction on account of good labour productivity</td>
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<tr>
<td>(e) Building projects in Nairobi County done in last 5 have increased authorities approvals on account of good labour productivity</td>
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18. Comment on your answers above

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