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**ASSESSMENT OF THE MINISTRY OF PUBLIC  
WORKS SUPERVISION CAPACITY IN THE  
CONSTRUCTION OF PUBLIC BUILDINGS IN KENYA**

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**Assessment of the Ministry of Public Works Supervision Capacity in  
the Construction of Public Buildings in Kenya**

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**Thesis Submitted in Partial Fulfilment for the Award of Master of  
Construction Project Management in the Jomo Kenyatta University  
of Agriculture and Technology**

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**DECLARATION**

This thesis is my original work and has not been presented to any other University for award of a degree.

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## **DEDICATION**

To my children,

Joy, Dennis and David.

Be inspired to greater height of academic excellence but in everything, give thanks to

God.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>AAK</b>	Architectural Association of Kenya
<b>BOOM</b>	Building Operations and Maintenance Manual
<b>BORAQS</b>	Board of Registration of Architects and Quantity Surveyors
<b>BQ</b>	Bills of Quantities
<b>CA</b>	Chief Architect
<b>CEME</b>	Chief Electrical and Mechanical Engineer
<b>CS</b>	Cabinet Secretary
<b>COW</b>	Clerks of Works
<b>CPM</b>	Chief Project Manager
<b>CQS</b>	Chief Quantity Surveyor
<b>CSE</b>	Chief Structural Engineer
<b>DCA</b>	Deputy Chief Architect
<b>EE</b>	Electrical Engineer
<b>ERS</b>	Economic Recovery Strategy
<b>GDP</b>	Gross Domestic Product
<b>HRD</b>	Human Resource Department
<b>IEK</b>	Institute of Engineers of Kenya
<b>IQSK</b>	Institute of Quantity Surveyors of Kenya
<b>ISK</b>	Institute Surveyors of Kenya
<b>JKUAT</b>	Jomo Kenyatta University of Agriculture and Technology
<b>LDCs</b>	Less Developed Countries
<b>ME</b>	Mechanical Engineer

<b>MOPW</b>	Ministry of Public Works
<b>PMI</b>	Project Management Standards
<b>PPM</b>	Principal Project Manager
<b>PS</b>	Permanent Secretary
<b>PS'</b>	Principal Secretary
<b>PSA</b>	Principal Supt. Architect
<b>PSE</b>	Principal Supt. Engineer
<b>PSEME</b>	Principal Supt. Electrical and Mechanical Engineer
<b>PSQS</b>	Principal Supt. Quantity Surveyor
<b>QS</b>	Quantity Surveyor
<b>SABS</b>	School of Architecture and Building Services
<b>SE</b>	Structural Engineer
<b>SPM</b>	Senior Project Manager
<b>SPPM</b>	Senior Principal Project Manager
<b>SPSA</b>	Senior Principal Supt. Architect
<b>SPSE</b>	Senior Principal Supt. Engineer
<b>SPSEME</b>	Senior Principal Supt. Electrical and Mechanical Engineer
<b>SPSQS</b>	Senior Principal Supt. Quantity Surveyor
<b>UN</b>	United Nations
<b>WS</b>	Works Secretary

## **ABSTRACT**

Quality supervision is utilization of available resources effectively and efficiently. It has a major influence on the overall performance of building projects. Inadequate supervision, or lack of it cost huge sums of money which can not be divested. It is believed to be one of the major causes of poor project implementation, missed objectives of the projects and project failure in terms of schedule, budget, quality and safety. Consequently, inadequate professional supervision will result in material wastage, re-work, project abandonment or stalling of public building projects. The loss through project failure has a crippling effect on the economic growth of the country and militates against the realization of millenium Development Goals and Kenya Vision 2030. The purpose of this study is to critically assess the efficiency of Ministry of Public Works (MOPW) to supervise public building projects in Kenya, with a view of identifying and prioritizing factors and practices that have the potential for improving supervisory effectiveness in the delivery of public building projects. To achieve the study goal, a survey in a case study design was used. Purposive sampling which is a non-probability sampling technique was used to collect data directly from respondents drawn from MOPW building department, selected client ministries and contractors representatives. Secondary data was obtained from documents obtained from contract office, forward planning and departmental registry. A sample size of 40 respondents comprising Architects, Engineers, assistant Architects, assistant Engineers and clerks of works were used for this survey. The research findings revealed that MOPW organizational structure was not effective in a number of critical areas including teamwork; problem identification, reporting relationship and communication; timeliness, procurement process of plant and equipment; staff stagnation and inflexibility among other areas. The workload is eschewed with a huge staffing gap of 86% . The extent of new technology uptake in project management, supervision and decision-making tools, equipment and techniques is as low as 25%. Further, the study showed that project supervisors, despite having technical training and many years of experience, have had little continuous professional development training.

The study therefore recommends that flexibility be in-built in its organizational structure to enhance inter-linkages between staff. The study also recommends that the Ministry should ensure full implementation of its training policy by objectively identifying the training needs for project supervisors. The trainings must aim at bridging the skill gap of project supervisors on contemporary project management tools and should be done regularly. The study recommends that MOPW develop a comprehensive manual to guide in building projects supervision to avoid subjectivity in supervision and ensure uniform standards and quality in the buildings projects. Further, the study recommends that MOPW incorporate in its systems the principles of project management. Finally, The study recommends that MOPW look for more innovative ways of closing the technical staff gap including re-training the already employed staff to built capacity, employing young staff and ensuring that they are retained to reduce the huge workload currently being witnessed in the ministry.

**Key words:** project management, public building projects, supervision

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Background of Problem**

The construction industry, both public and private sector, is key to economic growth, employment generation and poverty reduction. The industry has a great impact on the economy of all countries. It is one of the sectors that provide crucial ingredients for the development of an economy. According to Chitkara (2004), the construction industry in many countries accounts for between 6% and 9 % of the Gross Domestic Product (GDP) and according to Bhimarayan (2001), it reaches up to 10 % of the GDP of most countries. Active promotion of an efficient and effective construction industry that is comprised of adequately qualified and well-trained practitioners, that reduces waste, and that improves the working environment of its people for better employment and greater productivity, is pivotal for sustained growth of the economy (Fellows *et al.*, 2002). The construction industry is, therefore, an important sector of any economy and a necessary tool for development as it provides infrastructure facilities that support all other sectors of an economy. The number of industries that are within the umbrella of the construction industry are many and varied and governments are known to have cured economic slump by injecting money to the construction industry.

In Kenya, Construction industry accounted for 4.1% of the GDP according to Kenya National Bureau of Statistics Economic Survey of 2012, which is considerably lower than the sub-Saharan average of 6%. Construction projects in Kenya are very important in the economic development (GoK, 2012). An efficient construction sector is a pre- requisite to effective national development since building civil and industrial engineering works are usually a major contributor to Gross Fixed Capital Formation, Gross Domestic Product and National Employment (GoK, 2011). In 2008, the Coalition Government split the Ministry of Public Works from the Ministry

of Roads and Public Works. The Ministry is charged with coordinating the building programme of various Government Ministries and Departments. This coordination is done through design and supervision of New Construction, Refurbishment/Rehabilitation and Maintenance of buildings. The Ministry acts as a Consultant to other Ministries and Departments. The projects range from building offices, houses, Labs, Theatres, foot bridges, installation of electrical mechanical equipments e.g. CCTV, lifts etc. The projects provide accommodation or access as part of the infrastructural development of our country.

The Ministry has several Departments among whose primary objective is to provide client Ministries with suitable accommodation. As per the presidential circular No.1/2008 of May, 2008, Ministry of Public Works is responsible for the following: public works policy; public works planning; Development and maintenance of public buildings; Maintenance of Inventory of Government property; Provision of Mechanical and Electrical building services; Supplies Branch; Coordination of procurement of common user items by Government Ministries; Kenya building Research Centre; Registration of Engineers, Architects and Quantity Surveyors and other public works. The Ministry of Public Works as part of the Infrastructure sector has its vision to provide cost effective worldclass infrastructure facilities and services in support of vision 2030.

Ministry of Public Works functions as stated earlier are faced with many challenges. For example: Reports obtained from the ministry indicate lack of capacity in the implementation of the respective quality control measures hence the issues that deals with quality assurance are left to the public health technicians who are not vast with the construction issues. Despite the high competencies showcased by the majority of professionals in the building department, some of the professionals provide poor services through sealed loopholes of bureaucracy, canvassing, poor decision making, sub standard documentation and unnecessary extension of projects completion time. Other challenges are as a result of external factors, for instance: Global financial

crisis forced the Minister of Finance either cut finance on Government projects or suspend undertaking of any new projects by Ministries (Daily Nation, Wednesday, March 2009)

Provision of public buildings at minimum construction and maintenance costs is key to economic growth, employment generation and good working environment. Despite efforts made by all stakeholders involved in building projects to ensure success in the project delivery, construction projects fail at an alarming rate worldwide – more than 50% by some estimates (Matta and Ashkenas, 2003). Fragmentation of the building supervision process, resulting from different professionals is seen to be the biggest single problem (Hindle, 1996). The construction professionals to a large degree deal with each of their areas of specialization on a project separately and in isolation of each other despite the fact that most of the components are interrelated. Communication breakdowns are common, with clear lack of a shared vision and teamwork. Today's projects are more complex than those of yesterday in terms of their structure, technology and resource demands, their financial and organizational arrangements (Edwards and Bowen, 2005). However, for project success, professionals should not act in isolation but within a well defined and closely knit network.

It is said that project failure is not really the failure of the project itself but that of the project team engaged in the project. Many projects today are so complex that only the most talented teams in terms of supervisory skills have hope of succeeding in its development. (Edwards and Bowen, 2005). Application of project management tools is critical to good project implementation. Lack of adequate planning, scheduling, materials management, quality control and quality assurance are chronic problems of building projects (The Business Roundtable, 1982). The effects of these problems are well known and include low productivity, poor safety, inferior working conditions, and inadequate quality (Koskela, 1993).

Quality management principles and tools are not strongly embedded in conventional construction management practice. As a result, rework, on many cases, is accepted as an inevitable feature of the construction process increasing the likelihood of project time and cost overruns, and ultimately leading to client dissatisfaction. According to Taneja (1994), the costs of rework can range from 4% to 12% of the total budget. A significant part of these costs can be traced back to inadequate supervision and control of quality of materials, misunderstanding of drawing among other factors.

Supervision can help to accelerate the performance of a project, just as it can also help to stifle it, if the project suffers incidence of over-supervision. For it to enhance performance, supervision must be constructive, rather than punitive; it must help to solve problems, rather than see such problems as obstacles or pitfalls of the project and thus, a basis for applying sanctions and withholding disbursements; it must be based on a sense of collective responsibility between the recipient and the funder, shared commitment, and a shared sense of success or failure. Yet, supervision must be rigorous, objective and hard-hitting in its assessment of performance, if need be, but with a view to improving performance rather than building a case to terminate the project. A failed project does neither the beneficiaries nor the funder any good (Nwachukwu *et al*, 2010). The beneficiaries would have lost a stream of benefits expected from the project, if it had succeeded, while the funder would have wasted resources, financial and professional staff time that could have been used productively elsewhere.

In Kenya, the number of public building construction projects is increasing every year with creation of new ministries and government departments (ERS, 2003 – 2007). The growth of the Government Ministries to 42 requires that the Ministry of Public Works increases its capability to provide the desired services. This increase in demand for accommodation of government ministries is not proportional to financial resources, human resources, and plant and equipment resources available to Ministry of Public Works (MOPW). The government of Kenya, through the MOPW and its development partners continue to allocate financial resources every financial year to

finance public building development and other public works but the intended benefits are partly or never realized. The Ministry undertakes many public building construction projects as part of Kenya government development plan. Vibrant and efficient infrastructure base is key because it drives all the other sectors of the economy for sustainable development (Kenya Vision 2030). The construction industry thus has a crucial role to play if this Vision is to be realized.

MOPW use public resources to construct and maintain public building projects and other public works. For this reason, there is increased awareness and growing demand from the general public, taxpayers and ratespayers to see projects completed expeditiously and more accountability put in place, translating to more pressure on public works officials to deliver projects efficiently.

Despite the efforts made by MOPW to deliver on its mandate, public building projects continues to overrun the estimated budget and scope; quality and safety standards have not been fully met; evidence of stalled and abandoned building projects need not be overemphasized. Challenges faced by MOPW range from poor documentation of projects and poor decision making to unnecessary extensions of contract period variations. In the same breadth, few contractors deliberately tender at low rates with the aim to later convass for change in specifications if awarded the contract. This group of contractors frustrates the contract and eventually submits very huge claims. Unethical practices may occur through the use of inferior materials or sub-standard mixtures for example, undersize steel bars, wrong concrete mixes or even poor quality paint.

As earlier stated, MOPW has many challenges including inadequate building project supervision. Unless these challenges MOPW faces are identified and means of mitigation found, the ministry will be incapable of executing its mandate. The MOPW, in an attempt to solve or atleast cope with the many challenges it faces, it develops yearly plans, establishes appropriate structures for its projects, establishes efficient allocation and management of resources, recruits new and young

professionals who brings in new culture and relevant skills to the positions to which they are recruited. However, with increasing construction activity prevailing countrywide, a study to assess the supervision capacity of MOPW in construction of public building projects is therefore warranted.

### **1.1 Statement of the Problem**

In Kenya, MOPW is responsible for the construction and maintenance of government buildings and other public works (BOOM, 2010). In the early days, MOPW implemented its mandate fully because the government comprised of few ministries and departments. The Ministry was thus endowed with resources in terms of human, capital and technological know-how equal to the task. But today, the government has seen growth in terms of the number of ministries and departments, translating to high demand to accommodate the new Ministries and departments. This high demand is however not proportional to resources both financial, human, plant and equipment available to MOPW. In recent years, MOPW sub-contracted 225 stalled projects and 1450 economic stimulant projects all over the country to private consultants. Today, many organizations have embraced the concept of project management because of its systematic approach of managing projects (Morgan, 1987). Effective supervision of building projects is vital for prudent management and delivery of public projects. Wastage of construction materials is a major area of weakness in the management of public building projects. Koskela (1993) states that wastage, repairs and failure in building projects are a function of poor project supervision. In recent years, public sector project management has attracted much attention in the literature. However, almost all papers that have been published in academic journals focus on the public sector in European, North American countries, Australia or New Zealand (Bakhshi, 1991). Project management has also led to many organizations to become more effective and efficient in project delivery. However, implementation of project management tools and techniques in MOPW is still at its early phases of development. The purpose of this study, therefore, was to assess the

supervision capacity of the MOPW to effectively supervise public building projects in Kenya.

## **1.2 Justification of the Study**

The conduct of the study was justified at two levels: policy and academic. At the policy level, the study touches on an industry - construction industry - that is a fundamental economic sector which permeates most of the other sectors as it transforms various resources into constructed physical, economic and social infrastructure necessary for socio- economic development. Thus the realization of Millennium Development Goals and Kenya Vision 2030 partly depends on the existence of a reliable and competitive public construction sector that is capable of delivering quality services and value for money in the development and maintenance of public works.

At the academic level, the study seek to address some of the literature gaps established in the literature reviewed. For instance, that, effective supervision of projects is vital in ensuring prudent management of public building projects and that, Wastage of materials is a major area of weakness in the management of public building projects; and lastly, that according to Koskela (1993), wastages, repairs and failures in building projects are a function of poor project supervision. The author emphasized that wastage beyond permissible limits during construction also brings cost overrun. This study brings out factors for effective supervision of building projects which can be applied to minimise the negative factors earlier mentioned that arise due to poor project supervision.

## **1.3 Objectives of the Study**

### **1.3.1 Overall Objective**

The broad aim of the study is to assess the MOPW supervision capacity in the construction of public buildings, with a view of identifying the challenges that the ministry encounters during the process of supervising the projects.

### **1.3.2 Specific Objectives**

The specific objectives of the study are as follows:-

- i. To examine the MOPW organizational effectiveness in supervision of building projects.
- ii. To examine human resource skills and competencies in the MOPW.
- iii. To evaluate project management and supervisory tools employed in supervision of projects.
- iv. To recommend policy management strategies for effective supervision of public building projects.

### **1.4 Research Questions**

The research objectives stated in section 1.3 above are translated into the following research questions to further examine the problem statement:

*(Objective 1: To examine the MOPW organizational effectiveness in supervision of building projects)*

- 1) Does the MOPW have adequate organizational capacity to supervise building projects?
- 2) Does the current organizational structure enhance efficiency in supervising public buildings projects?

*(Objective 2: To examine human resource competencies (skills) in the MOPW)*

- 1) What are the current competencies (skills) available to MOPW to effectively supervise public building projects?
- 2) What human resource challenges the ministry is facing in supervision of public building projects?

- 3) Is the current annual work load for the ministry achievable using available resources?
- 4) Are the ministry of public works resources strained?

*(Objective 3: To evaluate project management and supervisory tools employed in supervision of projects)*

- 1) What project management tools are available for the ministry to supervise public building projects?
- 2) What supervision tools are available for for the ministry supervision team?

*(Objective 4: To recommend policy management strategies for effective supervision of public building projects)*

- 1) What Policy management strategies for effective supervision of public building projects do you recommend?

## **1.5 Assumptions**

This study has made a number of assumptions in its implementation. The study assumes that access to the projects under investigation, whether successfully completed, stalled or abandoned, will be granted and that the projects have been well documented. The study further assumes that the consultants and contractors who undertook the projects implementation are still in active service/practice and have records of their projects and further still have clear information about the projects.

## **1.6 Significance of the Study**

The results of this study are important as they suggest critical areas for improving the supervision of public building projects thus ensuring delivery of successful project in terms time, budget, quality and safety by MOPW to other Government Ministries and Departments. This fulfills the objective outlined in the Kenya Vision 2030 on

public facilities improvement hence contributing to attainment of rapid socio-economic growth.

Improved construction project supervision will ensure that construction work is done in accordance with project design and specifications, while safeguarding the quality of construction, overseeing the safety of the works, labour and equipment, and providing a cost- monitoring service to the client. Improved site supervision will also lead to less material wastage, repeat works or repairs and total failure in building construction projects.

The findings would assist in developing an appropriate guideline for construction supervision practice for people engaged in the construction industry. This is achieved by picking the most important factors in construction of buildings as identified from the analysed data and putting them together to form coherent guidelines that can be adopted in supervision of public buildings.

The study contributes to the knowledge of the future readership, and as a source of reference for further research in the area of construction management and supervision.

### **1.7 Scope of the Study**

The focus of this study is on assessing the capacity of MOPW to supervise public buildings and it involve the technical staff (Architects, Engineers, Assistant Architects ant Clerks of Works) drawn from MOPW headquarters, Nairobi. Five contractors and five client ministry representatives were also included in the study. The research covered public building projects undertaken by the Ministry of public works between the year 2006 and the year 2012 in the Nairobi region only. This was the period when performance contracting commenced in the ministry and also the period which the Ministry was ranked as one of the worst performing ministries in the country (Public sector reform program,2008). The variable scope covers the

ministry's organizational structure effectiveness, human resource competencies, project management and supervisory tools and the current work load in the MOPW.

## **1.8 Limitations of the Study**

The limitations encountered include non-computerization of the ministry records. The records were poorly kept in the Ministries' headquarters registry, with some documents missing in the shelves/cabinets where they are supposed to be, while others were incomplete. It took the researcher a lot of time to mitigate this problem through clarification to piece-up missing information from data obtained from the interviews. Another limitation is that the study examined the supervision of projects during the execution phase. It did not consider the supervision during the other phases such as, planning, design, and maintenance.

## **1.9 Definition of Key Terms**

### **1.9.1 Institutional Capacity**

The World Bank (2004) defines institutional capacity as the ability of an institution to decide and to pursue its goals, to perform tasks, and to improve performance constantly. Mimba *et al.* (2007) on the other hand define it as the organization's ability to identify problems, to develop and evaluate policy alternatives, and to operate the government's programs. Both the definitions are adopted in this study.

### **1.9.2 Project**

Atkins and Gilbert (2003) define a project as a one-off, temporary activity with a clear start and a clear end; having full or part-time resources clearly assigned to it by resource-owning managers. On the other hand, PMI (1996) define public project as a temporary endeavour undertaken to create a unique product or service, where temporary means that the project has a definite ending point, and unique means that the product or service differs in some distinguishing way from all similar products or services.

Project has been termed as a human endeavour and may legitimately be regarded by its stakeholders as a project when it encompasses a unique scope of work that is constrained by cost and time, the purpose of which is to create or modify a product or service so as to achieve beneficial change defined by quantitative and qualitative objectives (Cooke-Davies, 2001).

Ohara (2005), describes a project as a “value creation undertaking based on specifics, which is completed in a given or agreed timeframe and under constraints, including resources and external circumstances. On the other hand, a project is regarded as a business case that indicates the benefits and risks of the venture, demonstrating a unique set of deliverables, with a finite life-span, by using identified resources with identified responsibilities (Bradley, 2002). The understanding drawn from the above definitions is that a project is considered as an activity with a definite start and end date. It must also have resources assigned to it be it financial, human or capital resources. This is therefore the definition that would be adopted in this study. According to PMI (2004), projects are a means of organizing activities that cannot be addressed within organizations normal operations. Projects are utilized as a means of achieving an organisation’s strategic plan, whether the team is employed by the organization or is contracted to provide the service.

### **1.9.3 Supervision**

Supervision is a process of observing, watching, and directing work, workers and organizations or institutions (Hornby, 1962). Knezevich (1962) perceives supervision in its broadest sense as involving the day-to-day relationships and contacts of varying degrees of formality between an administrator, with responsibility for achievement of any or all institutional objectives and others in subordinate roles in the hierarchy. On the other hand Weiss (2004), defines supervision as a developmental process designed to support and enhance an individual’s acquisition of the motivation, autonomy, self-awareness, and skills necessary to effectively accomplish the job at hand. This study adopts the definition by Weiss (2004).

#### **1.9.4 Supervisor**

Robert (1999) view a supervisor as: Creator of surroundings, a catalyst, and the person in the middle whose main job is to help individual workers achieve organizational goals by showing them how to get the job done with least amount of wasted effort.

#### **1.9.5 Failed Project**

A failed project is defined as any project with severe cost or schedule overruns, quality problems, or one that suffers outright cancellation ( Kaminetzky,1991).

#### **1.10 Study Outline**

This thesis is divided into five chapters. It starts with the introduction of the thesis followed by literature review and research methodology. Subsequently it discusses the results and finally concludes the report with the conclusion and recommendation chapter. A brief summary of these chapters is given below:

##### ***Chapter One: Introduction***

The first chapter gives an introduction about the thesis. It starts by the introduction / background of the problem and then goes on to describe the rationale behind doing this research. Subsequently the chapter discusses the research objectives and the questions that this research addresses. The last section of the chapter gives the scope and limitation of this research.

##### ***Chapter Two: Literature Review***

This chapter discusses the background information found in relevant literature and examines the extent to which previous studies have dealt with the problem identified in the study. Factors related to supervision of Government funded projects in Kenya such as productivity, capacity and workload of MOPW are discussed. Other issues like staffing, organizational structures, project management tools, institutional/

organizational effectiveness and suitability are further discussed. A conceptual framework is developed to fuse together key variables that make an effective supervision of public building projects.

### ***Chapter Three: Research Design and Methodology***

The aim of the third chapter is to explain the research design and methodology that was used to carry out this research. The chapter starts with a discussion on research approach and strategy. Subsequently the argument is made about the selection of an appropriate methodology for this research. This is followed by the discussion on the data collection and analysis techniques. Later the data analysis technique is discussed. The last section of the chapter discusses about the data reliability, validity and replicability.

### ***Chapter Four: Data Analysis, results and discussions***

This chapter is an assessment and analysis of the data collected in chapter three. The research findings are compared to the findings in literature detailed in chapter two. Results arising from the analysis of the data obtained are addressed.

### ***Chapter Five: Summary, Conclusions and Recommendations***

Chapter five discusses the most salient results emanating from the results obtained in the study. Conclusions are drawn based on the obtained results and integrated with existing literature. Moreover, practical implications of the research findings are highlighted and research conclusions and recommendations presented. This will serve as an action guideline to stakeholders in both the public and private construction industry. Areas uncovered in the study, are highlighted and recommendations for future research are outlined.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter provides an understanding to the concept of supervision capacity and the context of supervising public building projects. It focuses on subjects that are available in literature and related to supervision of public building projects. It begins by highlighting building projects supervision in general; Theories of supervision; Attribute of good supervision; Causes and effects of poor supervision of public building projects; and the current practices of building project supervision. The efficiency assessment also looks into the organizational aspects such as institutional/organizational capacity in terms of their effectiveness and productivity, skills of the staff and suitability of organisational structures. Concept of supervision and resources in construction projects are discussed.

#### **2.1 The Concept of Supervision**

In general term, supervision refers to the process of 'watching over' (Thompson and Gilbert, 2011). However, it should not be seen as a process of 'keeping an eye' on staff but as a process used by organizations to maintain the relationship of the organization and its needs on one hand, and the individual and his or her needs on the other. Supervision is the first level of management in the organization and is concerned with encouraging the members of a work unit to contribute positively toward accomplishing the organization's goals and objectives (Harris, 1980). What this means, is that supervisors do not do the operative work but sees that it is accomplished through the efforts of others.

Supervision is a way of stimulating, guiding, improving, refreshing, encouraging and overseeing certain group with the hope of seeking their cooperation in order for the supervisors to be successful in their task of supervision (Ogunsaju, 1983). The term

supervision is derived from the word ‘super video’, meaning to oversee (Adepoju, 1998). It is an interaction between atleast two persons for improvement of an activity. Adepoju (1998) sees supervision as a combination or integration of processes, procedures and conditions that are consciously designed to advance effectiveness of individuals and groups.

Building controls Act 2004, of New Zealand defines supervision in relation to building work as the means to provide control or direction of the building work to an extent that it is sufficient to ensure that the building work is performed competently, and complies with the building consent under which it is carried out. The Act further states that, the extent of supervision will depend on individual circumstances and will require judgment by the licensed building practitioner.

Supervision is getting the job done through others (Eckles *et al.*, 1975). Good supervision must include personal trust, respect and confidence between employees and supervisors. This kind of good supervision will result in an increased desire to work. This would include pressure on the supervisor from one side, where management wants the work done without problems while on the other side, is pressure on the supervisor from the employees who want clean, fair, and consistent leadership.

## **2.2 Construction Supervision**

Baum (1982) writes: “Supervision is the least glamorous part of project work, but in several respects it is the most important”. It is an exercise in collective problem solving, and as such, is one of the most effective ways of ensuring project success. Construction supervision is aimed at ensuring that a high standard of supervision of building project is systematically carried out by the project parties diligently throughout the construction period. Construction supervision is therefore a continuous, participatory process as opposite to traditional supervisory visits which focus more on inspection and fault finding rather than on problem solving to improve performance. These periodic site visits offer little guidance to improve productivity,

site workers are left undirected, with few or no milestones to help them assess their performance, until the next supervisory visit. Motivation is hard to maintain in such an atmosphere. Supervision focuses on the identification and resolution of problems, promote high standards, teamwork and better two-way communication (Marquez and Kean 2002).

Adanan (2006) highlights the importance of client satisfaction in construction as it is an indication that the construction organisation has met the client's expectation. Construction organisations aim at the same targets as adequate staff competency, timely completion, resources supervision and monitoring, quality consciousness and safety compliance.

Inadequate professional supervision of building projects results in material waste, repeat work/rework, low productivity and inadequate quality (Koskela, 1993). Professional construction supervision is about knowledge, expertise and competence as a construction supervisor, with emphasis on professionalism and fundamentals of effective supervision. According to Love et al, (1997), rework is defined as an activity that is deemed to be complete, but not to the satisfaction of the customer. With adequate project supervision, rework which contributes to huge variations, overruns in time, cost and client's dissatisfaction can be avoided (Love et al, 1997).

Construction industry in many developing countries is mainly labor intensive. Most of this labor is unqualified and unskilled and as a result, extra coordination and supervision is needed. According to Betts (1989), the success in project completion relies heavily on the quality of supervision. The quality of supervision is dependent on the supervision skills.

A supervisor is given (delegated) authority and responsibility to plan and control the work of a work unit by close contact (Betts, 1989). Supervisors are managers. According to Eckles et al, (1975), supervisor's major activities focus on leading, coordinating and directing the work of others in order to achieve group goals. In the same vein, Betts (1989) argues that a successful supervisor has to deal with several

skills such as management skills, human skills, and skills in leadership, motivation, communication and organizational behavior.

In Indonesia, construction supervision is a crucial element. The inability of construction supervisors to plan work, communicate with workers and direct activities adequately is fundamentally linked to project failures. These abilities can be improved by formal training (The business Roundtable, 1982). Most project managers argue that formal training can improve the supervisor's skills. However, the majority of supervisors learn their job the hard way; that is making mistakes and then correcting them. Although this system of trial and error, according to Betts (1989), is considered essential part of training, the practical experience must be supplemented by formal training to form a sound working basis.

### **2.3 Productivity in Construction Projects**

Researchers around the world have provided several contributions related to improving the various aspects of construction productivity. In Australia, research work related to factors affecting productivity such as rework and worker's performance and motivation was performed by Edwards and Love (Edwards *et al.* 2007; Love *et al.* 2005). Schwartzkop (2004) stresses the importance of labor productivity in construction as it is the units of work accomplished for the units of labor. Greater productivity is an indication of greater output for the same level of input. In the construction industry, the reciprocal is how productivity is frequently expressed, that is, man-hours per unit of work. Construction organizations need to aim at achieving fewer man-hours expended per unit of work.

Productivity is very important to construction organizations (Ellis and Lee, 2006). Productivity requires efficient reporting in order to identify problems for corrective action. Production is the process of having input of resources at one end and results in output of goods and services at the other end. Ellis and Lee (2006) emphasized that the conversion technology process of the input resources becomes efficient if each resource is provided in the proper proportion and at the proper time. Productivity

indicates the total construction output per worker. It clearly outlines the amount of time taken to complete a unit area of various construction activities. Ellis and Lee (2006) amplify the need for construction organizations to aim at transferring the non productive activities to productive activities in order to produce significant cost savings on the project.

Novakoski *et al.* (1995) amplify the importance of measuring productivity in construction as it provides accuracy in measuring the quantity of works performed and the cost per hour for labor. Construction organizations need to have individuals who can identify and evaluate critical factors which influence productivity that provide a challenge. Every error in productivity estimates causes an inverse effect in the actual cost of labour to perform a scope of work.

In Canada, construction productivity largely depends on the performance of construction workers. The labor force plays a vital role in the construction process. The improvement in construction productivity needs to be achieved through greater resource allocation and human resource efficiency, effectiveness and engagement; increased innovation and technology diffusion (Alberta, 2008). Research performed by the University of Alberta indicated that productivity is a complex issue as many factors influence productivity such as labor, capital, material and equipment. Lack of right materials, tools and equipments, poor communication or relationship between workers and management, disorganized projects, poor supervision, lack of cooperation and communication between different crafts, lack of worker participation in decision making process, and unfair workloads are the some of the factors that affect productivity (Dozzi and Abourizk, 1993).

According to Liberda *et al* (2003), productivity factors can be classified into three broad groups: Human, External, and Management.

- i. Human factors such as worker motivation, worker attitude and morale, worker experience, and worker skills as well as the team spirit.

- ii. External factors such as union rules and influences, adverse weather conditions, noise, dust, radiation, congested work area, change in drawings and specifications, changes in contract, and the nature of project (size and complexity).
- iii. Management factors such as unrealistic schedules, disrespectful treatment of workers, salary and benefits, failure to use worker's skill, incompetent personnel, poor inspection programs, unsafe working conditions, inadequate equipment, inadequate supervision, inadequate communication, lack of worker training and education, lack of procedures for construction methods, subcontracting, lack of detailed planning and non availability of information, materials, tools and equipment.

Hewage (2007) came up with factors affecting productivity and categorized them into nine classes as follows: These categories are: design and changes, worker motivation, inadequate communication, worker skills, non-availability of information, lack of planning, congested work areas, inadequate supervision, and adverse weather conditions.

Aduagyei and Ruwanpura (2008) identified some of the significant situations that create congestion and reduce the productivity of resources in the work area. Some of the critical situations were over stacking of trades, improper activity sequencing, excessive on-site prefabrication & storage of material in the work area and improper planning of the activities with regards to movement of resources in the work area with the progression of the work.

#### **2.4 Supervision capacity of Building Projects**

It is becoming increasingly evident that, inspite of well developed technical expertise in both engineering and architecture, the provision of even basic infrastructure services are proving to be beyond the Capacity of many governments and institutions (WFEO,2010). There is ample evidence that in many nations, including developed

nations, there is a steady loss of informed decision-making capacity where infrastructure and the built environment are concerned. Capacity can be explained better under the following 6 pillars (WFEO,2010).

i. Individual Capacity

This ensures that needs of individual are met

ii. Institutional Capacity

This ensures that there are educational, professional, technical, governance and statutory institutions, systems and support structures in place.

iii. Technical Capacity

This ensures that there are technical standards, codes of practice, technical literature and guidance materials to underpin and support ethical and appropriate engineering and technological procedures.

iv. Decision Making Capacity

This ensures that decision makers have sufficient information and understanding as well as access to knowledge and skills to enable them make informal, logical and rational decision.

v. Funding Capacity

This ensures that adequate and affordable finance is available to enable sustainable solutions and that financial practice is at all times responsible, including adequate revenue streams and where appropriate, even after external funders have withdrawn.

vi. Resource, Equipment, Tools and Supplies capacity

This ensures that there is access to appropriate, affordable and suitable materials, equipment, tools and supplies for the designing, building, implimentation, operating and maintaining of infrastructure.

### **2.4.1 Institutional Capacity**

The World Bank (2004) defines institutional capacity as the ability of an institution to decide and to pursue its goals, to perform tasks, and to improve performance constantly. In a public sector, institutional capacity can be defined as the organization's ability to identify problems, to develop and evaluate policy alternatives, and to operate the government's programs (Mimba *et al*, 2007). ). It is commonly believed that public sector organizations in less developed countries still have a limited institutional capacity (Cassel and Janovsky, 1998; Frischtak, 1994). According to IMF (2003), some of the characteristics of public sector organization with weak institutional capacity are:

- i. Weakness in regulatory practice,
- ii. A low level of public accountability,
- iii. Administrative inefficiencies,
- iv. Limited human resources,
- v. A lack of facilities,
- vi. And insufficient funding

These characteristics lead to situations in which it takes long bureaucratic procedures, with a lack of transparency, to inadequate delivery of public projects ( Mimba *et al*, 2007).

### **2.4.2 Production Capacity**

A common problem that affects project performance in the construction industry is low productivity. For instance, Makulwasawatudom *et al* (2003), identifies 23 critical factors influencing the construction productivity in Thailand. Ten of these were found to be critical: lack of material, incomplete drawing, incompetent supervisors, lack of tools and equipment, absenteeism, poor communication, instruction time, poor site layout, inspection delay, and rework. Mutijwaa and Rwelamila (2007) observed that the South Africa construction industry is under

pressure to improve performance, that is, to deliver projects on time, on budget and to higher standard of quality. They attributed the problem to lack of skilled workers.

Construction in developing countries is characterized by low levels of productivity, overruns and excessive wastages (Al-Momani, 1996). Both housing and public buildings experience delays in completion and face constant modification as work progresses. This proven to be a serious and very expensive problem in Jordan's construction industry (Al-Momani, 1996)

#### **2.4.3 Factors that affect supervision capacity**

i. General incompetence

Poor site management and supervision, slow information flow between parties and poor project management assistance form the basis for this factor. Training skilled human resource in site management is insufficient. Superintendent is often rated on years of experience without updating knowledge. Contractor selection stage must receive more serious consideration. Testing practically contractors' experience and competency through successful projects in the past should have bigger weight in score-scale of contractor selection. Similarity should apply to consultant selection that requires consultants to demonstrate their satisfaction and ability carrying out their role in all project activities (Lo et al., 2006). Communication is a critical success factor of construction project. Setting information flows or communication channels between parties that run effectively to quickly solve differences, difficulties arising during implementation is not too hard or expensive in the IT (information technology) era. Practitioners lack project management skills. Competent project manager and competent project team play a key role in successful project management and in preventing project from delay or extra cost.

ii. Design

In developing countries, going with fast swelling of construction industry, they must take more significant care of design-related problems. Design factor is constituted by three variables namely: mistakes in design, design changes and additional works.

Mistakes in design or poor design come from low-competence of designers. Inspection and approval of design or drawing process has been poor, especially with government-funded projects. Design consultancy organizations have been mushrooming from 2000 but the quantity does not mean the quality. Unrealistic designs lead to changes or owners unclearly specify the scope of project, resulting in projects been delayed or postponed. These have reduced project's profits or have caused extravagance. Lo et al. (2006) have suggested that comprehensive planning, risk assessment is important at the outset of project. Chan et al. (1996) have proposed that design offices should establish a system to control and evaluate variations and an effective contingency plan to deal with unexpected situations. The more the skilled designer has been identified at the tender stage, the less the cost and time have paid for design-related headache arising later (Chan et al., 1996).

iii. Market and Estimate

Shortages of materials, inaccurate estimates and price fluctuations have much effect on construction of projects. Large projects need special materials that must be imported from other countries. In other hand, the fast development of construction industry demanding a large amount of materials such as cement, steel, bricks, etc. have contributed to the shortage of materials and have caused the prices to go up (Kaming et al. 1997). Unreliable material suppliers occasioned the blame for lack of

materials. Many times, the suppliers are profited from materials speculation. The contractors are ultimate party responsible for poor estimation but owners and consultants are also responsible as Long et al. (2004) suggested. Price fluctuation, escalation in most cases, is rather difficult to predict because it is objective. It is principally the results of the high inflationary trend in developing countries or the speculation of suppliers as mentioned.

iv. Financial Capability

Many large construction projects are delayed because of insufficient funds. Owners should prepare an available fund for the project, build financial plan to pay contractor as in contract agreement. On the other hand, contractors must prepare a detail financial plan for project that prove feasibility and it should be submitted and ratified by owner as one of criteria for contract award (Lo et al. 2006).

v. Other Factors

Government-related problems are few. However, corruption, bureaucracy, intricate documentation have still hindered the interest of investors (IER, 2003). The fast development of construction industry demands a large number of workers. Number of construction worker increase year by year following the booming of projects but skilled ones remain inadequacy. The low quality and productivity workers will impact on the progress of projects; especially large construction projects that are complex and required modern technology.

## **2.5 Factors influencing successful completion of construction projects**

According to Greer (1999), a project is successful if it satisfies all three legs of the triple constraint, namely, performance (specification), cost and time. Thomsett (2002) expanded this criteria of success as: “satisfies stakeholder groups, meets

functional requirements, meets quality expectations and requirements, within cost, within deadline, delivers sustained and actual benefits and provides the team with professional satisfaction and learning”. Pinto and Slevin (1987) argue that in spite of extensive research there has been limited convergence on the components and causes of project success. De Wit (1988) make a distinction between project success and project management success. For instance, he contend that project success is measured by comparing the project outcomes to the overall objectives of the project; whereas project management success tends to be measured against the traditional measures of performance, namely, cost, time and quality. In De Wit’s (1988) view, success criteria refer to the measures by which success or failure of a project will be evaluated; whereas success factors are those inputs to the management system that lead directly or indirectly to the success of the project or business.

The failure of any construction project is mainly related to the problem and failure in performance. Many reasons and factors are attributed to such problem. Ogunlana et al, (1996) stated that construction performance problem in developing countries can be classified in three categories: Problems of shortages or inadequacies mainly of resources; Problem caused by clients and consultants and lastly, problems caused by contractor incompetence/inadequacies. Long et al, (2004) remarked that performance problems arise due to many reasons such as incompetent designers / supervisors / contractors among other reasons. Thomas (2002) identified the main performance criteria of construction projects as financial stability, resources availability, management capabilities and the amount of subcontracting.

The factors that influence the success/failure of the project have received attention from a number of authors. Also called critical success factors, researchers have focused on the factors that would have impact on the project outcome (Dvir et al, 1998). Torp et al (2004) agrees that identifying critical success factors and potential pitfalls in project is vital to its performance. Other frameworks for success factors have been developed, mostly highlighting project management in general as noted by Pinto and Kharbana (1995). As Mengesha (2004) notes, there is gradual shift in

focus over time from purely technical issues towards organizational and management issues, significantly, identifying progressive emphasis on such issues as top management support, organizational issues, stakeholder management, coordination and human relations.

The literature on the success factors for public construction projects reveals that very few studies have been taken up and that too they are not focused on individual performance criterion. for example, Jacobson and Choi (2008) and Toor and Ogunlana (2009) identified success factors for overall performance such as specific plan/vision, open communication and trust, political support, expert advice and review, high degree of commitment, clear role and responsibility etc. Hence more awareness of success factors of public projects with specific references to different performance criteria needs to be created among construction professionals. The objectives of public project management is to ensure the success of the project, and this involves not only managing the schedule, cost and quality, generally known as 'Iron triangle' but also satisfying a number of criteria for performance measurement such as no-dispute and complying with safety norms.

## **2.6 Resources for Construction Projects**

Griffith (2000) state that the use of construction resources required planning, monitoring and control of all aspects of a construction projects. The implication for effective management of construction organizations is that the resources must be present and management must have the competencies to manage the construction projects. Further, projects require a technical team that possesses adequate supervisory skills in order to manage site activities. Adequate management/supervision of site activities results in productive and cost effective utilization of plant and equipment. Material wastage is reduced and the labor workforce performs optimally. Smallwood (2006) identifies the following resources for construction projects: Competencies; Finance; Information; Technology; Innovation; Management; Supervision; Labor; Materials and Plant and equipment.

Egbu (1999) states that the acquisition of relevant skills, knowledge and competencies for the day to day management of construction activities, in an increasingly competitive environment, is the overriding concern. The skills are acquired through appropriate education and training. Management is the key which determines business growth (Smit and Cronje, 2002). Rwelamila *et al* (1997), Dlungwana and Rwelamila (2004), agree with this view. They state that there is a need to provide construction organizations with management skills that will enable them to create sustainable employment in the sector. Inadequate management/supervision at all levels of project construction result in longer construction times and bigger supervisory numbers (Proverbs and Holt, 2000).

According to Edwards, Holt and Robinson (2002), plant and equipment in the construction industry is perceived as a means to enhance higher productivity output whilst simultaneously reducing production costs. One key factor that contributes to poor project supervision in construction industry is lack of distribution of information to its intended recipients (Nuntasunti and Bernold, 2006). Effective site information distribution results in the sharing of site issues among the staff of the construction organisation. Cheah and Garvin (2004) argue that no business venture can operate without the consideration of financial issues. According to Steele and Murray (2004), innovation in construction organisations requires individuals to adapt continuously to complex and changing conditions of the industry in order to survive. Burleson *et al* (1998) emphasise the need for possessing multi skilled labour construction organisations. Such labour enables them to apply appropriate skills in more than one work process on a project. According to Chinowsky *et al* (2007) technology in construction is important as it is used in developing integrated solutions that extend beyond the bounds of the construction industry to include participants throughout the design construction interface.

Scott and Assadi (1999) amplify the need for supervision on a construction site to be conducted by a supervising team that maintain good records of what actually takes place during the construction process. Scott and Assadi (1999) define site

supervision as a physical and mental effort applied by a supervisor during the construction process in a leadership position to realise results through other people. McCaffer (2004) identifies planning as an integral part of estimating construction processes and gains as part of production control for evaluating the use of resources in terms of cost, time and planning to formulate cash flow. Site supervision planning deals mainly with labour, production output, and quality. Adequate competency in site supervision by personnel is indicated by using the right labour skills to achieve the best quality product at a maximum production output (Xiao and Proverbs, 2002)

Serpell and Ferrada (2007) indicate the importance of leading in construction as it involves a lead of internal and external work teams to carry out the construction process stages in accordance with the assigned project's human resource plan. Leading in construction at a supervision level entails decision making, communicating, motivating and developing people. McNamara (2008) states that controlling in a construction site includes benchmarking or comparing to a well accepted standard, monitoring and measuring results, comparing the results to the standard and then making adjustment accordingly to get the project back on track for completion as intended. Hejducki (2004) states that adequate organising in construction ensures the continuity of work, workforce, plant and equipment. Organising includes developing relationships and delegating. De Saram (2001) highlights the importance of coordination as an important function in the construction process as it forms a link of all site activities, to meet the project objective. Site supervisors ensures that coordination of activities do not overlap with one another and create confusion.

Fong and Choi (2000) indicate the need to have adequate and suitable resources in construction projects These are physical and human resources. The availability of resources for a particular project depends on the workload during construction. Construction managers need to gauge their workload so that it can equate to their resource capacity.

The factors that would cause insufficient financial Resources, according to Ubaid (1991), include; difficulties in getting loan from financiers and inadequate allocation of government budget. Project funding, foreign currency exchange rate as well as foreign investments and joint venture affect the success of projects in many ways. Delayed financing affects the commencement of the other components leading to overall delay in the project. The structure and timing of financial provision may impose certain constraints on the design and scheduling of the project.

Many developing countries are richly endowed with natural resources but most are also characterized by shortage of resources such as money, trained people, technical 'know how' and appropriate technology (Wells, 1986). Some developing countries promote labor intensive construction to provide social and economic advantages for the population, even though this procedure might hinder the quality and completion of construction projects (Maovenzadeh, 1984). Brandenburg *et al.* (2006) stress the importance of human resources in construction organizations. Construction organizations need to embark on human resource development in their organizations in order to produce comprehensive workforce management strategies in the construction industry. Such will improve the effectiveness and productivity on their workforce through effective supervision and project management. According to Ofori (2001), education and training numbers of personnel at all levels is an important component of construction industry development programmes. It is an advantage to construction organization that has personnel that is comprised of qualified professionals and technicians. It is also an added advantage if the latter are specialists in their categories as they lead construction organization through the use of their tried and tested competencies.

Panushev and Vanderwerf (2004) stress the importance of technical knowledge in construction as it demonstrates knowledge and understanding of the principles of design and construction relating to the chosen field of practice. Technical knowledge requires individuals to apply their knowledge to the design and construction processes. Construction organisations' managers need to advice their workforce on

the selection and application of particular construction processes within their area of experience. Skipper and Bell (2006) amplify the need for improved leadership skills in the construction sector in order to gain recognition within the industry. Such equips professionals in construction organisations with adequate experience filled with new experience and the opportunity to develop people skills. These include job experience, project management experience, formal leadership training, and job assignments.

According to Kaming *et al* (1997), one of the most important factors causing delays in Indonesia is the shortage of resources. A survey by Ubaid (1991) concluded that the contractor's resources are major measures on the contractors' performance. The resources include financial resources, human resources, material resources and plant and equipment resources.

Human resources are arguably the most valuable assets of any organization and obviously constitute the largest corporate investment (Roslender *et al.*, 2009). Employees' skills and competencies have significant bearing on organizations' productivity. Therefore, in order to achieve organizational objectives, there is the need to assess employees' job performance. Performance appraisals are indispensable for the effective supervision and costing of staff (Jabeen, 2011). ). It is an important factor in identifying people's talents and capacities and its results can make them aware of advancements, plans and goals (Hamidi, 2010). Differences in levels of employees' performance are attributed to differences in skill and ability in one part and difference levels of motivation in another (Boachie and Dogbe, 2011). Inadequate skills and ability are usually rectified through training and development while differences in motivation are corrected through appropriate motivational strategies and policies (Soh, 1998). Firms need to challenge their employees to innovate and be creative, and motivate them to upgrade their skills continuously (Kaifeng, Lepak, Jia, & Baer, 2012).

Finance and the way that it is managed is the key determinant of project success. For the public sector, this primarily concerns delivery of the best value within financial limits. project implementation cost includes: determining what resources (people, equipment, materials) and what quantities of each should be used, that is, developing an approximation (estimate) of the costs of the resources needed to complete the project; allocating the overall cost estimate to individual work items; and controlling and management of changes to the implementation budget (Hrebiniak, 2006). When the cost schedule is not being followed, action must be taken to maintain the agreed cost schedule and document all cost changes that occur during the project (Nyoro, Wanjala, Awour, 2001).

Arvanitis & Loukis (2009) referred technology as products, processes, knowledge, instruments, procedures and systems which facilitate the production of goods and services. Byrd, Lewis & Bryan (2006) suggest that technology enhances and maintains communication and accountability during project implementation process. Kenworthy (2012) stated that training of relevant staff to use new systems and programs was relevant for successful implementation of projects.

## **2.7 Research and Development**

Abudayyeh *et al* (2004) stress the need for construction organizations to focus on research and development in order to discover new technologies and materials that improve the methods and processes of construction. Such an initiative requires the development of structured educational programmes at both diploma and degree levels, that are designed to target new engineers and architects who are capable of research. Research in construction organizations allows for the development of new and promising technologies. Construction organizations need to embark on research to increase their competitive potential in innovative projects.

## **2.8 Organization Structure**

In large organizations and under well defined conditions, organizational structure may be bureaucratic. The essential elements of bureaucratic organization are: the use

of standard methods and procedures for performing work and high degree of control to ensure standard performance. Mintzberg (1981) identified two types of bureaucracies. They are standard and professional bureaucracies. The standard bureaucracy is based on efficient performance of routine work. Professional bureaucracy depends upon efficient performance of standardized but complex works that requires high levels of specialized skills. The structure of standard bureaucracy is based on functions, specialization and span of control. According to Luthens (1986), every organization structure contains both centralization and decentralization. Modern organizational structures show a strong tendency towards decentralization.

While recognizing bureaucracy as the most efficient form of organization, and even indispensable for the modern state, Weber, however saw it's weakness as being rigid, impersonal, self perpetuating and empire building, displacement of objectives, cost of controls, and anxiety to improve status (Hicks and Gullet, 1975). Following the above weaknesses of the bureaucratic theory, modern theories are preferred. In modern theory, an organization is defined as a designed and structured process in which individuals interact for objectives (Hicks and gullet, 1975). Notwithstanding the limitations of Weberian bureaucracy, the modern theories are an improvement to the same and compliment it by advocating for flexibility and adaptability to the organizational environment taking into consideration the people.

An organizational structure consists of activities such as task allocation, coordination and supervision, which are directed towards the achievement of organizational aims (Pugh, 1990) Organizational Structure is the pattern or arrangement of jobs and groups of jobs within an organization. This pattern pertains to both reporting and operational relationships, provided they have some degree of permanence (Schlesinger, 2005).

Organizational structure is the explicit and implicit institutional rules and policies designed to provide a structure where various work roles and responsibilities are

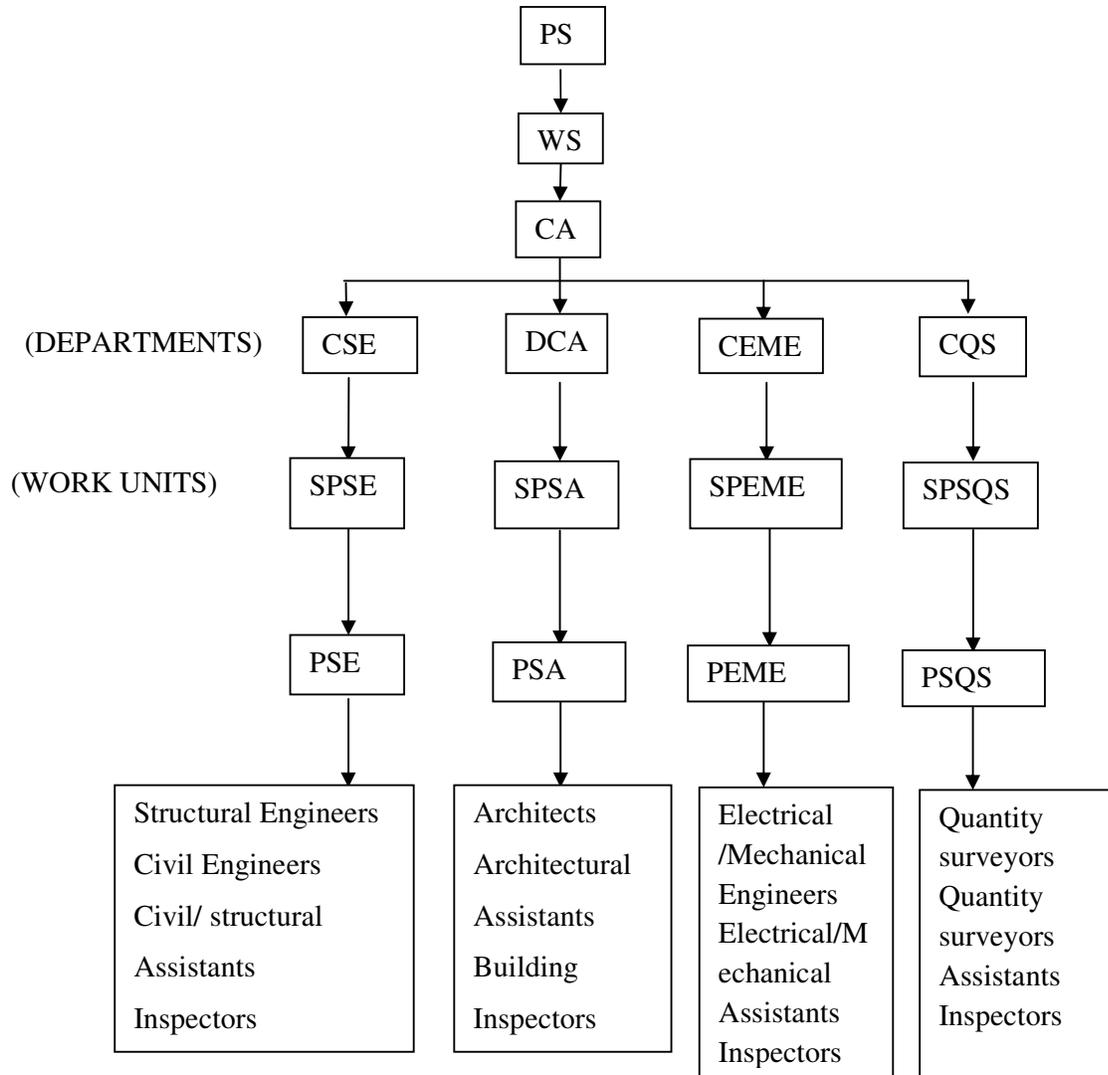
delegated, controlled and coordinated. Organizational structure also determines how information flows from level to level within the company. Thus organizational structure determines how the roles, power and responsibilities are assigned, controlled and coordinated, and how information flows between the different levels of management (Sambrook, 2010).

Luthaus, (2002) defines organizational structure as the ability of an organization to divide labor and assign roles and responsibilities to individuals or groups in the organization as well as the process by which the organization attempts to coordinate its labour and groups.

Wilson and Rosenfeld (1990) define organization structure as the established pattern of relationships between component parts of an organization outlining communication, control and authority patterns. Thus structure distinguishes the parts of the organization and delineates the relationship between them. With regards to the number of levels in the structure of the organization, often referred to as the scalar chain, Drucker (1989) suggests that these should be as few as possible. Too many levels bring difficulties in the understanding of objectives and communicating both up and down the hierarchy.

Figure 2.1 shows the current organizational structure of the MOPW. The current organisation structure, as it is, shows separate independent departments with little or no teamwork.

### Current Organisation Structure



**Figure 2.1 Current Organisation Structure**

**Source: MOPW, 2012**

### **2.8.1 Delegation in Construction projects**

The purpose of a construction organisation's structure is to ensure that work activities are allocated rationally that there are effected links between roles and that work force is properly supervised and coordinated. It facilitates control by creating a communication network of instructions and feedbacks (Fryer, 1985). When designing or improving a construction organisation, project supervisors should ensure, according to Fryer (1985) and Mintzberg (1973), task and responsibilities are allocated to work groups and individuals, which should include directions over work methods and resources; jobs and activities are clearly defined, but are not rigid; Authority is delegated and procedures are set up for monitoring its use.

Supervisors in construction organisations are required to coordinate and utilize all available resources to achieve a particular objective. In order that one person is not overwhelmed by having to deal with too much detail at all levels in an organisation, there must be delegation. Delegation is the process of conferring the authority to carry out certain functions on employees at a lower level of the organisation (Pilcher, 1992). The delegation of a particular authority is one means of securing the coordination of individual effects, by allotting the right to make decisions and to issue instructions governing the work of others.

Some scholars believe that delegation is an aspect of directing people (Fryer, 1995). It involves passing authority down the management hierarchy. The supervisors tells employees what must be achieved but at the same time gives them a degree of freedom to choose their own methodology. Delegation is considered vital to staff development as it provides subordinates with new experience at measured pace suited to their abilities and ambitions (Tannenbaum, 1968).

As Pilcher (1992) observes, delegation is trusting another person to do a job for which you are responsible. The scholar stressed that, to delegate successfully, the supervisor verifies the employee's acceptance of responsibility, specifies a method of

accountability, and establishes authority equal to accountability. On the supervisor's side, supervisors are always accountable for the work of their units. Supervisors are also accountable for the effectiveness of their delegations. On the subordinate's side, subordinates accept responsibility for work assignments and are then accountable for those assignments. According to Betts (1989), it is the job of the subordinate to accept assignments and to report on progress in designated work.

Effective delegation includes defining the objectives, timely feedback, tolerance, and Corrective actions (Mintzberg, 1973). Delegation is shared responsibility, not passed off responsibility. It is achieved by assigning duties, granting appropriate levels of authority to carry out those duties, and create contract to perform. Common barriers to delegation include: lack of confidence, lack of appropriate planning, supervisors loss of job satisfaction (technical aspects), feelings of inadequacy/insecurity, and fear of making errors.

On a construction site, a supervisor cannot be everywhere at the same time while construction activities are executed. This means that a supervisor of construction contracting project needs to trust his subordinates to lead certain activities without him being there. These trustees are workforce foremen and gang leaders. A construction project supervisor develops working relationships with the latter and delegates construction tasks to them (Hejducki, 2004). Task delegation provides the latter with roles and responsibilities to perform site activities. In turn the foremen and gang leaders perform to the best of their abilities in a productive manner to gain full confidence of the supervisor. According to McNamara (2008) delegating is an approach to get things done in conjunction with other people.

A review of the organizational structure of the MOPW, showing how responsibilities are allocated, its reporting relationships, its decision-making authority and whether it has the capacity to handle her mandate. The MOPW was established in the year 1988 after having gone through various changes of name and functions from 1963. Before that time, public works were carried out by the public works department under the

direction of commission of works and subsequently the Director of Works (MOPW, 1974). The organization of MOPW consists of headquarters in Nairobi, eight provincial headquarters and 45 district offices. Currently, there are additional new district offices. The building department came into being in 1970, when the buildings, structural, electrical, contract and quantity surveying branches were incorporated in one department headed by the chief architect. Since 1970, the building department has evolved and now includes the following functions:

- i. Architectural design
- ii. Building maintenance
- iii. Contract and quantity surveying
- iv. Building services (electrical) design
- v. Civil Engineering design
- vi. Structural engineering design
- vii. General administration
- viii. Research and development
- ix. Forwarding planning
- x. Public relations and information

### **2.8.2 Problem Solving in Construction projects**

Unexpected problems are inevitable on construction projects because predictive and preventive techniques can never be perfect (Loosemore, 1994). Most on-site problems go unnoticed at the early stages, they create more trouble later, leading to decreased site productivity and finally schedule and cost overruns (Bennett, 1983). Monitoring and control are attempts to spot problems at execution stage. Key to problem recognition lies in comparing actual progress to planned set goals or targets (Bennett, 1983). Site managers or supervisors are expected to act as trouble shooters by recognising and pinpointing problem before they expand to uncontrollable proportions (Belassi and Tukel, 1996). It is the duty of managers and supervisors to perceive the problem first, then try to solve it and if not, pass it to higher level as

soon as possible (Mastrandrea, 1986). The key lies in the recognition of the problem, the solution comes later. Oglesby et al (1996) categorised such techniques as informal and formal assessment methods.

### **2.8.3 Decision Making in Construction projects**

Decision making is the study of identifying and choosing alternatives based on the values and preferences of the decision maker. making a decision implies that there are alternatives choices to be considered and in such a case, we want not only to identify as many of these alternatives as possible but to choose the one that best fits with our goals, objectives and values (Harris, 1980).

### **2.8.4 Communication in Construction Projects**

The efficiency and effectiveness of the construction process strongly depend on the quality of communication. In literature four reasons are mentioned why improvements in communication are needed. The first reason is that an improvement in the communication within the building team and in the project teams (Thomas *et al* 1998) and between project manager/ project supervisor and contractors, according to Franks (1998), could reduce project failure. Secondly, a more open communication at all levels could lead to innovations (Lenard and Eckersley 1997) and better technical solutions (Sörensen, in Atkin *et al* 2003). Thirdly, communication improvements in early phases of projects would positively influence the quality as perceived by all stakeholders involved (Emmit and Gorse 2003; Brown 2001; Usmani and Winch 1993). Finally, improved communication during the briefing might lead to better decision making, for example less haste in moving to solutions and better ways of looking at the requirements first (Salisbury 1998; Barrett 1995; Nutt 1988 ).

### **2.8.5 Motivation in Construction Projects**

Motivation as defined by the Merriam-Webster dictionary 11th edition is: The act or process of motivating; the condition of being motivated; a motivating force, stimulus,

or influence. Motivation is the most important factor for productivity and quality (Boehm, 1981)

Zhou (2006) performed a study on motivating construction management professionals and concluded that motivation, when it is combined with work experience and education is an important factor in improving performance.

In construction, higher productivity means seeing the final result sooner, which in turn creates satisfaction. Borcharding and Oglesby (1975) reported that job dissatisfaction can be one factor that will increase costs, produce time delays and generally reduce productivity on most types of projects. One way that construction management can influence productivity is by determining how smooth the work will flow and how much work can be accomplished. Another more important way that construction management influences productivity is by how it influence worker's attitude, which is a major element in worker motivation and determining how much work will be accomplished. Promotion of employees is another way of motivation. Promotion may be an employee's reward for good performance, which is positive appraisal. Before an employee is promoted to a particular position, the management ensures that the person is able to handle the added responsibilities by screening the employee with interviews and tests and giving them training or on the job experience. A promotion can involve advancement in terms of designation, salary and benefits, and in some organizations the type of job activities may change a great deal. The opposite of a promotion is a demotion (Hamidi, 2010)).

The productivity of construction workers in developed countries has been extensively explored over the past decades. Borcharding (1975) investigated the effective utilization of manpower in construction. Garner (1981), Maloney (1986) and McFillen (1987) examined workforce motivation and productivity. Motivating is the work managers perform to inspire, encourage and impel people to take action (Allen, 1986). According to Robin and DeCenzo (1995) motivation is the willingness to exert high level of effort to reach organizational goals. Thomas *et al.* (1990)

believes there is evidence supporting the existence of a linkage between an employees' motivational level and their individual performance.

Lam and Tang (2003) amplify the importance of motivating in construction as it is a driving force within individuals that drives physiologically and pursue one or more goals to fulfil their needs or expectations. Motivators may be intrinsic. An example is that of self fulfilment of a worker as a result of performing a task well. construction organisations' management need to ensure that their workforce is highly motivated in order to produce maximum input efforts.

Applebaum (1999) emphasises the need for construction organisations to acknowledge worker satisfaction as it entails values and individual characteristics of workers and the nature and organisational structure of jobs. When the characteristics of individuals interact in a positive way with the characteristics of the job, there is a high degree of job satisfaction. Construction organisations' management need to ensure that worker satisfaction is achieved by formulating job related attributes such as job control by management, worker autonomy, skill levels, specialisation, socialisation on the job, promotional opportunities, hours of work, wage levels and worker decision making.

### **2.8.6 Teamwork Building in construction projects**

According to Chow and Skitmore (2005), the teamwork building process is an important participative initiative as it engages all group members in identifying problems and opportunities. This includes planning appropriate actions, making individual commitment to implement these actions, and conducting appropriate evaluation and feedback activities. Construction organizations need to have experts integrated into a larger task where members need to become increasingly involved in the total work environment. This will result in the workforce working together and by doing so, the sector will achieve its effectiveness.

### **2.8.7 Internal Organizational Factors**

Internal organizational factors also affect the success of project implementation. Managerial factors comprise of human resource, technology and leadership and top management support aspects which involve communication, objectives, goals in relation to project cost and schedule, project sponsorship, lines of responsibility, authority, and accountability, decision making process, training of the local staff for sustainability, and end user participation. Zhang & Banerjee (2003) found that internal organizational factors that influence the sustainability may include sustainability of leadership and coordination amongst an organization's actors.

### **2.9 Understanding Public Sector Organizations**

Public sector organizations are structured as pyramids: the policies and decisions are formulated at the top, responsibilities and tasks are also decided at the upper level of the pyramid and assigned to the lower levels through a hierarchical chain of command.

Power rests at the top of the hierarchy (Sotirakou and Zeppou, 2005). Public sector organizations are different than their private sector counterpart because of the complex organizational environment, goals, structure and managerial values (Boyne, 2002). These variables create differences in how the basic functions of management are carried out in the public and private sector organizations. The table below highlights the key differences in the public and private sector organizations.

**Table 2.1 Differences in Public and Private Sector Organizations**

<b>Public Sector Organizations</b>	<b>Private Sector Organizations</b>
<b>Ownership:</b> Public sector organizations are owned collectively by members of political communities	Private sector organizations are owned by entrepreneurs or stakeholders (Rainey et al., 1976)
<b>Funds:</b> Public sector organizations are funded largely by taxation from public	Private sector organizations are funded by the fees paid directly by customers (Walmsley and Zald, 1973)
<b>Control:</b> Public sector organizations are controlled predominantly by political forces	Private sector organizations are predominantly controlled by the market forces (Dahl and Lindblom, 1953)
<b>Complexity:</b> Public sector organization faces a variety of stakeholders	In the private sector organizations the stakeholders are limited than the public sector organizations (Metcalf, 1993)
<b>Permeability:</b> Public sector organizations are open systems that can be easily influenced from external events	Private sector organizations may ignore the demand from external parties towards policy formulation and implementation (Ring and Perry, 1985)
<b>Instability:</b> Public sector organizations are more influenced by the political instability	Private sector organizations are less influenced or affected than their public sector counterparts (Bozeman, 1987)
<b>Competition:</b> Public sector organizations have less competitive pressure	Private sector organizations have more competitive pressure (Boyne, 1998)
<b>Goals:</b> Public sector organizations have distinctive and multiple goals imposed upon them by the numerous stakeholders that they must attempt to satisfy.	Private sector organizations have more focused goals (Flynn, 1997)
<b>Structure:</b> Organisation in the public sector have more formal procedures for decision making and are less flexible and more risk averse	Private sector organizations are flexible in their decision making and are less risk averse than their public sector counterparts (Bozeman and Kingsley, 1998)
<b>Red Tape:</b> The red tape implies an unnecessary and counter-productive obsession with rules rather than results. Public sector organizations are rigid in following the rules	The private sector organizations are not that rigid in following the rules and processes as does the public sector they are more concerned with the results and outcomes. (Bozeman and Scott, 1996)
<b>Autonomy:</b> Managers have less freedom to react to the circumstances	Much more freedom than their public sector counterparts (Allison, 1979)
<b>Managerial Values:</b> Less materialistic	More materialistic (Pratchett and Wingfield, 1996)
<b>Commitment:</b> Stronger desire to serve the Public	More concerned with the demand of the individual customer (Perry and Porter, 1982)

Source: Boyne, 2002

Spittler and McCracken (1996) perceive that most public sector organizations are functionally divided and bureaucratic. They further state that this division into functional areas can be for a variety of reasons. One obvious reason is that it maintains specialization. Sometimes it is undertaken to segregate the steps in procurement and sometimes to maintain the chain of command. This is done for the reason that the responsibility is readily understood and accountability is easily traced. In addition to this the process of conceptualizing, funding, designing, constructing and operating a project involves functional division of the organisation (*ibid*).

## **2.10 Project Management Techniques**

The foundation of the project management can be traced back to as early as civilization itself (Cooke-Davies and Arzymanow, 2003). Modern project management has its roots in the Second World War and is developed in construction and defence industry during the industrial revolution. Various scholars have written on project management in general. They have at different times pointed out the centrality of efficient project management to the success of an organization (Barriere, 2003). Although many studies have been done on project management, yet the issues of project management techniques and performance in the construction industry in less developed countries where skills have not been successfully developed in its project management related workforce appear to be quite limited. Abbassi et al., (2000) asserted that the state of project management practices in developing African countries is still in its early phase of development. While Sukhoo (2004) was of the opinion that this is partially due to the fact that developing countries are faced with shortage of skilled staff, difficult economic and social conditions, and weak political institutions.

Project management in any organisation lies at two levels, namely, the macro and the micro levels (Lewis, 2002). On the macro or broader level, an organisation is motivated to implement project management techniques to ensure that what is undertaken, small or major, is delivered on time, within budget and to specified

standards. On the micro level, project management has the objectives of: Making the project workplace conducive to teamwork; Ensuring that deadlines are met; reducing cost and operating within real-time basis; and lastly ensuring that important documents and information is shared among members of the team. Most recently the demand for project management has increased as number of projects is increased dramatically in a broad range of industries (*ibid*). Project Management is expressed as planning, organizing, monitoring and controlling of all the aspects of a project and the motivation of all the involved stakeholders to achieve the project objectives safely and within agreed time, cost and performance criteria. (APM, 1995). According to Azzopardi (2009), the discipline of project management is the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, and quality and participation satisfaction. Project management is an application of knowledge, skills, tools and techniques to project activities to meet project requirements. This is accomplished through the application and integration of the project management processes of initiation, planning, executing, monitoring and controlling (PMI, 2004). According to Ohara (2005), Project management is also articulated as a professional's capability to deliver, with due diligence, a project product that fulfils a given mission, by organizing a dedicated project team, effectively combining the most appropriate technical and managerial methods and techniques and devising the most efficient and effective breakdown and implementation routes.

In the early days, project management was solely concerned with the implementation of single project (Kartam *et al*, 2000). But today, many organizations have embraced the concept of project management. This is mainly because of its systematic approach of managing the projects (Morgan, 1987). It's a way to generate consistent results when undertaking new initiatives and a powerful business tool that can transform an organization's ability to perform well (Artto *et al*, 2008). Project management can also be used throughout the organization to boost personal and

collaborative productivity. This can be done by building a standardized system that embeds best practices into the way projects are managed (Milosevic and Patanakul, 2005).

In less developed countries, the implementation of project management tools and techniques is still in its early phases of development. It is a relatively modern practice that attempts to achieve planned objectives within specific time and cost limits, through optimum use of resources and using an integrated planning and control system (Abbasi and Al-Mharmah, 2000). According to Schlichter (1999) project management has led a number of organizations to be more effective and efficient in delivery of their products and services, to have more accurate budgeting and scheduling and improved productivity.

In recent years, public sector project management has attracted much attention in the literature. However, almost all papers that have been published in academic journals focus on the public sector in European, North American countries, Australia or New Zealand (Bakhshi, 1991). There is little literature available about the project management in the public sector of less developed countries (Abbasi,2000). Fellows *et al.* (2002) state that construction management entails the management of the business of construction as well as the management of projects, which in practice are interdependent. According to Smallwood (2006), there are nine recognized construction management functions applicable to all organizations. The functions include: General management, technical or production, procurement, marketing, financial, human resources, public relations, legal, administration and information technology. The general management function in turn, is constituted by the five functions of management work, namely planning, organizing, leading, controlling, and coordinating (Allen, 1973). Planning includes forecasting, developing procedures, and developing policies. Allen (1973) continued to describe the functions of management as: Organizing includes developing organization structure, delegating, and developing relationships. Leading includes decision-making, communicating, motivating, selecting people, and developing people, and controlling

includes developing performance standards, measuring performance, evaluation performance, and correcting performance.

Hutchings and Christofferson (2001) state that quality workmanship and products, customer communications and relations, teamwork, work ethic and commitment are success related factors in terms of the management of construction. Jacquet (2002) reinforces the importance of competencies and states that in order for an incumbent to perform in a chosen operating field of expertise, an adequate qualification relative to the field of expertise, and adequate qualification relative to the relevant industry is a pre-requisite.

According to Gamble (2004), construction management competencies complemented by adequate resources, yield successful construction results. This includes personnel who possess adequate construction-related qualifications, and the relevant management and technical skills. Furthermore, argued Gamble (2004), implementing the right technology is critical to an organization's success, and sustaining a skilled, highly educated and motivated knowledge workforce is equally a valuable asset.

Rwelamila (2002) states that lack of construction related resources in local construction organizations results in an unhealthy dependence on established organizations. Ngowi and Ofori (2001) agree with this in that they state that the situation facing the South African construction industry is related to financial factors. Proverbs and Holt (2000) mention the use of inadequate supervision personnel at a construction site as the main contributory factor to failure in construction. Incompetent supervision does not know how to plan, lead, control and organize construction site activities. Such incompetency leads to quality that is compromised due to non conformance with specification by inadequately trained supervisory staff (Ncwadi and Dangalazana, 2006).

Fischer *et al.* (2005) stress the need for construction contracting organizations to possess project management technology in order to control project budgets and schedules. Such acquisitions stimulate the development of better project management

methods and supporting tools for the construction industry. Adequate project management in construction organizations needs to focus on the improvement of planning and execution of Building construction programmes. This includes the project manager's goal commitment, experience, project planning efforts, teambuilding and scope definition (Fischer *et al.*, 2005).

## **2.11 Project Supervision Tools**

Supervision tools include: Project specifications; Supervision Manuals; Bills of Quantities; and Project Drawings. These tools ensure that:

- i. Activities implemented are in accordance with the approved project plan or work program.
- ii. Resources are effectively and efficiently utilized.
- iii. Designs, specifications and implementation schedule are followed to ensure timely delivery of outputs.

### **2.11.1 Project Specifications**

Every construction project has its specifications, which define a major part of the contractual obligations of contractors and communicate the clients' technical requirements in a textual mode. Despite their importance, insufficient attention has been devoted to the production and use of specifications. This has given rise to problems of misinterpretation, lack of coordination, substitutions, lack of enforcement, and non-compliance, resulting in claims, delays, and sub-standard construction. Many contractors admit that they do not read the specifications while they price for the works and seldom do so during construction (Duell 1985, Stitt 1992, Matthews, Pellew, Phua and Rowlinson 2000 and Gelder 2002). Litigation often arises from ambiguous and inaccurate specifications (Wyatt, 1999). Poorly specified details may affect constructability on site.

To forestall the possible and often legitimate claims from contractors, some consultants have included a so-called "buildability" clause in construction contracts

to make contractors responsible for documentation risk, by guaranteeing that they can build from the documents, which includes drawings and specifications (Campbell 1998).

Rosen (1998) states that construction standards are made part of the construction specification by a reference, and the whole standard, with all its provisions, becomes part of the specifications as if it were reprinted in its entirety. A reference in project specifications to a standard saves the specification writer the time of writing a detailed set of requirements. Standard specifications normally results from a determined action to select, from a number of available solutions to a general and repeating problem. Construction organizations need to be conversant with the standard specifications in order to establish a common ground by which a product may be evaluated and measured for its performance.

### **2.11.2 Supervision Manuals**

Supervision manuals are intended to guide the implementing agencies about the procedures to be followed during any construction activity. International labour organisation (ILO), (1984), on management of construction projects; indicated that, the purpose of a supervision manual is to provide supervisors of building projects works with an easy step by step guide, which at the end, will ensure that building construction works are carried out to the specified standards, not only in respect of quality of works, but also in respect of construction methodology used.

### **2.11.3 Contract Documents**

Levy (2002) states that a construction contract document includes the general, supplementary, and special conditions. These important contract documents contain conditions, elaborations of each party's duties, rights, and obligations so necessary for the intelligent and professional administration of the construction project. According to Murdoch and Hughes (2000), contract administration includes the measurement of work completed, processing of interim progress payments, reporting

on progress and cost, attendance at meetings, and reviewing the contractor's programmes. During the construction phase, contract administration ensures that the contract work is carried out in accordance with the appropriate quality requirements. It is these quality requirements that construction organisations need to aim to achieve in order to sustain their businesses.

#### **2.11.4 Project Drawings**

Construction drawings are vital tools that contractors and supervisors need to complete a building project. Construction drawings are necessary for every project and have multiple users as well as multiple uses. Construction projects come in all shapes, sizes, and complexity. Larger projects have more drawings while small projects have fewer drawings. Construction drawings must be detailed, accurate, neat, and complete

The purpose of preparing a complete set of construction drawings are:

- Help the client to envision the entire project.
- Assist in planning and estimating the cost and time for the project.
- Prevent unpleasant surprises and last minute changes.
- Provide all parties involved (clients, contractors, inspectors, plan reviewers, etc.) with clear instructions regarding layout, materials, and the expected finished product.
- Expedite the plan review process.

#### **2.12 The Attributes of a Good Supervision**

Construction manager's and supervisor's jobs are demanding, complex and varied and are heavily dependent on their managerial skills so that they can deliver projects effectively and efficiently to clients (Akintoye, 1998). Hammer and Champy (1993) suggested that training increases skills and competence and teaches employees the 'how' of a job. According to Gale (2000), training improves the persons ability to perform productively in the early months of employment.

As suggested by Sears and Clough (1991), construction managers and supervisors must possess three attributes. First, they should have practical experience. Without such a basic grounding of construction fundamentals, the construction manager/supervisor would be unprepared to carry out their task and responsibilities. Secondly, supervisors must be familiar with various tools and techniques for planning, scheduling and controlling construction operations. And thirdly, the supervisor must have personality and insight that will enable them to work harmoniously with other people (teamwork). After all, supervisors must acknowledge that they cannot achieve everything through their own efforts alone but be able to work with and through other people to perform their duties. Backs and Saunders (1998) states that Engineers need to possess an array of skills (personal, business and technical), as they are required to deal with people at strategic, technical and operational levels.

According to Thompson and Gilbert (2011), getting the best out of staff owes so much to the skill and commitment of the supervisor. An effective supervisor is able to create win-win situations where everybody is happy: the employee fulfils their potential; the employers get the best return on their investment; and people who use the organization's services benefit from the quality of the staff member's practice. Thompson and Gilbert (2011) further observed that supervision is not simply a matter of making sure that the supervisee is doing their job properly but also involves helping staff to achieve the best quality of work that they are capable of by maximizing learning, promoting high levels of well-being and addressing any conflicts, tensions or other obstacles to optimal practice. In the same vein, Akintoye (1998) agrees that effective supervision pays dividends for all people involved in a building project in terms of: Higher standards of work; higher levels of job satisfaction; a better working environment; and fewer mistakes or difficult situations to deal with.

### **2.13 Effects of Poor Supervision**

In the absence of adequate supervision, some contractors end-up doing sub-standard work by engaging in unethical practices thereby compromising the quality of end product. This has contributed, among other factors, to collapsing of buildings, stalling and abandoning of building projects, not to mention the amount of rework, repeat, repairs and material waste. Loss of life and property are also attributed to inadequate supervision. Added cost of rebuilding the projects usually results in cost overrun.

A number of studies have been conducted to examine factors impacting on project performance in developing countries. Faridi and El-Sayegh (2006) reported that shortage of skills of manpower, poor supervision and poor site management, unsuitable leadership; shortage and breakdown of equipment among others contribute to poor project delivery. Hanson *et al* (2003) examined causes of client dissatisfaction in the South African building industry and found that conflict, poor workmanship and incompetence of contractors to be among the factors which would negatively impact on project performance. Mbachu and Nkando (2007) established that quality and attitude to service is one of the key factors constraining successful project delivery in South Africa.

According to Hindle (1998), the differences among the specialist consultants involved in a project are over-emphasized with the result that major discontinuities are created by the focus on function rather than process. For project success these professionals should not act in isolation but within a well defined and closely knit network.

Today's projects are more complex than those of yesterday in terms of their structure, technology and resource demands, their financial and organizational arrangements (Edwards and Bowen, 2005). There is the common belief amongst many professionals that they can effectively manage projects from their offices thousands of kilometers away. For example, Broome (2005) says, "We were building

in a country with limited resources. It was a long way from home and we were visiting site once a month". This project is flawed from the beginning and the consequences would be inevitable.

#### **2.14 Impact of Inefficiency in Building Project Supervision**

Inefficiency in building projects supervision have both economic, social and environmental impacts (Modak & Biswas, 1999). Some of the economic and social impacts includes:

- i. Contract delays which has adverse effects on both the Owner and the Contractor either in form of lost revenue or extra expenses as reported by Abbas (2006).
- ii. Supervision inefficiency leads to cost overruns. This occurs when the final cost of the project exceeds the original estimates (Arhar and Farouqi,2008).
- iii. Client's dissatisfaction is another product of inefficiency in project supervision. This occurs due to poor workmanship, poor use of specifications among other factors as argued by Hanson et al. (2003).
- iv. Increased rework costs as a result of many supervisors inability to plan work, communicate with workers and direct activities adequately is another impact of project supervision inefficiency (Love et al. 1997)
- v. Inefficiency in project supervision will lead to low productivity, poor safety, inferior working conditions and inadequate quality as reported by Koskela (1993).
- vi. Another impact of inefficiency in projects supervision is material waste as argued by Love at el. (1997).

While buildings provide countless benefits to society, they also have significant environmental and health impacts (WHO, 2000). Some of environmental impacts of inefficiency in building projects supervision includes:

- 1) Damage to waterways and wetlands as reported by Murnane (2006).

- 2) Air and noise pollution as argued by Birley (1995). WHO (2005), observed that approximately 1.6 million people die every year due to air pollution caused by poor air quality alone.
- 3) View quality (visual impact) is seriously deteriorated as observed by both Miller,(2001) and Ciem (2003).
- 4) Interruption or modification of natural drainage and the general landscape is significantly changed (Miller, 2001).
- 5) Soil erosion as indicated by (HU et al., 2001).
- 6) Damage to biodiversity and ecological values as argued by Ciem (2008).
- 7) Pollution of water masses as reported by Dhg ( 2009).

## **2.15 Causes of Poor Project Supervision**

This section highlights the factors that cause poor project supervision as brought out from the literature reviewed. The factors discussion include inadequate resources, inadequate qualified supervisory staff, community interference with projects, and absence of established and published work specifications.

### **2.15.1 Inadequate Resources**

Resource inputs at the project site which produce outputs in the form of work include: men, materials, machinery and money. The success of a project depends upon the performance of these input resources when controlling costs (Hendrickson 1998). The clients should do everything possible to avoid unnecessary delays as it is one of the leading causes of cost escalation.

### **2.15.2 Inadequate Qualified Supervisory Staff**

In many cases, the government does not have adequate qualified supervisory staff. As a result, projects receive inadequate supervision. Naturally, the quality of supervision is dependent upon the supervisor's skill. A supervisor is usually given authority and responsibility for planning and controlling the work of a group by close contact, (Betts, 1989). Eckles et al. (1975) state that supervisors are managers whose

major activities focus on leading, coordinating and directing the work of others in order to achieve group goals. In addition, they argue that a successful supervisor has to deal with several skills such as management skills, human relation skills and skills in leadership, motivation and communication.

Supervisors play very important role in the training process and therefore, their involvement in a training program is critical. Supervisors involvement in training process would include: Updating supervisors on current policies, new construction practices, techniques, and management skills; Training supervisors on how to coach, mentor, effectively communicate, and conduct performance planning. This will build their supervisory skills to improve performance and solve problems at hand and lastly, Involving supervisors in the training process, conducting training needs assessments and carrying out workshops. Because they know the issues at their level, supervisors can help identify training needs and performance gaps, and develop training priorities for building inspectors.

### **2.15.3 Community Interference with Projects**

In some cases, communities insist on their own people being engaged in local projects when they may not have the competence in terms of skills, attitudes or work ethic to carry out the required works satisfactorily. This results in added costs to the project. Blaser *et al.* (2004) highlight the importance of negotiation with community in a construction project as it allows all interested and affected parties' engagements from the inception stages of the project to the implementation and close out stages. Affected communities need to be engaged as early as the conceptual stage of the project. This enables them to pass any objections they see might be disadvantageous to their livelihoods. Construction organizations need to have individuals who can clearly liaise with the affected communities at implementation phase.

### **2.15.4 Absence of Established and Published Work Specifications.**

Kenya as a country lacks a set of building specification. This problem does not only affect the Kenya's construction sector but that of the entire East African construction

sector generally because for instance Tanzania follows German specifications, Rwanda follows French specifications While Uganda and Kenya follow British specifications. In practically all cases, these specifications have not been updated for many years.

The construction industry worldwide is very robust and with its growing, the environmental burdens also increase (Beer and Ziolkowski, 1995). Major construction projects are important to any country's economic development. However, according to Beer and Ziolkowski (1995), at construction phase of a building project, such projects pose a significant risk to the environment, which must be addressed by both supervisors, developers and contractors. Construction practices that fail to control pollution can cause damage to waterways and wetlands (Murnane, 2006). When construction occurs near built-up areas, poor practices as a result of inadequate supervision may result in air and noise pollution (Birley, 1995) . Therefore, frequent and effective supervision and monitoring is required to continually check the effectiveness of the measures put in place at construction sites to ensure safe environments (Beer and Ziolkowski, 1995). This is important because according to WHO (2005), approximately 1.6 million people die every year due to air pollution caused by poor air quality alone. While buildings provide countless benefits to society, they also have significant environmental and health impacts (WHO, 2000).

View quality (visual impact) is partially dependent on relatively unchanging landscape elements like mountains or valleys. Views are also affected by more readily altered landscape features, particularly built structures such as buildings (Miller, 2001). In case of abandoned buildings, resulting from inadequate supervision as earlier indicated, view quality can be seriously deteriorated. Their dilapidated appearance generate a huge negative visual impact (Ciem, 2003).

Interruption or modification to natural drainage and the general landscape is significantly changed once construction process starts with waste soils, gravels and residues, temporary soil piles on construction sites (Miller, 2001).

Soil erosion occurs when construction starts because digging and moving of soil and rocks leave abandoned loose earth and residues. Loose soil and earth piles formed by construction can be eroded seriously (HU *et al*, 2001).

In site locations near oceans, lakes and rivers, degradation of these areas would end in a decrease of biodiversity. Damage to biodiversity and ecological values resulting from the poorly supervised buildings need to be controlled (Ciem, 2008).

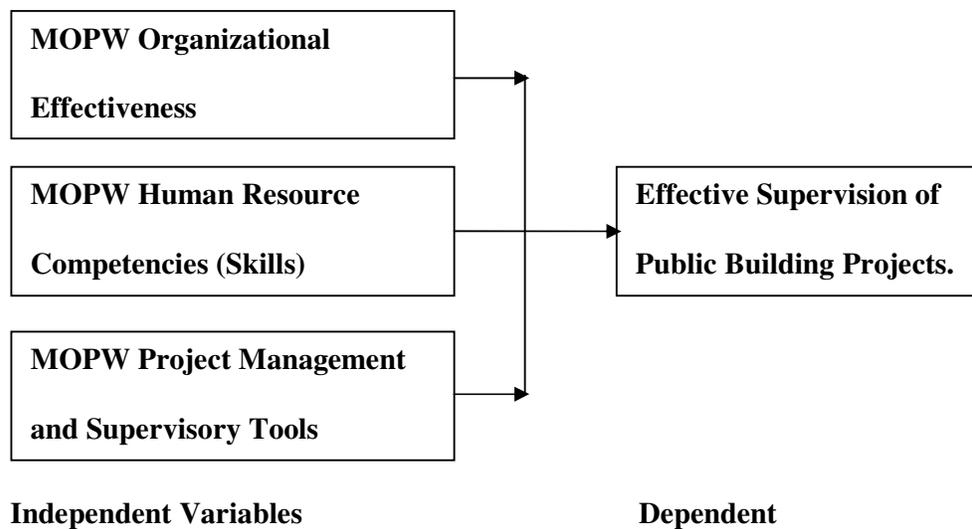
In cases where supervision is inadequate, buildings usually trigger the creation of uncontrolled and unsupervised garbage disposal. Besides garbage, half-built housing development may bring other kind of pollution such as lack of sewage treatment plant, with pollution generated being noticed downstream hence, a decrease of water quality for aquatic life and recreational activities, alteration of ecological conditions and increase of illnesses related to water (Dhg, 2009).

#### **2.16 Construction of Public Building Projects in Kenya**

It is estimated that over 70 percent of public building projects implemented in Kenya experience time overruns while over 35 percent suffers cost overruns (Mbatha, 1986). Talukhaba (1989) supported the same argument when he conducted similar study but on both public and private building projects. Gichunge (2000) puts it that risks analysis for projects are not sufficiently examined before contracts are awarded. Numerous variations as a result of 'extra work' done by the contractors are viewed as a serious problem that makes a project more expensive and also leads to extension of construction period. According to Gichunge (2000), more than 70 percent of public building projects in Kenya suffer from huge variations in both contract period and contract sum. Defective materials, which in turn lead to rework accounted for more than 35 percent. There is sufficient evidence that construction projects performance in Kenya is inadequate (Masu, 2006). Poor building project supervision is blamed for poor workmanship. Other key performance indicators of successful projects completion, according to Masu (2006), included change of specifications poor supervision, poor planning, poor coordination between contractors and subcontractors, all by project supervisors/ consultants.

## 2.17 Conceptual Framework

This is a framework showing how the explanatory variables (independent variables) affect the response variable (dependent variable). In this case, the independent variables are: MOPW organizational effectiveness; MOPW human resource skills and competencies and MOPW project management and supervisory tools. The dependent variable is effective supervision of public building projects.



Variable

**Figure 2.2 Conceptual Framework**

## 2.18 Critical Review

Matta and Ashkenas (2003) observe that despite efforts made by all stakeholders involved in building projects to ensure successful delivery, 50% of construction projects fail worldwide. Hindle (1996) associated project failure to fragmentation of supervision process offered by different consultants who to a large extent, deal with their area of specialization on a project separately and in isolation of each other. This signifies communication breakdown, lack of shared vision and absence of team work. Edwards and Bowen (1982) pointed out that

today; projects are so complex that only talented building teams in terms of supervisory skills have hope to a successful delivery. Lack of quality control and quality assurance in building constructions are chronic problems which lead to low productivity, poor safety and quality failure (Koskela 1993). According to (Harris 1980), construction project supervision is the first level of management aimed at encouraging work unit to contribute positively towards accomplishing the organization's goals. Supervision is getting the job done through others, (Eckles et al 1975). Baum (1982) writes, 'Supervision is an exercise in problem solving and as such is one of the most effective ways of ensuring project success'. Building project supervision focuses on the identification and resolutions of problems, promote high standards, teamwork and better two-way communication (Marquez and Kean, 2002). Koskela (1993) pointed out that inadequate professional supervision of building projects results in material waste, repeat work, low productivity and inadequate quality. On the other hand, according to Love et al, (1997), with adequate professional project supervision, rework, which contributes to huge variations, overruns in time, costs and client's dissatisfaction can be avoided. In many developing countries like Kenya, construction industry is mainly labour intensive. Most of this labour is unqualified and unskilled and as a result, extra coordination and supervision is required and according to Betts (1989), the success of project completion relies heavily on the quality of supervision, which in turn depends on supervision skills. Makulwasawetudom et al (2003), concluded that lack of materials, incomplete drawings, incompetent supervisors, lack of tools and equipment and poor communication are some of the critical factors influencing construction productivity in Thailand. Lack of skilled workers is blamed for poor building project delivery in South Africa (Mutijwaa and Rwelemila (2007). According to Al-momani (1996), public building projects experience delays and face constant modification as work progresses. Long et al (2004) remarked building project performance problems arise due to incompetent designers or supervisors. Thomas (2002), identified performance criteria of building projects

as financial stability, resource availability and management capability. Smallwood (2006) identifies resources for construction projects as competencies, finance, information, technology, innovation, management, supervision, labour, materials, plant and equipment. According to Edward, Holt and Robinson (2002), plant and equipment enhances high productivity output while reducing production cost. Scott and Assadi (1999) amplify the need for effective building project supervision by a supervision team. Roslender et al (2009) argued that human resources are the most valuable assets of any organization and that employee skill and competencies have significant bearing on organisation productivity. Inadequate skills and ability are rectified through training and development while differences in motivation are corrected through motivational strategies and policies (Soh, 1998). According to Badri, Bashiri and Hejazi (2013), organizations need to attract employees with necessary experience, technical skills and other soft skills. Hicks and Gullet (1975), describe bureaucracy as the most efficient form of organization but Weber saw its weakness as being rigid, impersonal, self-perpetuating and empire building, displacement of objectives, cost of control and anxiety to improve status. The latter continued to argue that a good organization should be designed and have a structured process in which individuals interact for objectives, advocate for flexibility and adopt environment that takes care of the people. Pugh (1990), pointed out that an organisation structure consists of tasks allocation, coordination and supervision, all directed to achieving organizational goals. Abbassi (2002) asserted that the state of project management practices in developing African countries is still at its early phase of development. According to Sukhoo (2004), this is partially due to the fact that developing countries are faced with shortage of skilled staff, difficult economic and social conditions, and weak political institutions. Firidi and El-Suyegh (2006) reported that shortage of skilled manpower, poor supervision and poor site management, shortage and breakdown of equipments among other factors are responsible for poor project delivery. Broome (2005) stated that limited construction resources

contribute to poor project delivery in developing countries. In Kenya, Mbatha (1980) and Talukhaba (1989) estimated that over 70% of public building projects and private building projects respectively experience time overruns while over 35% suffer cost overruns. Gichunge (2002) asserted that more than 70% of public building projects suffer from huge variations in both contract period and contract sum. Defective materials, which leads to rework accounted for over 35%. According to Masu (2006), there is sufficient evidence that construction project performance in Kenya is inadequate and that poor building project supervision is blamed for poor workmanship. From the above observations, the overall implication is that either building construction resources are inadequate, incompetent or the resources are significantly wasted due to poor professional supervision. The observations imply that time has come to re-look at the bureaucracy type of organization structures which are common with public organizations. Another logical conclusion that can be drawn from the observations is that public organizations need to embrace project management techniques and supervisory tools for efficient project delivery.

## CHAPTER THREE

### RESEARCH DESIGN AND METHODOLOGY

#### 3.0 Introduction

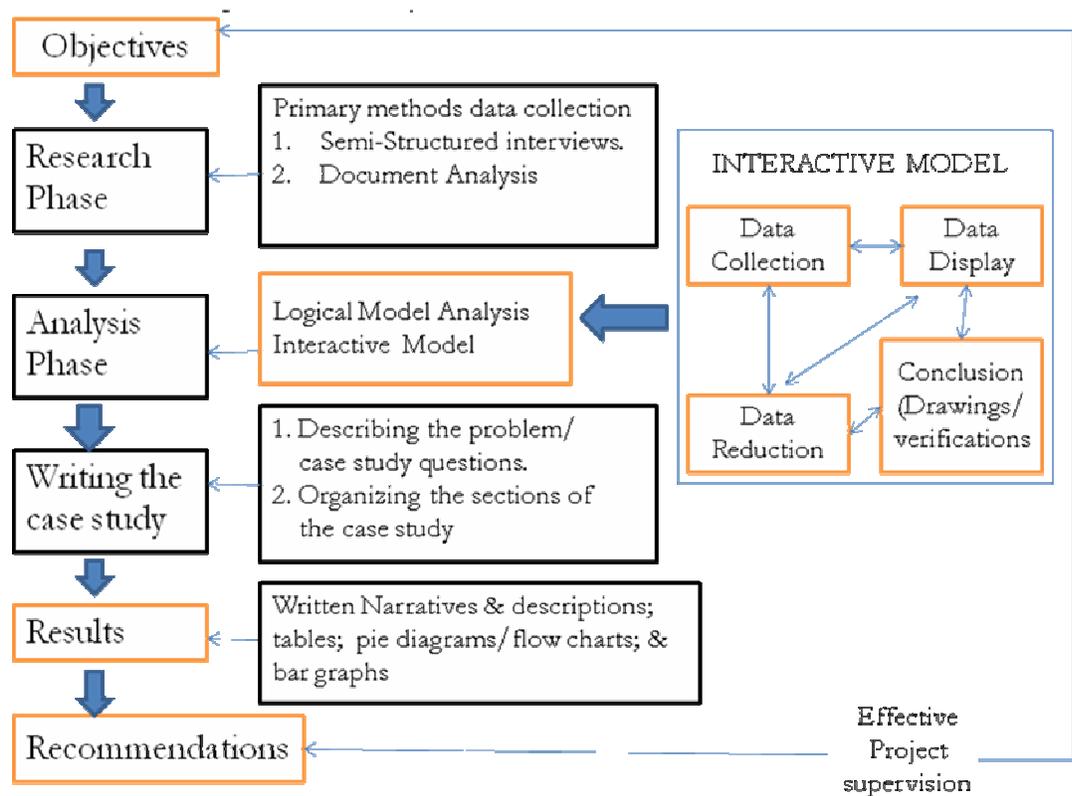
This chapter outlines the methodology for the study. It gives details on the research design, nature and sources of data, the target population and sampling frame used in the study. The section also provides details of the sampling methods, methods of data collection and the instruments used. The section concludes by providing methods of data analysis and presentation, data validation and reliability, and constraints to data collection are also provided.

#### 3.1 Research Design

This study adopted a case study design as a guide to the research because the study entailed a detailed and intensive analysis of a single case. As Stake (1996), Orodho and Kombo (2002) observed, case studies seek to describe a unit in detail, in context and holistically and is concerned with the complexity and particular nature of the case in question. In addition, great deal can be learned from a few examples of the phenomena in a case study. The latter continued to observe that case studies are suitable for a single community, single school, single family and single organization. In this case, the single organization was the MOPW.

The choice of a case study research strategy had been attributed to a number of reasons. Case study has a distinctive advantage over other research strategies when “how” or “why” questions are being posed to discover a current phenomenon and when the researcher has little or no control over the events (Yin, 2003). It offers the opportunity to “explain why certain outcomes may happen – more than just finding out what those outcomes are” (Denscombe, 1998). Gray (2004) confirmed that a case study approach is particularly useful in revealing the casual relationships between the phenomenon and the context in which it takes place.

Moreover, the case study enables the study to use multiple sources of data and a variety of research methods to explore the research questions. Thus, any findings or conclusions are likely to be more compelling and accurate (Yin, 2003). According to Morris and Wood (1991), the case study strategy is best for gaining a deeper understanding of the problem being investigated. A case study of MOPW technical staff at the ministry’s headquarters, buildings department was developed to assess the entire MOPW supervision capacity of public building projects in the country and the challenges it faces in its mandate. Figure 3.1 provides a detailed summary of the research design adopted by the study.



**Figure 3.1 Summary of Research Design adopted by the Study**

### **3.2 Nature and Sources of Data**

The study used semi-structured interviews and document analysis as the primary methods of collecting data for assessing supervision capacity of MOPW. This was dictated by the nature of the data required, the problem for research and the analysis required (Leidy, 1989). This research aimed at assessing the supervision capacity of the ministry of public works to supervise building projects in Kenya, a significant proportion of the data required was both verbal and numerical, with some research questions being exploratory in nature while other research question were inherently confirmatory. This dictated the use of mixed methods, thus making the research both qualitative and quantitative. However, the study chose to use qualitative approach. The qualitative approach helped the study to get a deeper understanding of the issues being investigated. It is an approach that has enabled the research questions to be answered by providing a rich picture on the actual conditions surrounding the research problem. As Gray (2004) showed, qualitative research is distinguished as a highly-contextual approach where data is gathered in natural real life settings. It can answer how and why questions rather than giving a brief view about the phenomenon studied.

The distinction between qualitative and quantitative research is a methodological issue. The decision to choose a specific methodology should be based on its suitability to answer the research questions (Bryman, 1988). Berg (2001) distinguished between qualitative and quantitative research arguing that qualitative research referred to the meanings, concepts, definitions, characteristics, metaphors, symbols and descriptions of things, while quantitative research referred to the measures and counts of things. Snape and Spencer (2003) indicated that qualitative research is a naturalistic/interpretative approach concerned with understanding the meaning people give to the phenomena within their social setting. They outlined a number of key elements which distinguish the qualitative approach, among these: it is the approach which provides a deeper understanding of the social world; it is based

on a small scale sample; it uses interactive data collection methods, i.e. interviews; it allows new issues and concepts to be explored.

The data collected from the field and documentary sources were in form of numerical data but the figures represented humans and human behaviour. Mugenda and Mugenda (1999) observed that human behaviour is explained best using qualitative research. They further observed that human phenomena that cannot be investigated by direct observation such as attitudes and other emotions are best studied using qualitative method.

As stated in section 3.1 above, a case study design was adopted to guide this research. Case studies are a common form of qualitative evidence. These often involve small sample sizes as opposite to numerical data which is less reliable if the sample size is small. Qualitative case studies are usually done on a small group. The purpose of a case study is to study impact in depth rather than in breadth and the main techniques of the researcher will be observation and/or interviews. Quantitative research is usually associated with research hypothesis while most qualitative researches are associated with research questions. Creswell, (2009) states that “qualitative research is exploratory and is useful when the researcher does not know the important variables to examine”. This type of approach may be needed because the topic has never been addressed with a certain sample or group of people (Morse, 1991). Gillham (2004) stated that qualitative methods are essentially descriptive and inferential in character. He further argues that, one may have significant statistical results but these results have to be described and interpreted. This is because ‘facts’ do not speak for themselves- someone has to speak for them. The study used this as a strong argument that justifies the use of qualitative method to answer some questions in the research. In further argument for the use of qualitative approach, Gillham (2004) amplified that ‘objectivity’ can ignore important data for adequate understanding. The choice of qualitative research is the result of a reflection on the nature of the problem- the MOPW technical staff abilities, attitudes, motivation, skills, accomodation of changes like embracing project management principles,

among other issues, all constitute to human behaviour hence a detailed qualitative phenomena. In other words, the assessment of the supervision capacity (or lack of it) in the construction of public building projects using face-to-face interview methods weretherefore, preferred to quantitative methods as they give intricate details to the qualitative phenomena. Bless and Higson-Smith (2000) cited the following as the advantages of qualitative interviews:

- a. Qualitative interviews actively involve the respondents in the research process and therefore empower the respondents.
- b. They allow free interaction between the interviewer and the interviewee.
- c. They allow opportunities for clarification so that relevant data is captured.
- d. They maximize description and discovery.
- e. They offer researchers access to people's ideas, thoughts and memories in their own words, rather than in the words of the researcher.

In this research, semi-structured interviews were seen as the richer and most useful option to collect data. The data collected from documentary sources and fieldwork was qualitatively analysed.

### **3.2.1 Semi - Structured Interviews**

Qualitative interviews are effective research instruments for getting deep insights about how people experience, feel and interpret the social world (Mack *et al.*, 2005). Dawson (2002) argued that the semi-structured interview is perhaps the most widespread type used in qualitative research. In this kind of interview, the study pre-establishes a set of questions to know more information about specific issues and sometimes identify new issues that were not originally part of the interview. It is characterized by its flexibility in which the study can add or remove questions from the schedule based on the results of each interview. Also, Saunders *et al.* (2003)

indicated that the investigator is not required to follow a specific order of questions but can vary the order depending on the flow of the conversation.

The information from documents and interviews was summarised to come up with clear understandable statements and conclusions. This was done by counterchecking, comparing, contrasting and corroboration the information collected from various sources together with the conceptual framework outlined, research questions and objectives.

At the beginning of each interview, the interviewer introduced himself to the interviewee stating his name, position, institution and then explained the aim of the research to formalize the interviewee with the research topic. This brief introduction was followed by asking the interviewee about his/her position and responsibilities as a way of collecting more detail about him/her and at the same time creating a good atmosphere to conduct the interview and facilitate the interaction with the interviewee. All respondents exhibited diverse experience in the research topic. All interviews took place within the interviewees' organization and lasted between 35 – 45 minutes. The study assured all interviewees about the confidentiality of the information given. Finally, they all were thanked deeply and promised to be supplied with a report of the research results.

### **3.2.2 Documents**

A document is any substance that gives information about the investigated phenomenon and exists independently of the study's actions. It is normally produced for specific purposes other than those of the research but it can be used by the study for cognitive purposes, e.g. letters, newspapers, diaries and websites. (Corbetta, 2003). Yin (2003) asserted that *“For case studies, the most important use of documents is to corroborate and augment evidence from other sources”*. Corbetta (2003) identified a number of advantages of the documents over other research methods:

- i. It is a non-reactive technique where the information given in a document is not subject to a possible distortion as a result of the interaction between the researcher and the respondent, e.g. as in interviews.
- ii. It helps the researcher to study the past.
- iii. It is a cost-effective method as the information has already been produced (Denscombe, 1998). However, documents may have some limitations in terms of the accuracy and completeness of the data (Patton, 2002).

In the present study, a number of documents were critically analyzed, including: MOPW annual work programmes; estimates of recurrent expenditure; building operations and maintenance manual (BOOM); contracts documents; economic development plans; economic recovery strategies, staff establishment for MOPW documents and site reports, minutes and certificates among other documents. Such documents were of great value to examine the study from different angles and enrich the researcher's knowledge about supervision of public building projects in Kenya. This method enabled the study to highlight and pursue any contradiction in the evidence emerging as a result of the inconsistencies between the data collected in the documents and that resulting from interviews.

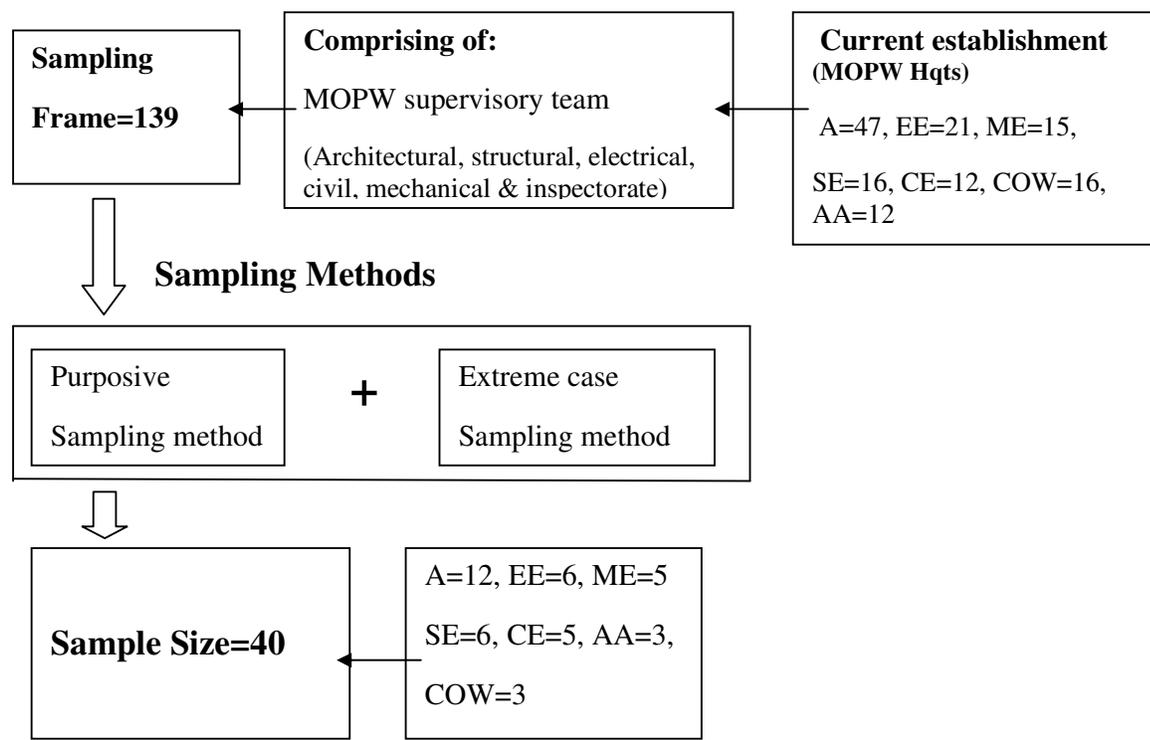
### **3.2.3 Source of Data**

This study relied on two complementary sources of data: primary and secondary. Primary data was the information that the study gathered directly from respondents using interviews. Structured and semi-structured questions were orally administered to key informants drawn from purposively sampled MOPW professional staff involved in the supervision of building projects between 2003 and 2012. The researcher purposively targeted departmental heads and their deputies, group or unit leaders because these are rich cases or informants who are knowledgeable about the issues being investigated. In other words, these are objects with experience because they started as junior offices and gone through the ranks to their current positions.

The interviewees were: the chief architect/ deputy chief architects; superintending architects in charge of work units (group leaders); project architects and clerk of works. Others includes: chief structural, electrical, mechanical engineers and their deputies; superintending engineers and project engineers. Secondary data included written sources like books, journals articles, government reports and documents, unpublished thesis assesses from the internet and libraries. Online journals available on the internet were also consulted. Additional data was collected from secondary documents such as ministry's annual work programs; Estimates of recurrent expenditure, and perusal of project documents and electronically stored information.

### **3.3 Target Population and Sampling Frame**

The target population for this study was the technical staff of the building departments at the MOPW headquarters. The sampling frame for study was 139 subjects all drawn from MOPW building supervisory team at the ministry's headquarters. This team comprised of the entire current establishment at the ministry's Headquarters. Figure 3.2 shows the process followed to arrive at a sample size of 40 subjects from a sampling frame of 139 subjects.



**Figure 3.2 Sampling frame, Sampling methods and Sample size adopted by the study**

The survey was created to collect data from MOPW project design and supervision teams, representatives of client ministries, and contractors who were involved in the implementation of building projects during the period under study. The survey obtained recollections of exact field experiences from project Architects, Engineers, clerk of works, client ministries and contractors representatives. The study took the entire current technical staff establishment at the MOPW headquarters as the representative sample of the target population referred to as accessible population (Mugenda and Mugenda, 2003).

### 3.4 Sampling Methods

Cresswell (1998) defines sampling as the process of finding people or places to study; to gain access to study; and to establish a rapport so that participants provide

relevant data. During the process of sampling, the aim was to get a sample that was as representative as possible of the target population (Mouton, 1996).

This study adopted a non probability sampling strategy using purposive technique which enabled the study to select and study a case that would serve the purpose of the study and answer the research questions. Purposeful sampling, according to Macmillan and Schumacher (1993), is selecting rich cases for in-depth study. With the purposive sampling, the study used personal judgment to select cases that will best meet the research questions and objectives (Saunders *et al.*, 2003). Rubin and Rubin (1995) named three main guidelines for selecting a purposive sample. The study selected the informants who are knowledgeable about the issues being investigated, willing to talk and representative of the range of points of view. A purposive approach was well-suited to small-scale and in-depth study (Ritchie *et al.*, 2003). This method is extremely useful under certain conditions, particularly when the research question seeks an in-depth investigation of a small population. Mugenda and Mugenda (2003) observed that purposive sampling is a technique that allows a researcher to use cases that have the required information with respect to the objectives of the study. Therefore, the subjects were hand picked because they are informative or possess the required characteristics. In this study, the sample size of the subjects consisted 12 Architects, 22 Engineers, and 6 Architectural assistants and clerks of works all drawn from MOPW headquarters. This together, made up a total of 40 subjects that were interviewed for this study.

### **3.4.1 The Sample Size**

Using a purposive sampling method, a sample was chosen by the researcher subjectively, bearing in mind the need for the sample to be as much as possible representative of the population and also taking into account any extremes (Mugenda and Mugenda, 2003). Architectural department consist of 7 work units. The study targeted at least 1 architect from each work unit/group, that is either the unit leader or the deputy, resulting to 7 architects in total. The 5 remaining architects slots were

filled by senior architects who are not unit leaders using Extreme case sampling method, were cases which are special were hand-picked, for example, the chief Architect plus his 2 deputies, totalling to 12 Architects. In the Engineering and service section, the work groups are divided according to provinces. There been 8 provinces in the country, the researcher chose to select 2 engineers per province, making a total of 16 Engineers. Again, the remaing 6 slots were filled using Extreme case sampling method. The services of clerks of works and that of architectural assistants are shared by the 7 work units of the architectural department. The researcher selected 6 from the 7 work units for interview. Consequently the study employed Extreme case sampling technique, which is type of purposive sampling and which focuses on cases that are rich in information because they are special in some way (Orodho and Kombo, 2003). The technique focussed on MOPW individual professionals believed to be rich in the information on issues of effective project supervision.

**Table 3.1 Sample Size**

<b>Professionals (Designation)</b>	<b>Current technical staff Establishment (Target Population)</b>	<b>Sample Size</b>
Architects	47	<b>12</b>
Electrical Engineers	21	<b>6</b>
Mechanical Engineers	15	<b>5</b>
Structural Engineers	16	<b>6</b>
Civil Engineers	12	<b>5</b>
Clerks of Works	16	<b>3</b>
Architectural Assiatants	12	<b>3</b>
<b>Total</b>	<b>139</b>	<b>40</b>

After conducting all the 40 subjects through telephone conversation, a follow up introductory letters, affixed to the semi-structural interview schedules, explained the

nature of the study, as well as assuring respondents of the confidentiality of any information provided were forwarded to respondents. Respondents were also provided with instructions as to how the interviews were to be conducted. The rationale behind providing clear guidelines and assuring confidentiality of information is based on the fact that this significantly reduces the likelihood of obtaining biased responses (Sekaran, 2003). Sekaran (2003) maintains that sample sizes of between thirty and above subjects are appropriate for most research.

### 3.4.2 Response Rate

The response rate gives the percentage level of response by looking at the targeted number of respondents against the actual number of participants who participated in the study. The results on response rate are displayed in table 3.2

**Table 3.2 Response Rate**

	<b>Number of respondents sampled for interviews</b>	<b>Actual number of respondents interviewed</b>	<b>Response Rate (%)</b>
<b>Number</b>	40	40	100

This study used a purposive sampling technique and 40 respondents were hand-picked for inclusion in the study. From the results displayed in table 3.2, it is shown that all the targeted respondents were actually interviewed hence translating to 100% response rate for this study.

### 3.5 Method of Data Collection and Instruments

In this research, the primary data was collected from interviews- that is, face-to-face interviews. Interviews are effective research instruments for getting deep insights about how people feel, experience and interpret social world. Interviews are flexible in that the researcher can 'add' or 'remove' questions from schedule and that the researcher is not required to follow a specific order of the questions but can vary depending on flow of conversation. Flick (1998) feels that the interest in face-to-face

interview is linked to the expectation that the interviewed participant's view points are more to be expressed than they would be in a non face-to face questionnaire. In collecting data for this research, the researcher followed specific steps. This was to ensure the success of face-to-face interviews:

### **Phase 1**

The survey was initiated by Pre-arranged telephone discussions with the selected MOPW technical staff, stating the purpose and benefits of the study and formally seeking their consent to participate in the survey. This was followed by booking appointments with would be respondents at their offices, with clear time and date schedules. The study explained the questions and the purpose of the study to prevent any possible misunderstanding on the part of the respondents.

### **Phase 2**

The study sought from the MOPW, forward planning and contract units the names and contact details of client and contractors representatives who implemented the project under study. The study contacted the client and contractors representatives to determine their willingness to participate in the study. The research team visited the latter's offices and explained the questions and the purpose of study to them. Finally, a total of 40 respondents, who were purposively targeted by the study were interviewed and the analysis in the next chapter was based on 40 respondents as the sample size.

#### **3.5.1 Key Informant Interview**

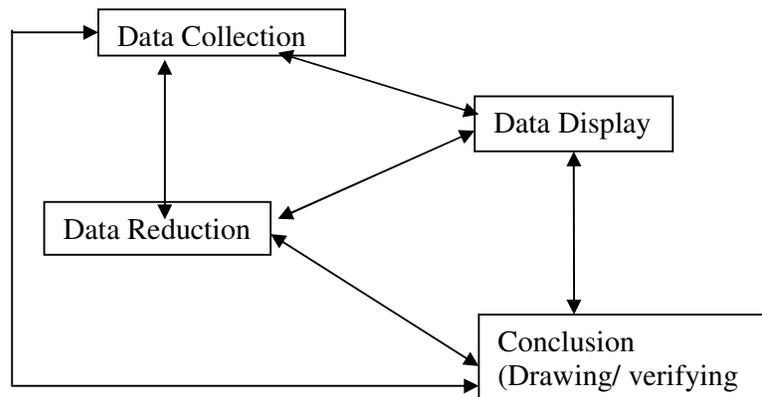
A key informant interview was used to collect data from persons the researcher considered to hold crucial and relevant information. Therefore, the researcher hand-picked the respondents because they are informative or they possess the required characteristics. The researcher interviewed the consultants in the ministry, the contractors and client's representatives. The interview gave, to a far extent, accurate and clear answers due to the clarifications which were made by the researcher. The

researcher introduces the questions in the same way for all respondents. This gave all respondents common ground for answering the questions, with clear replies and eliminated the tedium and idleness of the respondents.

In the beginning of the interview the researcher introduces himself to the respondent to create a friendly atmosphere, and then he thanks the respondent and affirms that all the data collected would be used only for the research purposes. In the end of the interview, the researcher expressed his deep thanks to the respondents for their effort and time.

### 3.6 Methods of Data Analysis and Presentation

The results of the interview is an interview script or interview transcript and the result of document analysis is a document notes. According to Sugiyono (2011), data analysis is the process of systematically searching and arranging the results of a research interview scripts, field notes, document notes and other materials to enable the researcher to present what was discovered or the research findings. In this study, data obtained from the two instruments (interview and documents) were divided into several steps of analysis to answer the research questions. In line with Miles and Huberman (1984), the researcher used data reduction, data display and conclusion (drawings/ verifying) to analyse the data. Figure 3.3 shows the analysis process adopted by the study



**Figure 3.3 The components of the data analysis (interactive model)**

### **3.6.1 Data Reduction**

This study obtained data from interviews and document analysis. Documents were analysed to complement the words from respondents in the interview. Once data were in paper form, it was sorted into labelled folders according to source. There were 40 transcripts of over 17 pages each, 20 pages of document notes and 10 pages of follow-up comments from both the client ministries and the contractors representatives respectively. The researcher went through these documents, one after the other, reading and note-taking, describing, classifying, interpreting and representing or visualizing the data. At times, this seemed to be a very artificial task but the researcher knew it needed to be done to sort out so as to reduce several data that were not necessary with the research questions as aforementioned. In this research, data reduction was done carefully to ensure that the remained data would give a clear picture of what is actually needed and that it would address the research questions. As mentioned earlier, the researcher used interviews as the main instrument to get primary data while document notes were used to complement and complete the interviews.

### **3.6.2 Data Display**

After the data were reduced and the important items remained, the next step taken by the researcher was to display the data. Miles and Huberman (1984) revealed that the most form of displaying data for qualitative data is in form of the narrative text. In this research, the data were shown not only in narrative text, but also in form of frequency tables which were done by use of MicroSoft Excel spread sheet.

### **3.6.3 Conclusion and Verification**

Microsoft Excel was used to organise the data into frequency tables. Data was then presented into pie diagrams/charts and bar graphs. In this research, the researcher made conclusions through verifying the data from interviews and document notes.

### **3.7 Data Validation and Reliability**

#### **3.7.1 Validity**

Validity is concerned with two main issues: whether the instruments used for measurement are accurate and whether they are actually measuring what they want to measure (Winter, 2000). In this study, the researcher used several procedures to validate the findings. A member checking method was applied in this research to validate the findings. A member checking is a way to receive feedback from informants (Creswell, 1994) to know how far the data obtained in the findings is appropriate with the data from informants (Sugiyono, 2011). Moreover, one of the transcriptions was validated and rechecked with the interviewee to ensure the correctness and the accuracy of the data. Finally, all secondary sources of data used were initially assessed to determine the validity of the information given. Therefore, by applying three procedures above, the study was expected to have the accuracy of the data.

#### **3.7.2 Reliability**

Reliability is about the extent to which research findings can be replicated, if another study is undertaken using the same research methods (Ritchie and Lewis, 2003). A number of measures were undertaken to enhance the reliability of the current study: Questions were worded clearly and asked in a natural tone of voice. If there was any misunderstanding the question would be repeated in order to enable the interviewee understand what she/he was asked for. Moreover, all interviewees were given the opportunity to explain their own beliefs and thoughts freely without any intervention either with comments or gestures, which would create bias in the interviewee's response to the question being asked.

It is recognized that the conditions surrounded the research might be different when replicating the current study but in an attempt to help others understand the various decisions and processes adopted along the research journey and increase the probability of replicating the present study, all decisions and procedures were set

clearly. The study provides detailed information about the aim and objectives of the research, how the study was undertaken and the justifications of the adopted research strategy and methods.

#### **3.7.4 Replicability**

The study spelled out the procedures it employed in great detail in order for Replication to take place. This was necessary because, according to Bryman (2008), for one reason or another, researchers may choose to replicate the findings of other researchers.

### **3.8 Constraints to Data Collection**

This section describes some challenges and constraints in data collection, which have been encountered during the study. The researcher encountered reluctance on part of respondents to cooperate and share information. There were several instances when the respondents failed to keep their initial interview appointments with the research team after all the arrangements had been made. They were either out of the office or simply changed their minds and refused outright to be interviewed. A second round of appointments was therefore required and in some cases, the researcher had to look for replacements in order to meet the targeted number of respondents. But with a lot of patience, and a bit of persuasion and assurance, the challenges were dealt with and the planned number of sample was met.

## **CHAPTER FOUR**

### **RESULTS, ANALYSIS AND DISCUSSIONS**

#### **4.0 Introduction**

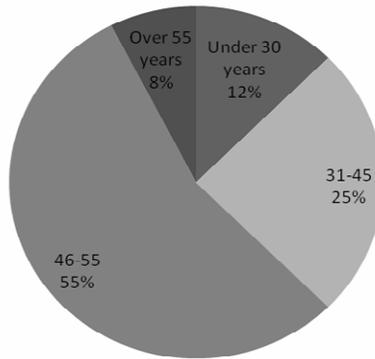
This chapter discusses the results of responses obtained from the field during the study. It presents thematic analysis of major issues/topics emerging from the objectives of the study mainly: organizational structure effectiveness, current human resource competencies in the MOPW, current practices of project management and supervision tool available for the ministry's technical staff and the current work load for the MOPW current staff establishment.

#### **4.1 General Information**

This section gives general information of the respondents interviewed including their age, level of education, profession and their years of experience.

##### **4.1.1 Age of the Respondents**

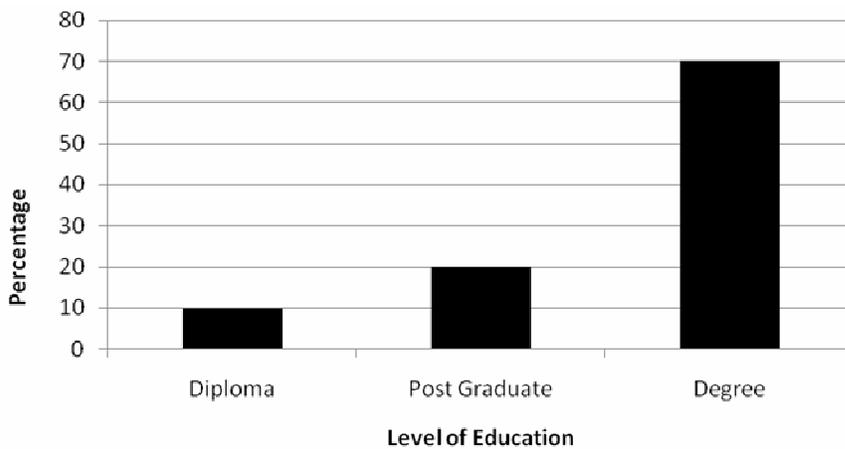
Results shown in figure 4.1 indicate that the largest group of employees in the MOPW, building department is between 46 and 60 years old, representing 63% of the total technical staff in the department. The remaining staff population is below 45 years old and constitute only 37%. The results further implies that large number/part of the experienced labour in the Ministry is going to retire in the near future and that the Ministry is still struggling to cope with the challenge, as reviewed in the literature, of recruiting new and young professionals who would bring in new culture and who are less resistant to change and who possess the relevant skills to the positions to which they are recruited.



**Figure 4.1 Respondents' Age**  
**Source: Research Data**

**4.1.2 Education Level**

The results displayed in figure 4.2 illustrate that 90% of the MOPW technical staff were both degree and post graduate degree holders respectively in various technical fields such as; architectural, structural engineering, mechanical engineering, civil engineering and project management fields. The rest of the staff had diplomas in various technical fields. Diploma holders were mostly the clerk of works, the assistant architects and assistant engineers. The figure further displays MOPW as a purely technical Ministry whose employees have all necessary educational background to deliver on its mandate.

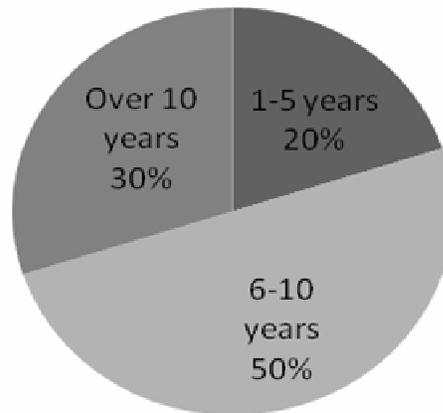


**Figure 4.2 Respondents' level of education**

**Source: Research Data**

### 4.1.3 Work Experience

The results shown in figure 4.3 indicates that 80% of the MOPW technical staff have work experience of over 6 years. Despite the vast work experience of the ministry's technical staff, public building projects continue to fail in both scope, cost, time and quality. As literature reviewed, work experience need to be combined with necessary supervisory skills and project management tools, construction resources and some level of staff motivation among others success factors to ensure effective project supervision.



**Figure 4.3** Respondents' Experience in Years  
Source: Research Data

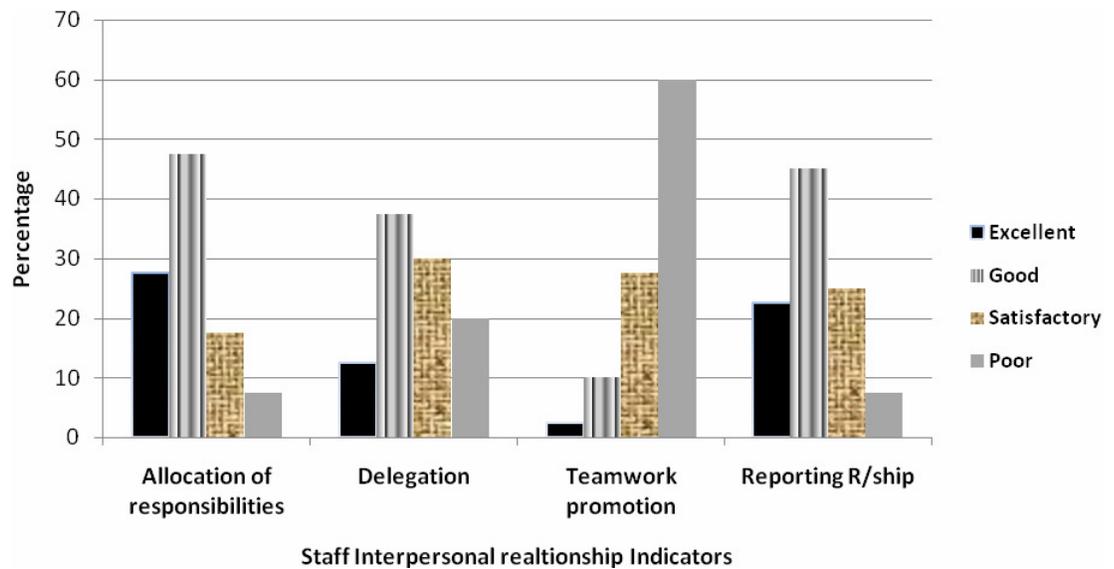
## 4.2 Organizational Structure

The aim here was to examine the MOPW, buildings department, organizational effectiveness in building project supervision interms of the extent to which the structure enhances staff relationship, sound decision making and communications, and its overall efficiency and effectiveness among other things.

### 4.2.1 Teamwork

There is need to improve teamwork in the MOPW. For teamwork in the MOPW to be poor is quite ironical given that building projects comprises of different

components that require input from various professionals. The findings therefore goes contrary to the emphasis made by Edwards and Bonen( 2005)and Hindle( 1996) on the need for team work in the construction process. Successful delivery of projects would thus require a great deal of team work and coordinated working relationship among the various technical staff. The respondents on the other hand indicated that; allocation of responsibilities, delegation of work and the reporting relationship in the ministry was fairly good as shown in figure 4.4

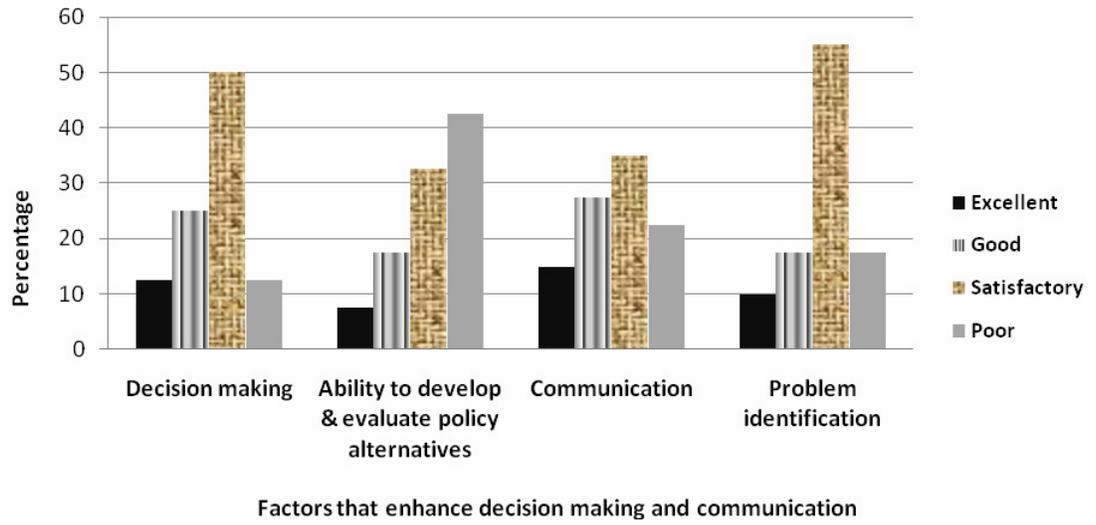


**Figure 4.4** Extent to which organizational structure enhances staff relationships

**Source: Research Data**

#### 4.2.2 Decision Making and Communication

Figure 4.5 shows that MOPW has good decision making and problem identification structures. Communication structures need to be improved. However, a great deal need to be done by the Ministry on the ability to develop and evaluate policy alternatives.

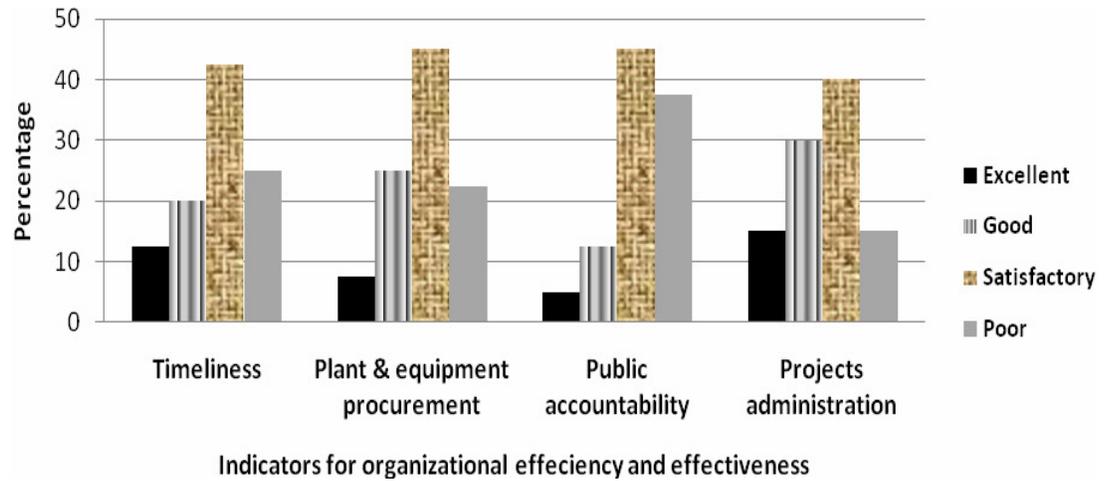


**Figure4.5 Extent to which organizational structure enhances sound decisions and communications**

**Source: Research Data**

**4.2.3 Organizational Structure Efficiency**

Figure 4.6 illustrates the outcome of responses on the four indicators used to determine the extent to which the ministry’s organizational structure enhances efficiency and effectiveness. The four assessed variables indicate ‘satisfactory’ response, meaning that MOPW workers are satisfied with the structure responsiveness with regards to the four items.

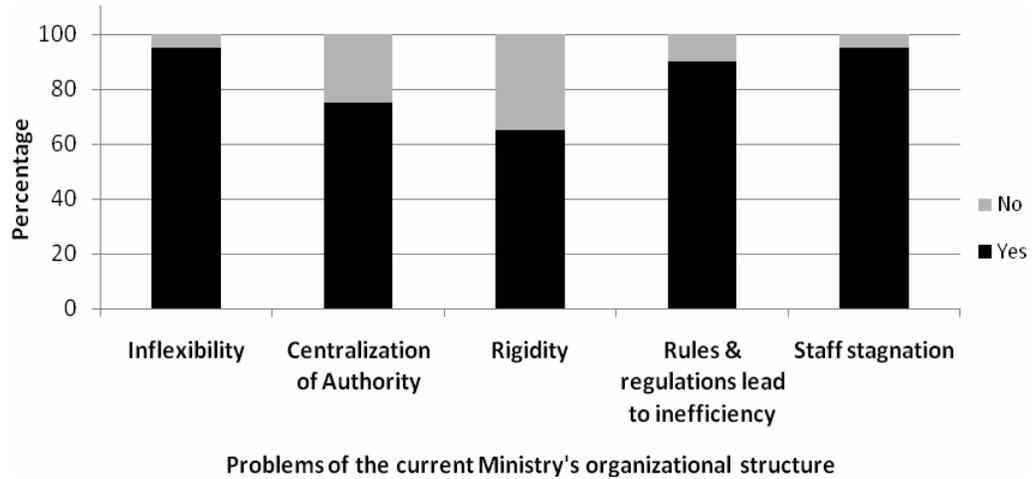


**Figure 4.6 Extent to which organizational structure enhances efficiency and effectiveness**

**Source: Research Data**

#### 4.2.4 Organizational Structure Challenges

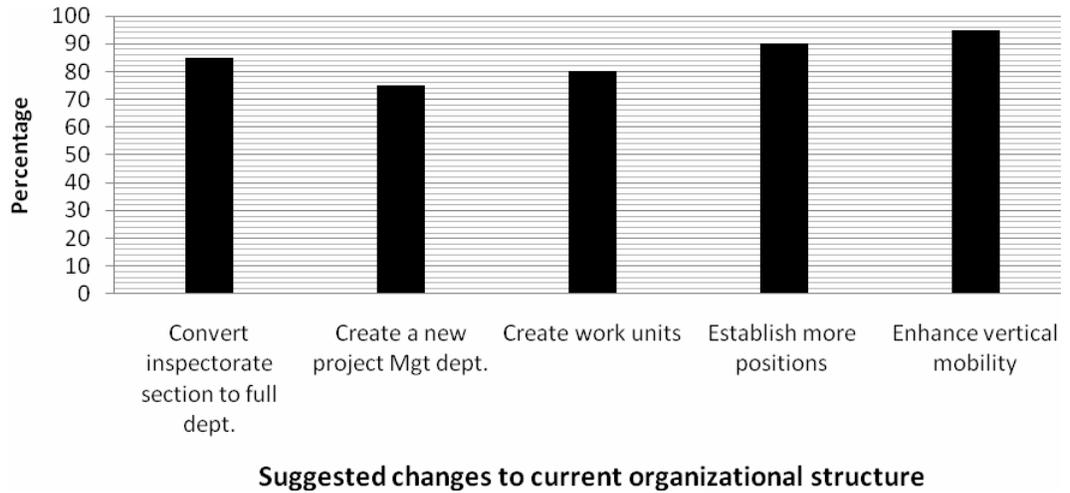
Figure 4.7 gives a highlight of some of the problems with the ministry’s current organizational structure as mentioned by the respondents. The score on the existence of the 5 challenges was over 60%, with the structure inflexibility and staff stagnation leading with 90% each. This is in contrast with both Hicks and Gullet (1975) and Pugh (1990) views that a good structure should flexible and enhances peoples welfare.



**Figure 4.7 Problems of the current Ministry's Organizational Structure**  
**Source: Research Data**

#### 4.2.5 Suggested Changes to the Organizational Structure

Results shown in figure 4.8 indicate overwhelming need for organizational restructuring of the current MOPW organisation structure. All the 5 variables assessed indicated a score of over 70% with enhancement of vertical staff mobility and establishment of more positions up in the structure leading with 95% and 90% respectively. Restructuring of the current structure was found necessary because the literature reviewed indicated the need for the following: Detection/identification of problems; Effective sharing of organisational goals (communication); Teamwork promotion (development of teams that collaborate to achieve common goals); High employee morale (personal development issues, employee value their positions in the structure and want to work there for a long time); Offer training opportunities (confront poor performance and take corrective actions to improve performance); Adopt to opportunities and change (look for opportunities to grow, adopt technological and operational change); Clearly defined structure (posses a sense of order and does not limit innovations and growth); and lastly, promote efficiency at all levels.

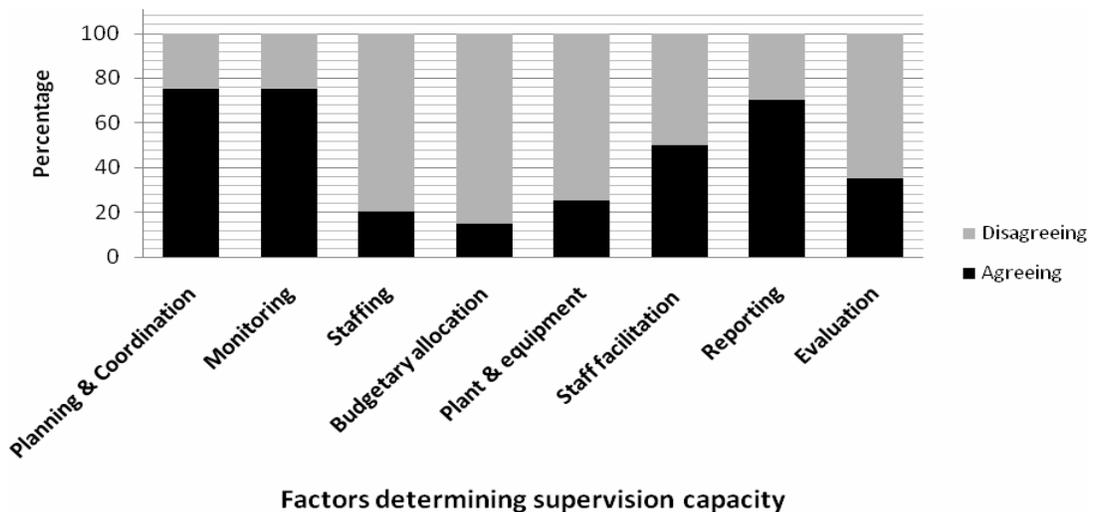


**Figure 4.8 Suggested changes to the Ministry’s Organizational Structure**

**Source: Research Data**

**4.2.6 Supervise Capacity of MOPW**

Section 4.2.6 displays the results on overall Supervision capacity of the Ministry of Public Works in the construction of building projects.



**Figure 4.9 The Ministry’s Capacity to Supervise Building Projects**

**Source: Research Data**

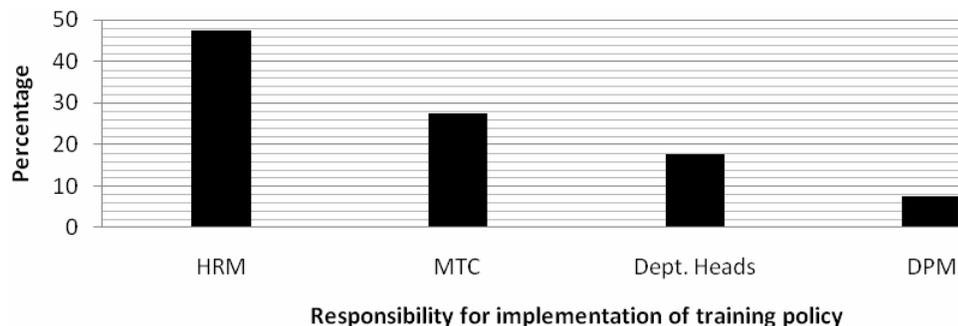
Figure 4.9 shows that MOPW had capacity to plan, coordinate as well as reporting capacity in the supervision of building projects. This fact was suggested by over 70% of respondents. The capacity of the Ministry to supervise building projects was lowest with respect to budget allocation, staffing and plant and equipment because the score was less than 25% in favour.

### 4.3 Human Resource Competencies, Workload and Technical skills

Among the specific objectives of this study was to assess the technical skills possessed by the supervision team in the ministry of public works with aim of gauging their capability and technical capacity to undertake supervision of projects competently. The interest here therefore is first to examine whether a training policy exist in the ministry and to know who is responsible for its implementation. The study was also interested to know the supervisory and technical courses attended by the project supervisors in the last three years. Finally, the important factors to be considered in project supervision were sought from the respondents including their suggestions on the requisite training requirements for project supervisors.

#### 4.3.1 Training Policy

The respondents indicated that a training policy exists in the ministry of public works. This policy aim at identifying the staff training needs and provide a layout procedure for undertaking the training by the staff employed in the ministry.



**Figure 4.10 Responsibility for the implementation ministerial training policy**

**Source: Research Data**

Human resource management department is incharge of training policy implimentation as reported by the majority of the respondents in the MOPW.

#### 4.3.2 Courses attended by project supervisors

Literature reviewed indicated that adequately qualified and well-trained practitioners are a requisite in an effective construction industry. Table 4.1 shows that no MOPW technical staff attended supervisory course between the years 2006 and 2012. The assumption by MOPW staffing Authority is that, at the entry point, with a diploma, university degree or post graduate certificate, the officers are equipped to undertake the mandate of the positions to which they were recruited for. This casts some doubt on the technical capacity of the ministry’s technical team to undertake supervision effectively and with the necessary competence. These findings goes against the recommendations provided by Egbu (1999) who stated that the acquisition of relevant skills, knowledge and competencies for the day to day management of construction activities is crucial and that the skills are acquired through appropriate education and training.

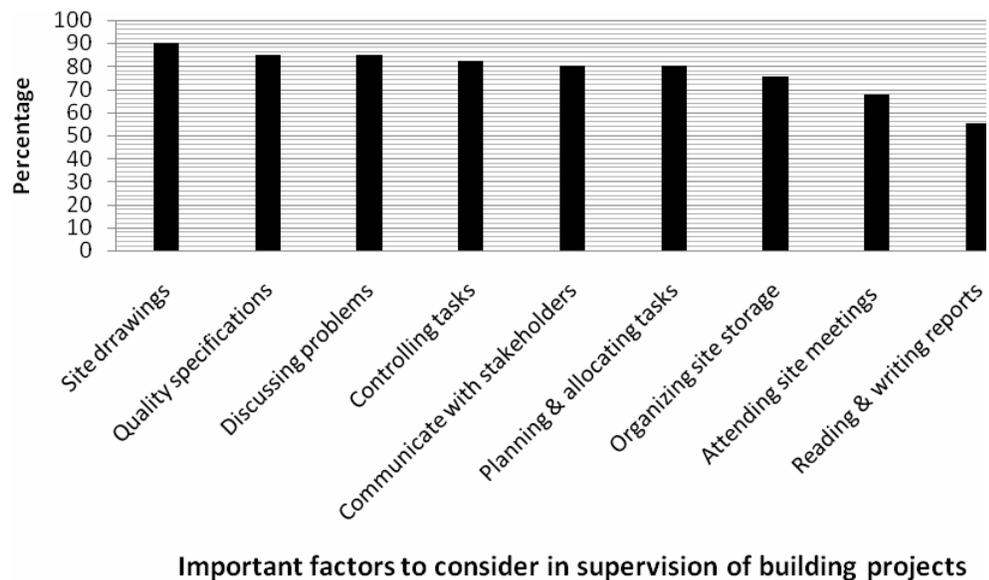
**Table 4.1 Courses Attended between 2009 and 2012**

Nature of Training	Period (2009 - 2012)			
	Atleast-1 course	1-3 courses	3-5 courses	Over-5 courses
Management Courses (SMC, SLDC)	15	12	9	4
Technician courses (SMC)	18	12	7	3
Seminars (Short courses like, finance, disaster and gender mgt. courses)	15	12	8	5
Supervisory improvement course	0	0	0	0

**Source: Research Data**

### 4.3.3 Factors Important for Effective Supervision

Figure 4.12 shows important factors for effective building projects supervision according to MOPW technical staff. Site drawings is a very important factor in the supervision of building projects. This factor scored very high among other equally important factors.

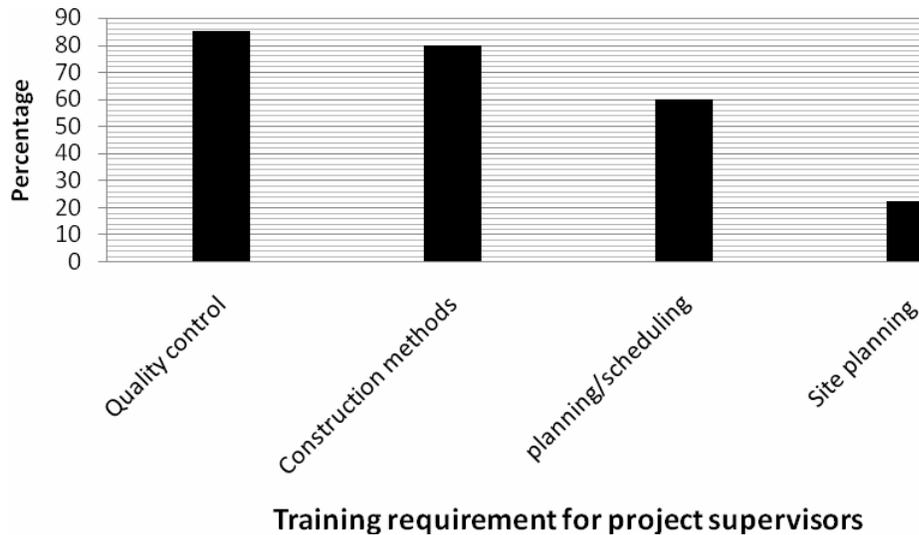


**Figure 4.11 Rating of factors considered important in building Projects Supervision**

**Source: Research Data**

### 4.3.4 Training Requirement for Project Supervisors

Figure 4.12 indicate that training in quality control scored very high among other equally important training requirements.



**Figure 4.12 Training Requirement for Supervisors**

**Source: Research Data**

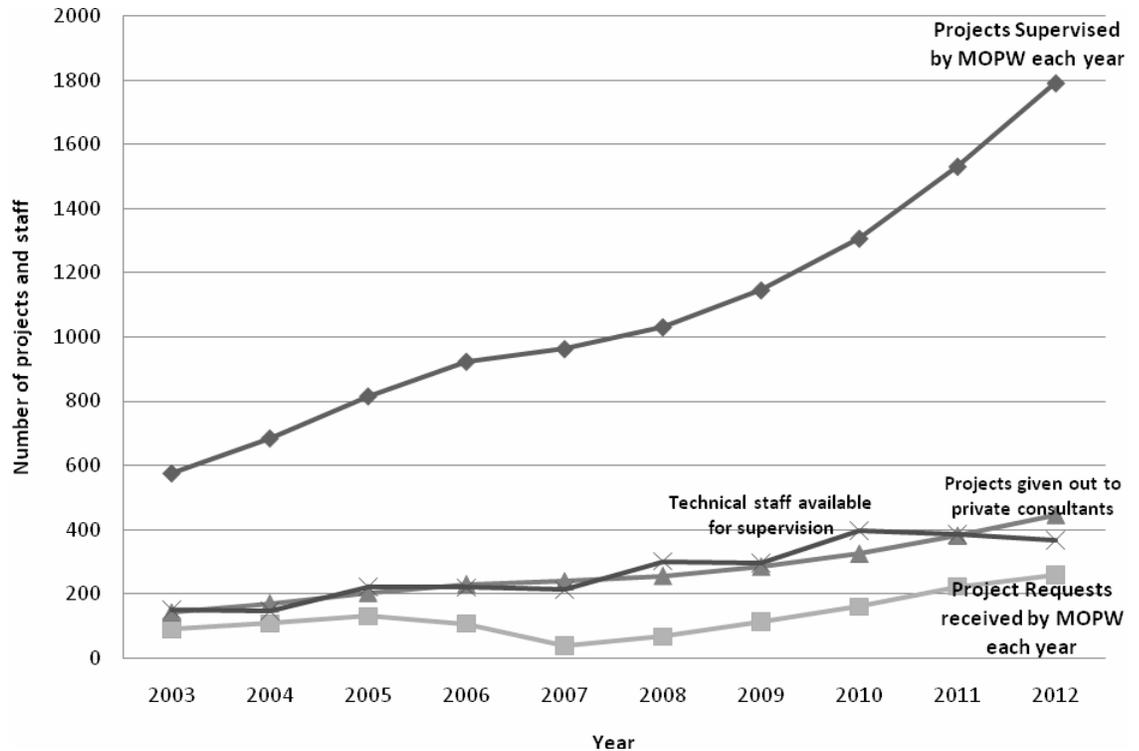
#### **4.3.5 Workload**

The researcher wanted to find out the level of workload in the ministry by comparing the number of projects that the ministry is expected to supervise versus available project supervisors. Information was thus sought on the ministry’s projects portfolio and staff levels from the forward planning unit and the human resource department respectively. The results from the analysis of the information sourced plus the responses given by the respondents are presented and discussed hereafter.

##### **4.3.5.1 MOPW Projects Portfolio**

The Ministry of Public Works projects portfolio consists of projects that are supervised each year by the Ministry, Projects requests that are received from client Ministries each year and projects that are given out to private consultants by the Ministry each year. These numbers are cumulative because completion times of the projects spill to the following year. Figure 4.13 shows upward trends in all the curves from 2003 to 2012 with some fluctuations especially in project requests received from clients in the period between 2005 to 2008. The number of projects to be supervised by the ministry is high and keeps on piling due to backlog from the

previous years and the additional projects requests received by MOPW each year. The current number of projects to be supervised is already overwhelming and if the same trend is maintained then the ministry will have a huge number of projects with few staff to undertake supervision.



**figure 4.13 Ministry of Public Works staff and projects profolio trends 2003 - 2012**

**Source: MOPW, 2012**

#### **4.3.5.2 Approved verses Current Staff Establishment**

The data received from the Human resources department in the ministry of public works indicated that there is a huge staff shortage in the technical fields. Staff shortage (current) in the near future will be caused by three factors: The increase in demand to accomodate new government Ministries; Increase in age of the present staff and the lack of new staff. The total number of technical staff currently in post stood at 440 against an approved staff establishment of 2891. This leaves a gap of 2451 posts in the technical fields that need to be filled up by recruiting new staff.

This disparity creates a huge workload on the existing staff as the huge number of building projects have to be handled by the few available technical staff.

**Table 4.2 Approved staff verses Current Staff in the MOPW**

<b>Staff/Profession</b>	<b>Current Establishment</b>	<b>Approved Establishment</b>	<b>Shortfall</b>
Architects	138	416	278
Civil/Stru. Enginners	82	229	147
Electrical Engineers	51	788	737
Mechanical Engineers	47	786	739
Clerk of Works	50	336	286
Architectural Assist.	72	336	264
Structural Assist.	23	120	97
Electrical Assist.	77	765	688
Mechanical Assist.	49	675	626
<b>Total</b>	<b>589</b>	<b>4451</b>	<b>3862</b>

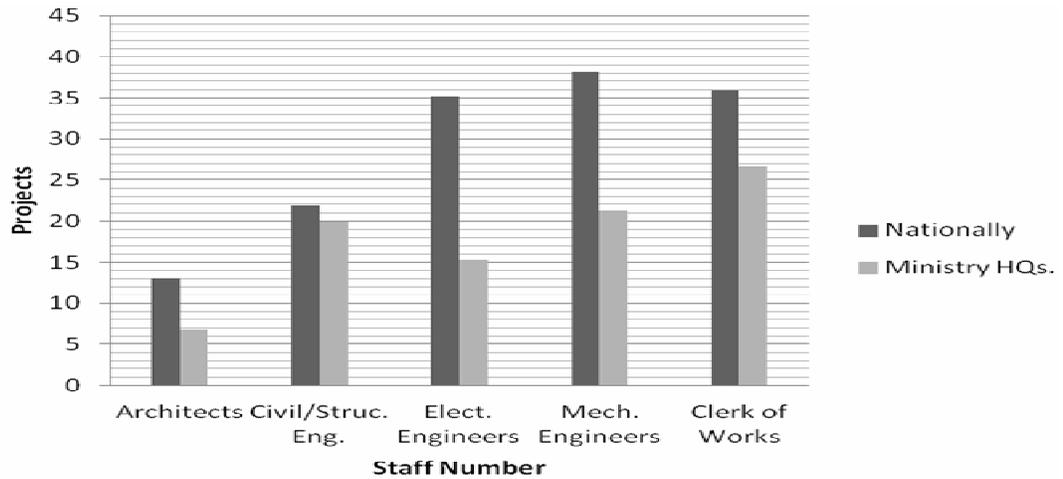
**Source: Research Data**

#### **4.3.5.3 The Projects to Staff Ratio in the MOPW**

The researcher used projects to staff ratio as a measure of workload. Project to staff ratio for the MOPW building department technical staff was calculated using the formular below;

$$\text{Project to staff ratio} = \frac{\text{Number of projects handled}}{\text{Number of staff.}}$$

From the formular, given the current establishment of the Architects as 138 and the total number of projects in the year 2012 as 1794, the study was able to show that, on everage, an Architect handles 13 projects while a civil/structural engineer manages 22 projects. It was also shown that an Electrical Engineer handles 35 projects. Figure 4.14 shows that Services Engineers and COWs in the Districts are most overwhelmed.

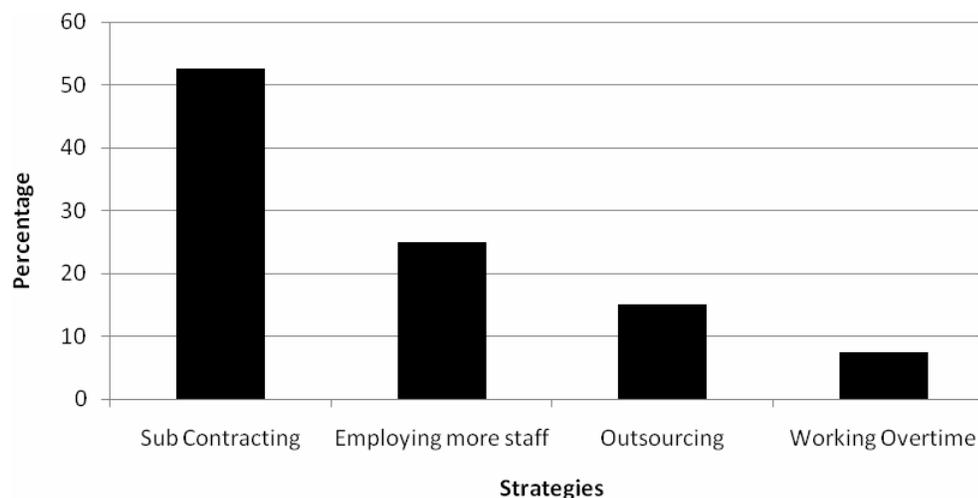


**Figure 4.14 Comparison of projects to staff ratio in the MOPW HQs and in the District**

**Source: Research Data**

**4.3.5.4 Alternatives used to Close in the Existing Staffing Gap**

Results shown in figure 4.15 indicate that subcontracting of work to private consultants by the MOPW is the main means the Ministry uses to close the existing staffing gap. The second alternative is employing more staff but again, this strategy does not seem to work due to high staff turnover witnessed especially among the technical staff as shown in table 4.3. Data from HRM indicate that despite effort made by MOPW to employ young professional, the ministry is not able to maintain them in the service.



**Figure 4.15 Alternatives Used to Close in the Existing Staffing Gap**

**Source: Research Data**

**Table 4.3 Staff turnover between the years 2003 and 2012**

<b>Technical Staff</b>	<b>2003</b>	<b>2004</b>	<b>2005 New staff empl oyed</b>	<b>2006</b>	<b>2007</b>	<b>2008 New staff employe d</b>	<b>2009</b>	<b>2010 New staff employ ed</b>	<b>2011</b>	<b>2012</b>
Architects	48	46	<b>84</b>	79	77	<b>112</b>	109	<b>145</b>	141	138
Civil/stru. Engineers	45	43	<b>51</b>	48	45	<b>64</b>	61	<b>90</b>	87	82
Electrical Engineers	28	27	<b>36</b>	34	33	<b>48</b>	45	<b>62</b>	58	51
Mech. Engineers	12	10	<b>22</b>	20	20	<b>37</b>	35	<b>50</b>	48	47
Clerk of Works	18	16	<b>30</b>	27	25	<b>42</b>	40	<b>52</b>	52	50
<b>Total</b>	<b>151</b>	<b>142</b>	<b>223</b>	<b>208</b>	<b>200</b>	<b>303</b>	<b>290</b>	<b>399</b>	<b>386</b>	<b>368</b>

**Source: Research Data**

#### 4.4 Project Management and Supervisory Tools and Techniques.

Project management and supervisory techniques, tools and equipment are meant to enhance the project supervision exercise. The techniques gives a systematic layout on how supervision of projects should be carried out while tools and equipment aid in project supervision.

##### 4.4.1 Supervision Manual

The respondents indicated that the ministry was not in possession of a construction supervision manual. Regarding manuals available in the MOPW, table 4.4 provided the name, date of formulation and the date the manual was last revised. Important to note is the fact that, from the list of manuals present at MOPW building department, none is specifically on guides to building project supervision or supervisory skill improvement.

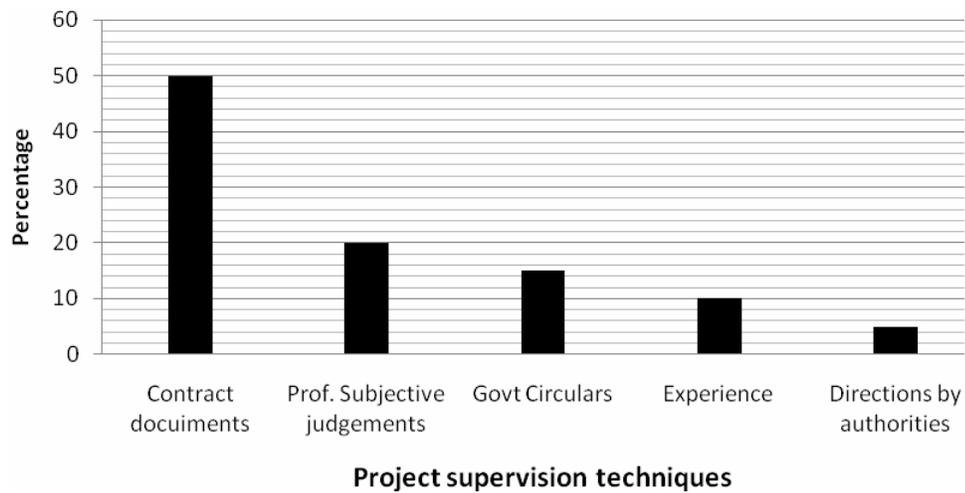
**Table 4.4 Supervision Manual**

<b>Name of Manual</b>	<b>Date of formulation</b>	<b>Purpose</b>	<b>Revision date</b>
Instruction to supervissors	1973	General instruction to supervisors	Has not been revised todate
Building operations and maintenance manual	1973	General administration of projects	On going
General specification of building works	1970	Builders works specification	Has not been revised todate
General specification for structural works	1970	Structural works specification	Has not been revised todate
General specification for electrical works	1970	Electrical works specification	Has not been revised todate

**Source: Research Data**

#### 4.4.2 Supervision Techniques

Public building projects are supervised using contract documents signed by the client as shown in figure 4.16. Hence need for a supervision guide manual. In some cases though, project supervisors relied on their own professional judgments to undertake supervision of public building. Lack of a standard methodology of undertaking project supervision in the ministry of public works will produce projects whose quality standards are questionable.



**Figure 4.16** Supervision Techniques commonly applied by Project Supervisors

**Source: Research Data**

#### 4.4.3 Management Skills

Management is focused on results. One can not be an effective project manager or supervisor without some abilities as a manager. The study sought from the respondents what Management skills are available at the MOPW and their responses are tabulated in table 4.5

**Table 4.5 Management Skills**

<b>Management skills available in MOPW</b>	<b>Percentage</b>	<b>Ranking</b>
Project human resource management skills (organizational planning, staff acquisition, team development, compensations, benefits and career development)	62.5%	2
Project cost management skills (planning, estimating, budgeting, accounting, cash flow management and control of costs)	37.5%	6
Project communication management skills (detail how communication happens, plan for communication)	55%	3
Project intergration management skills (creation of project charter, project scope statement and project plan)	30%	9
Project procurement management skills (selection of vendors, contract negotiation and contracting procedures)	32.5%	8
Project quality management skills (quality planning, assurance and control)	45%	5
Project risk control management skills (risk planning, analysis, monitoring and control)	25%	10
Project scope management skills (planning, creation, protection and fulfilment of project scope)	37.5%	6
Project time management skills (activities, their characteristics and how they fit into project schedule)	35%	7
Interpersonal skills (problem solving, motivating, communicating, influencing and negotiation)	75%	1
Use of information technology skills	50%	4

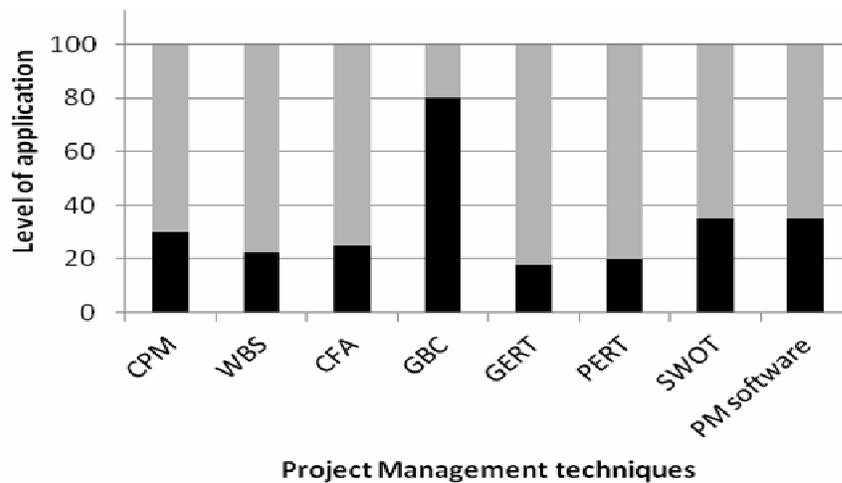
**Source: Research Data**

From the results displayed in table 4.5, MOPW has adequate interpersonal skills necessary for solving project problems, motivating workers, communication and

negotiating on project matters. Project human resource management skills was ranked second, with indicating that the ministry has enough human resource skills.

#### 4.4.4 Application of Project Management Tools and Techniques

The aim here was to assess the level at which the ministry applies project management tools and techniques. Eight techniques were identified and subjected to the respondents. The most applied technique was the Gantt bar chart (GBC) while the least applied technique was the Graphical evaluation and review technique (GERT).

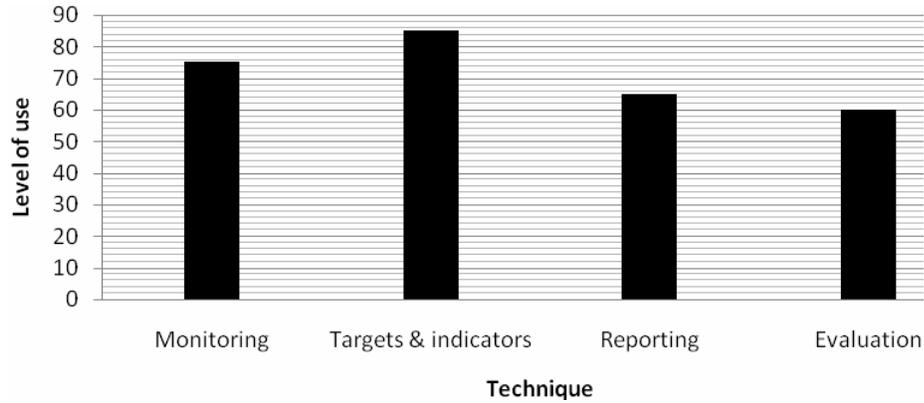


**Figure 4.17 Application of project management tools and techniques**

**Source: Research Data**

#### 4.4.5 Tracking Progress

Four techniques were mentioned as the most used in the ministry to track progress on projects implementation. MOPW uses targets and indicators to track project progress. This was followed by monitoring. Monitoring is a continuous assessment of project progress against the set targets and indicators.

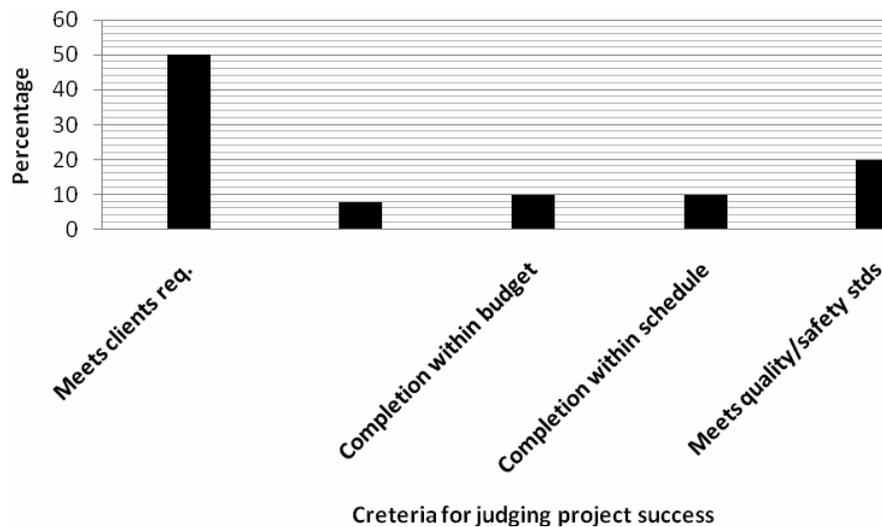


**Figure 4.18 Techniques Used to Track project Progress.**

**Source: Research Data**

#### 4.4.6 Project Success Criteria

To measure the level of project success, the respondents mentioned that there exist measurement criteria. Client satisfaction is considered a key factor in the satisfactory delivery of building projects by MOPW. Whether the project meets the quality and safety standards was equally important a factor according to MOPW technical staff.



**Figure 4.19 Criteria for Judging Projects Success**

**Source: Research Data**

#### 4.4.7 Specifications

Table 4.6 provides a summary of what happens as a result of defective specification on a project. The most serious problem as identified by the respondents is rework due to ambiguities, followed by delays in obtaining clarifications. Clear specifications are mandatory, especially at both design and construction phases of the project. It is the responsibility of design team, the project supervising team and the contractor to check and implement all the specifications, be it general or specific. Use of specifications ensures the soundness of a project and is enhanced by effective supervision of a project.

**Table 4.6 Outcomes of Defective Specification**

<b>Resultant situation from defective specifications</b>	<b>Percentage</b>
Rework due to ambiguities	<b>87</b>
Delays in obtaining clarifications	<b>80</b>
Rejection of work due to different interpretations	<b>75</b>
Formal claims for additional cost and time	<b>62</b>
Cost adjustments due to alternative materials being submitted	<b>60</b>
Delays in getting equivalent materials approved	<b>55</b>
Major change due to impossible specifications	<b>47</b>
Skill required not available from local workforce	<b>45</b>

**Source: Research Data**

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.0 Introduction**

The purpose of the study was to assess the supervision capacity of the Ministry of Public Works in the construction of public building projects in Kenya, with a view of identifying the issues and difficulties that the ministry encounters during the process of supervising a project. To achieve this goal the study outlined a number of specific objectives including: to examine the Ministry of Public Works organizational effectiveness in supervision of building projects; to examine human resource competencies (skills) in the Ministry of Public Works; and finally to evaluate project management and supervisory tools currently used in supervisions of projects

This chapter dwells on the summaries of the research findings and based on those findings, conclusions are made and recommendations are drawn which would be used in policy management strategies for effective supervision of public building project by the Ministry of Public Works.

#### **5.1 Summary of the Findings**

This section gives a summary of the findings in line with the research objectives which the study set out to determine.

##### **5.1.1 The Ministry of Public Works' organizational effectiveness in supervision of building projects**

The study set out to examine the MOPW's organizational effectiveness in supervision of building projects. This was done in terms of looking at the adequacy in organizational capacity and finding out whether the current organizational structure of MOPW enhances efficiency in supervision of public buildings.

The study findings revealed that teamwork among the ministry's supervision staff was poor. Equally, the ministry's organizational structure was found to be poor in its ability to develop and evaluate policy alternatives which would enhance project

supervision. The findings also showed that the ministry's organizational effectiveness in problem identification, decision making, and communications was satisfactory. The study findings further revealed that the ministry had capacity to undertake planning, coordination, monitoring and reporting. However, the ministry lacked capacity in terms of staffing and budgetary allocation.

On the other hand, it was established that the Ministry's organizational structure was good when it came to allocation of responsibilities to staff, delegation of duties and reporting relationship. As regards the Ministry's organizational structure effectiveness in enhancing timelines, procurement process for plant and equipment, public accountability and projects administration. The study findings revealed that the ministry of public works organizational structure effectiveness was satisfactory with regards to these parameters.

The findings of the study reveal some of the major problems of the current organizational structure to be staff stagnation, inflexibility of the structure, existence of stringent rules and regulations which brings inefficiencies. Finally, centralization of authority and rigidity of the structure was also identified as a major problem.

In light of the above challenges identified, the study also highlighted some changes that needed to be done on the existing organisational structure in order to improve on supervision. The changes included; enhancement of vertical mobility, establishment of more positions within the current organizational structure, conversion of the inspectorate section into a full-fledged department, creation of work units comprising of professionals in all technical fields relevant to building project supervision, and creation of a new project management department within the ministry.

### **5.1.2 The Ministry of Public Works' Human Resources Competencies**

The second objective of this study was to examine the technical skills possessed by the supervision team in the ministry of public works. The aim here was to gauge the human resources capability to undertake supervision of building projects competently. The key parameters used for gauging competencies included; existence of a training policy, the number of management courses attended by the supervision

team, supervisory improvement courses and technician courses attended in the last three years.

The study findings established that there exist a training policy in the ministry of public works which lays out the training framework for staff in the ministry. The implementation of the said policy was found to lie heavily with the ministry's human resource management department. However other organs mentioned such as MTC, HOD and DPM, all have a role to play in implementing the training policy in the the ministry.

As regards the number of competency training attended, the findings showed that none of the respondents interviewed had attended any supervisory improvent courses in the last three years. Instead majority of the respondents indicated that they had attended 1-3 management courses, technician courses and short courses, with minority attending atleast 3-5 management, technician and short courses in the last three years. These results highlight the need for building projects supervisors in the ministry to undergo constant refresher courses on supervisory improvement to equip them with latest skills that would help them enhance their performance.

In order to address the technical capacity gaps, the researcher sought to know from the respondents some important technical skills necessary for a building project supervisor. The study findings indicated that the most important competency required of a building project supervisor is the ability to understand and interprate site drawings, quality specifications and the ability of the supervisor to enforce implementation. The other important competency requirement identified were ability of the supervisor to identify and discuss problems with foremen, planning, control and allocation of tasks; ability to organize site storage; attendance of site meetings and finally the ability to read and understand reports.

Finally, the respondents were required to identify some of the training requirement necessary for supervisory improvement for a building project supervisor. According to the study findings, the first training requirement for project supervisors was quality control courses. The second training requirement was construction methods

training while the third was material control related courses. Other important training requirements identified were planning courses; Scheduling courses and site planning courses.

### **5.1.3 Project Management and Supervisory Tools used in Supervision of Projects**

The aim of the researcher here was: to establish the existence of project management and supervision tools such as supervision manual(s) for building projects supervisors in the Ministry; to find out the kind of supervision techniques commonly applied by project supervisors in the supervision of building projects; to determine the management skills available in MOPW; to establish the level of application of project management tools and techniques; to identify the techniques used by the Ministry to track progress on projects implementation; to know the criteria used for judging projects success in the MOPW; and finally to reveal the effects associated with the use of defective specification on a project.

The study findings revealed that the ministry did not have a building construction supervision manual to guide in projects supervision. Projects supervisors according to the study findings relied majorly on contract documents to undertake project supervision. They also relied on own subjective judgements, government circulars, their own experience and directions from higher authorities in building projects supervision. The results however, established that some of the manuals used by MOPW included; instruction to supervisors manual, building operations and maintenance manual, general specification of building works manual, general specification for structural works manual and general specification for electrical works manual. None of these manuals was specifically for building project supervision or supervisory improvement.

As regards the management skills available in MOPW, the study findings revealed that there exist ten important management skills in the ministry. The first three management skills in the list included; Interpersonal skills; project human resource management skills and project communication management skills. Other

management skills said to be available in the Ministry but at moderate scale included; use of information technology skills; project quality management skills; project scope management skills and project time management skills. Bottom in the list of management skills and therefore deemed lacking included project risk control management skills, project intergration management skills and project procurement management skills.

The study findings went ahead to reveal that the level of application of project management tools and techniques was generally low in the ministry of public works. The main project managemnt tool found to be extensively applied in the Ministry was the Gantt bar chart (GBC). The rest of the techniques identified were applied but to less significant levels. These included the Graphical evaluation and review technique (GERT), Strength weaknesses opportunities and threats (SWOT) analysis, Project management software, Critical path method (CPM), Cash flow analysis (CFA), Work breakdown method (WBM), and Programme evaluation and review technique (PERT). Similarly, the overall application level of the decision making techniques was found to be generally very low. Amongst the identified techniques in ascending order were expressed preferences, decision analysis, implied preference method, cost benefit analysis (CBA), revealed preference and finally sensitivity analysis.

As regards the techniques used in the Ministry to track progress on projects implementation, the findings revealed four techniques commonly used in tracking progress in projects implementation. The most commonly used technique was use of targets and indicators followed by monitoring, reporting on progress and finally evaluation. Finally, the study results indicated that the criteria used for judging projects success by the MOPW comprised of a number of parameters. The first was on whether the project meet clients' requirements while the second was on whether the project meets quality and safety standards. The other parameters mentioned in the study included checking whether the project is completed within schedule and budget and whether it meets the organizational objectives.

Finally, as regards the effects associated with the use of defective specification on a project, the study results revealed that the most serious problem as identified by the respondents was rework due to ambiguities, followed by delays in obtaining clarifications. Other problems included; rejection of work due to different interpretations, formal claims for additional cost and time, cost adjustments due to alternative materials being submitted, delays in getting equivalent materials approved, major change due to impossible specifications and Skill required not available from local workforce.

#### **5.1.4 The Current Workload in the Ministry of Public Works**

The study findings established that the ministry of public works had a huge backlog of projects to be supervised owing to the yearly accumulation of projects and the additional projects requests received by the ministry each year. The growth in projects numbers exhibited an upward growth trend despite some projects being given out to private consultants each year. For instance, the portfolio of projects to be supervised by the ministry in the year 2010/2011 stood at over 1700 projects.

To examine the current workload in the ministry, this sought to establish the staffing gap by comparing the current verses the approved number of technical staff in the MOPW. The study findings showed that the available technical staff needed to undertake project supervision were 440 against an approved staff establishment of 2891. This leaves an average staffing gap of 86% which scuttles the aim of providing effective projects supervision for the clients. The gap was found to be greatest in the Electrical and Mechanical engineering fields. The study findings went ahead to show that on average each technical staff currently handles 29 projects compared 4 projects they would had handled had the approved staff establishment been fully implemented.

The study went ahead to highlight some of the alternatives means the Ministry uses to close the existing staffing gap to ensure projects are supervised effectively. The findings here revealed that the alternatives ways the Ministry employs in ensuring that projects are fully supervised included subcontracting projects to private

consultants who must also be closely supervised by the ministry technical staff. The other alternative mentioned was employment of more staff. This strategy was found to have some limitation because it was not the Ministry who employs but the public service commission. The results also revealed that retention of the staff in the public service seems to be difficult as the numbers of young staff below 30 years was found to be very low in the earlier results.

The overall findings on workload was that the number of projects to be supervised by the ministry was found to outweigh the number of staff available. This is due to the fact that there existed a huge staffing gap hence the ministry was forced to subcontract work to private consultants. As a result of a technical staff handling many projects at a given time, this may lead to doing projects in a hurry thereby compromising some standards.

## **5.2 Conclusion**

The main aim of this study was to assess the supervision capacity of MOPW in the construction of public building projects with a view of identifying and prioritizing factors and practices that have the potential for improving supervisory effectiveness in the delivery of public building projects. The specific objectives in the supervision capacity assessment were aimed at evaluating MOPW capability in terms of organizational effectiveness, the human resource competency and technical skills, the project management and supervisory tools applied in project supervision and the current workload exhibited in the ministry.

In view of the above, the study findings revealed that the Ministry of Public Works organizational structure was only effective in the areas of allocation of responsibilities, delegation and reporting. However, it was found to be not much effective in a number of critical performance areas including building teamwork amongst employees, its ability to develop and evaluate policy alternatives, problem identification, decision making, communications, timeliness, procurement of plant and equipment, public accountability and in project administration. The ineffectiveness of the organizational structure was further brought out in the

problems which were identified to characterize the current structure such as staff stagnation, inflexibility, existence of stringent rules and regulations bringing inefficiencies and centralization of authority.

Despite the project supervisors in the Ministry of Public Works having the requisite technical trainings and number of years experience in the respective buildings construction fields, none of them had been trained in any supervisory improvement courses for the last three years. This problem is compounded by the fact that there exists no specific supervision manual in the Ministry. This puts question marks on their competency in undertaking project supervision without necessary skills in supervision or management acquired through formal training.

The findings further revealed that the Ministry of Public Works applies project management techniques and supervision tools to a lesser extent while undertaking projects supervision. The results indicated that no building projects supervision manual and that project supervisors relied heavily on the contract documents to undertake project supervision together with their own subjective judgements, government circulars, their own experience and directions from higher authorities. The study also revealed that there were important management skills lacking in the Ministry such as project risk control, project procurement and project time management skills.

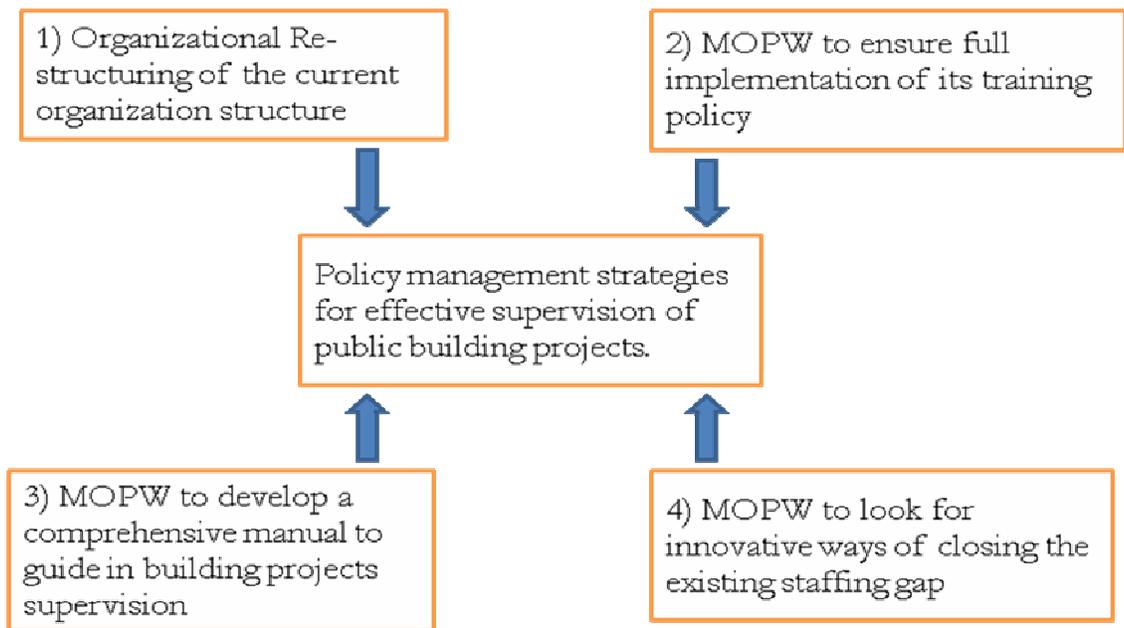
The study also found out that most specifications used for projects are general and copy-and-paste from one project to another. No specific specifications for most projects and as a result, alot of rework due to ambiguities, delays in obtaining clarifications and rejection of work due to different interpretations among other outcomes of defective specifications.

Finally, the study results found that the current workload in the ministry of public works was huge as the cumulative number of projects stood at over 1700 projects against 440 technical staff. The staffing gap was found to be averaging 86% and thus each staff is expected to supervise an average of 29 projects compared to an average of 4 projects that each staff would have been expected to supervise with the existence

of the full staff establishment. International Labour Organization (ILO) is not specific on the number of projects a technical staff can supervise at any given time. It uses project effort time, also known as development effort time for estimating the number of projects. 10% of total development effort time is generally acceptable for small projects while 20-30% of the total development effort time is acceptable for large projects. For purposes of calculation, this study used 15% total development effort time for a medium project and found that a technical staff will supervise between 5-7 projects comfortably.

### 5.3 Recommendations

This section gives recommendations based on the findings of the study. It starts by highlighting the recommendations in figure 5.1 below before presentation of the actual comprehensive policy recommendations.



**Figure 5.1 Study Recommendations**

**Source: Author's Analysis**

The Kenya Vision 2030 recognizes the importance of development of infrastructure as critical to socio-economic transformation. The Ministry need to enhance its commitment to all the factors mentioned in the study, namely; MOPW organizational

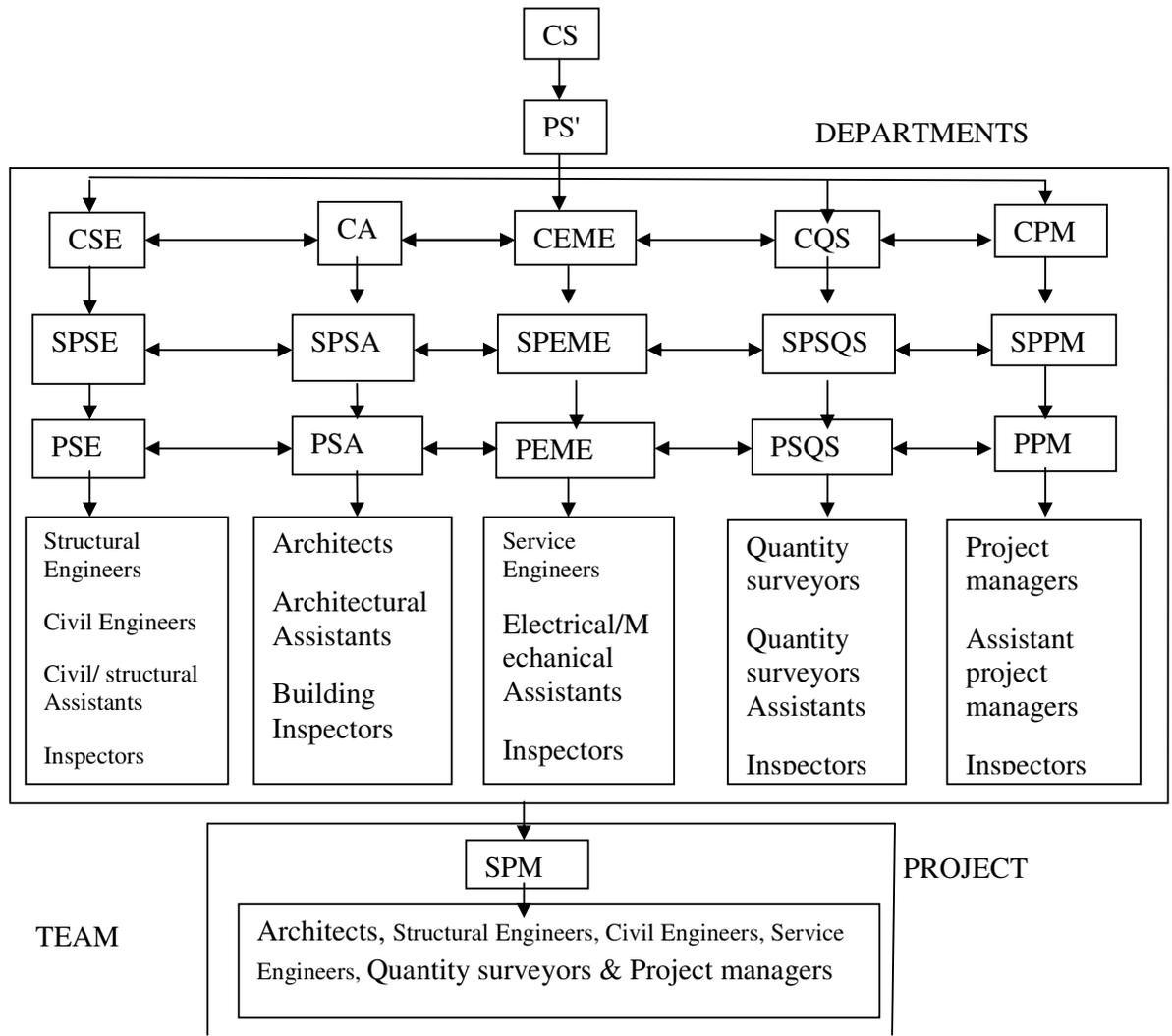
effectiveness: human resource skills and competencies that would built necessary capacity and project management and supervisory tools. The MOPW need to provide top management support for technical staff. Specific emphasis here is placed on the need to accord supportive work conditions to projects supervising staff.

The following are the datailed recommendations of the study;

- (i) The ministry of public works should consider organizational re-structuring of the current organisation structure in order to restore its effectiveness in building project supervision by:-
  - a. Enhancing vertical mobility of staff;
  - b. Establishing more positions within the current organizational structure;
  - c. Converting the Ministry' inspections section into a full-fledged department;
  - d. Creating work units comprising of professionals in all technical fields relevant to building project supervision and;
  - e. Creating a project management department within the ministry.

In line with the reasons and views of the respondents for the proposed re-structuring of the current structure, figure 5.2 shows the proposed organisation structure that indicate integration of technical teams that will enhance effective delivery of public building projects.

**Proposed organisation structure**



**Figure 5.2 Proposed organisation structure**

**Source: Research Data**

- (ii) The ministry should ensure full implementation of its training policy by objectively identifying the training needs for project supervisors based on current trends and technology in the buildings construction sector. The ministry should also ensure that project supervisors are trained regularly on supervisory and management courses in addition to the trainings on technical

courses in quality control, construction methods, material control, planning and scheduling and siteplanning. The emphasis here is to enhance supervision capacity of the MOPW project supervisors.

- (iii) The ministry should develop a comprehensive manual to guide in building projects supervision in order to avoid subjectivity in supervision hence ensuring uniformity and standard quality in the buildings projects.
- (iv) The ministry should look for more innovative ways of closing the staffing gap including employing young staff and ensuring that they are retained to reduce the huge workload currently being witnessed in the ministry.

#### **5.4 Areas for Further Research**

This study found out that there exists a huge staffing gap. Among the reasons for this gap was found to be the inability of the ministry to retain the young staff especially those below 30 years of age due to inflexibility and ineffectiveness in the organizational structure. Future studies should be done to extensively explore the ways in which the ministry can retain the young technical staff in order to close the existing staffing gap.

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## APPENDECES

### INTERVIEW SURVEY ON AN ASSESSMENT OF THE MINISTRY OF PUBLIC WORKS' CAPACITY TO SUPERVISE BUILDING PROJECTS IN KENYA

This is a research study aimed at assessing supervision capacity of the MOPW in the construction of public building projects in Kenya in terms of the available resources, in-house competencies and the existing project management tools with view of identifying and prioritizing factors and practices that have the potential for improving construction productivity in the delivery of public building projects. You have therefore been identified as one of the respondents; kindly spare 30 minutes of your precious time for the oral interview at your office or any other place of your convenience. The information given shall be strictly used for the purpose of the research and utmost confidentiality shall be ensured. The research is conducted with the authorization of JKUAT Construction management department.

#### A. ABOUT YOU

##### 1) Are you....?

- a) An Architect [ ]
- b) An Engineer
  - Structural Engineer [ ]
  - Electrical Engineer [ ]
  - Civil Engineer [ ]
  - Mechanical Engineer [ ]
- c) A Clerk of works [ ]
- d) A Contractor [ ]
- e) A Client Representative [ ]

##### 2) How old are you?

- i. Under 30 years [ ]
- ii. 31-45 years [ ]
- iii. 46-55 years [ ]
- iv. Over 55 years [ ]

- 3) For how long have you held this position?
- i. 1-5 years [ ]
  - ii. 6-10 years [ ]
  - iii. Over 10 years [ ]
- 4) Gender (Researcher to tick)
- a) Male [ ]
  - b) Female [ ]

**B. RESEARCH QUESTIONS (For MOPW Technical/supervisory team)**

*(Objective 1: To examine the ministry of public works organizational effectiveness in supervision of building projects)*

Research question 1:

- i. Does the current organizational structure enhance the following?  
Use a likert scale with four points rating scale to indicate your degree of satisfaction where 4-Excellent, 3-Good, 2-Satisfactory, 1-Poor:

<b>TOPIC</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Decision Making				
Allocation of responsibilities				
Reporting relationship				
Problem identification				
Ability to develop and evaluate policy alternatives				
Team work promotion				
Delegation				
Communication				
Level of public accountability				
Projects administration				

Human resource management				
Plant and equipment procurement				
Administrative Processes				
Timeliness				

ii. Are there vacancies in any of the posts as provided in the current organizational structure that would affect the functions of that office/ position?

- Yes [ ]
- No [ ]

iii. Would you consider the following as problems of the current organizational structure and why?

<b>Problem</b>	<b>Yes</b>	<b>No</b>
Inflexibility		
Centralization of authority		
Rigidity in handling people and problems		
Rules and regulations lead to inefficiency such as getting approvals.		
Is less effective during change or turbulence, requiring flexibility and action		
Ignores interpersonal relationships and their effects upon the workplace		
Fails to take environment into account		
Any other (please state)		

iv. What changes would you suggest in a new structure that would increase efficiency and effectiveness in supervision of building projects?

<b>Changes</b>	<b>Yes</b>	<b>No</b>
Fill in vacant posts		
Reduce staff stagnation		
Decentralization of authority within a work unity/ group		
Create new posts		
Any other (please state)		

- v. Is there any stagnation of officers in any category that would cause frustration, low staff morale and/ or low upward mobility?
- Yes [    ]
  - No [    ]
- vi. Does MOPW have adequate organizational capacity to supervise Government buildings projects and other public works in terms of Planning, coordination, monitoring, Staffing and resources?

TOPIC	SA	A	D	SD
Planning and coordination				
monitoring				
Staffing				
Budgetary allocation				
Plant and equipment,				
Staff facilitation				
Reporting				
Evaluation				

*Objective 2: To examine human resource competencies in the ministry of public works)*

Research question 2:

- i. How many technical staff do you have in your department? (*Departmental chiefs*)

Designation	Job Group	Authorized Establishment	In post	Variance
Architect(A)	K-T			
Architectural Assistants(AA)	H-P			
Clerk of works (COW)	H-P			

Engineers(E) <ul style="list-style-type: none"> <li>• Civil and Structural</li> <li>• Electrical</li> <li>• Mechanical</li> </ul>	K-S K-SK-S			
Structural Assistants	H-P			
Electrical Assistants	H-P			
Mechanical Assistants	H-P			

ii. The following are major challenges and labour issues of the ministry, Use a likert scale with four points rating scale to indicate your degree of satisfaction where SA-Strongly Agree, A-Agree, SD- Strongly Disagree, D-Disagree

TOPIC	SA	A	D	SD
Inadequate staff				
Insufficient budgetary allocation for staff welfare				
Lack of adequate budgetary provision for certain programmes				
Dilapidated and obsolete equipment				
Poor succession planning and management coupled With ageing workforce				
Limited staff capacity				
Poor working environment				
Disjointed scheme of service				
Bureaucracy in procurement of goods and services				

iii. Does the ministry have a training policy for its technical staff?

- Yes [    ]
- No [    ]

iv. If yes in (iii) above, who is responsible for its implementation?

- Human resource manager [    ]
- Ministerial training committee [    ]
- Departmental heads [    ]

- DPM [ ]
- None of the above [ ]

v. How many training opportunities have you had for the last three years?

Nature of Training	Period (last three years)				Relevancy	Reporting(after training)
	None	1-3 courses	3-5 courses	Over 5 courses		
Management courses					Very = Relevant = Not relevant =	Back-to-office report Yes- No-
Technician courses					Very = Relevant = Not relevant =	Oral or written Oral- Written-
Seminars					Very = Relevant = Not relevant =	To whom the report is done. Ps- HRM- MTC- DPM-
Workshops					Very = Relevant = Not relevant =	Period within which the report is done A week 2 weeks A month Never-X
Others (Specify)					Very Relevant Not relevant	

*(Objective 3: To evaluate project management and supervisory tools and equipment employed in supervisions of projects )*

Research question 3:

i. In the current in-house skills, does the ministry have sound project management skills?

- Yes [ ]
- No [ ]

- ii. If No in (ii) above, what would you recommend;
- Employ project managers [ ]
  - Train current staff construction management skills [ ]
  - Outsource services of project managers [ ]
  - Maintain the status quo [ ]
- iii. Does the MOPW have construction supervision manuals/ project management skills?
- Yes [ ]
  - No [ ]
  - I do not know [ ]

If No, kindly indicate and rank (from 1 to 5) the bases on which project supervision is guided.

<b>Bases</b>	<b>Rank (from 1 to 5)</b>	<b>Number of respondents</b>
Contract documents: condition of contract, specifications, BQs and drawings		
Circulars/ Government orders		
Architects/ Engineers subjective judgments		
Supervisors experience		
Directions issued by superior authorities		
Other criteria		

- iv. Does the MOPW develop any methodology for executing any items of works by the contractor?
- Yes [ ]
  - No [ ]
- v. Does the MOPW have any criteria for defining project success?
- Yes [ ]
  - No [ ]

If yes, kindly indicate and rank (from 1 to 5) the criteria used to judge success.

<b>Criteria</b>	<b>Rank (from I to 5)</b>	<b>Number of respondents</b>
Meets clients requirements		
Completed within schedule		
Completed within budget		
Meets organizational objectives		
Meets quality/ safety standards		
Other criteria		

vi. Does the MOPW have a list of critical success factors?

- Yes [ ]
- No [ ]

If yes, kindly indicate which of the factors you regard as critical to the outcome of the projects you are engaged in.

<b>Factors</b>	<b>Frequency</b>
Clear goals/ objectives	
Support from senior management	
Adequate funds/ resources	
Realistic schedules	
Effective leadership/ conflict resolution	
Clear communication channels	
Effective management of risks	
Effective monitoring and feedback	
Taking account of external influence	
Effective team building/ motivation	
Training provision	
Provision of planning and control systems	
Having access to innovative/ talented people	

vii. From the list of 18 options, indicate what tools and techniques are in current use by MOPW in the field of project management?

<b>Project management tools</b>	<b>Frequency</b>
Critical path method (CPM)	
Work breakdown structure (WBS)	
Cash flow analysis (CFA)	
Gantt bar chart	
Graphical evaluation and review technique (GERT)	
Programme evaluation and review technique (PERT)	
Strength weakness, opportunities and threats (SWOT)	
Other project management tools <ul style="list-style-type: none"> <li>• Project management software</li> <li>• In-house project management tools</li> </ul>	
Taking account of external influence	
<b>Decision making techniques</b>	
Cost benefit analysis	
Decision analysis	
Sensitivity analysis	
Expressed preferences	
Implied preferences	
Revealed preference	
Other decision making techniques <ul style="list-style-type: none"> <li>• In-house decision making techniques</li> </ul>	

viii. Do you agree that “Specifications are not being used to their full potential” in the construction projects?

- Yes [    ]
- No [    ]

- ix. What are the components of the Specifications for the project that you indicated above?

<b>Specifications</b>	<b>Frequency</b>
General Specifications (included in tender documents	
Published General Specifications (only referred to in tender documents)	
Particular Specifications	
No distinction as above, but just ONE set of Specifications	

- x. How often do you use the Specifications for the following purposes during construction?

<b>Specifications purposes</b>	<b>Frequency</b>
For ensuring that the required quality standard is met	
For comparing alternatives submitted by contractors	
For effecting changes when necessary	
For settling variation claims from contractors	

- xi. How often do you hear of the following situations resulting from defective specifications in general?

<b>Situations resulting from defective specifications</b>	<b>Frequency</b>
Re-work due to ambiguities	
Delay in obtaining clarification	
Delay in getting equivalent materials approved	
Cost adjustments due to alternative materials being submitted when no equivalent can be obtained locally.	
Rejection of work due to different interpretations	
Major change due to impossible specifications	
Formal claims for additional cost and time	
Skill required not available from local workforce	

- xii. Are the specifications adequate from technical content and from communication point of view? (Please circle the most appropriate number in the scales, representing your own evaluation on the attributes of the Specifications of a project familiar to you)

<b>TECHNICAL CONTENTS</b>					
Relevance of clauses to the project	Unclear				Clear
	1	2	3	4	5
Indication of quality expected	Poor				Good
	1	2	3	4	5
'Updateness' of information	Poor				Good
	1	2	3	4	5
Practicality of requirements	Low				High
	1	2	3	4	5
Reference to standards	Low				High
	1	2	3	4	5
<b>COMMUNICATION EFFICIENCY</b>					
Co-ordination amongst different spec sections & drawings	Poor				Good
	1	2	3	4	5
Language Style	Wordy				Concise
	1	2	3	4	5
Clarity	Poor				Good
	1	2	3	4	5
Retrieval of information	Difficult				Easy
	1	2	3	4	5

xiii. What kind of procedures do you often employ to ensure the project is on track?

Procedures	Frequency
Monitoring of projects	
Use of targets and indicators	
Reporting	
Evaluation	
Combination of the above	

xiv. How would you rate MOPW with regards to the following issues in its current project management processes? (Please tick suitable box to indicate relative frequency where Lowest 1 2 3 4 Highest)

ISSUES	Poor	Average	Above Average	
	Good			
	1	2	3	4
Project time management				
Project cost management				
Project scope management				
Non viability of tendered rates				

*(Objective 4: To assess the current workload, financial, plant and equipment resources in the ministry of public works)*

Research question 4:

- i. How many projects the ministry is undertaking this year?
  - 1-1000 projects [ ]
  - 1001-1500 projects [ ]
  - 1501-1700 projects [ ]
  - Over 1700 projects [ ]
- ii. Given the current technical staff establishment, is there a variance in the approved and in-post staff?

- Yes [ ]
  - No [ ]
- iii. If yes in (ii) above, how does the ministry close the gap?
- Subcontracting. [ ]
  - Employing more staff [ ]
  - Outsourcing [ ]
  - Working overtime [ ]
  - Doing nothing [ ]
- iv. The ministry's development plans such as the Economic Recovery Strategy (ERS, 2003-2007), the government was keen on reviving all stalled project in the country. Did the MOPW receive adequate funding for these projects?
- Yes [ ]
  - No [ ]
- v. If no in (iii) above, how much was the budget and what was the amount provided?
- Budget [ ]
  - Amount provided [ ]
- vi. In your view, is the ministry overwhelmed in her primary objective of providing client ministries with suitable accommodation?
- Yes [ ]
  - No [ ]
- vii. Use a likert scale with four points rating scale to show your degree of satisfaction to the following indicators proofing the ministry is indeed overwhelmed; SA-Strongly Agree, A-Agree, SD- Strongly Disagree, D-Disagree

S/No	TOPIC	SA	A	D	SD
1	There are many projects and few technical staff (Architects, Engineers, COWs etc)				
2	Huge imbalance between staff recruitment and staff leaving service (retrenchment, early retirement, death, resigning and transfers				
3	Subcontracting work to private consultants and contractors				
4	Stalled projects and prolonged delays in completion				
5	Any other (specify)				

viii. How many technical staff do you have in your group/section?

Designation	Architectural department/ Inspectorate						
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Architect							
COW							
	Engineering department						
Electrical Engineers							
Mechanical Engineers							
Structural Engineers							

ix. How many projects are you handling currently?

- 1-20 projects [    ]
- 21- 50projects [    ]

- Over 50 projects [ ]
- x. Is the current work load achievable with the available resources, i.e. technical staff, equipment, Transport facilities, computers, printers, photocopiers, office spaces etc
- Yes [ ]
  - No [ ]
- xi. What percentage of the projects under your docket is being handled by private consultant?
- A quarter plus [ ]
  - A third plus [ ]
  - Half plus [ ]
  - None [ ]