

**DEVELOPMENT OF A FRONT – END CONSTRUCTION
PROJECT MANAGEMENT FRAMEWORK IN RWANDA:
A CASE OF RWANDA HOUSING AUTHORITY (RHA)**

FREDERIC NYAMINANI

MASTER OF SCIENCE

(Construction Project Management)

**JOMO KENYATTA UNIVERSITY OF
AGRICULTURE AND TECHNOLOGY**

2021

**Development of a Front – End Construction Project
Management Framework in Rwanda**


Frederic Nyaminani

**A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of Master Science in
Construction Project Management of the Jomo Kenyatta
University of Agriculture and Technology**

2021

DECLARATION

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

Signature  Date: 5/08/2021

Frederic Nyaminani

This thesis has been submitted for examination with our approval as University Supervisors:

Signature Date:

Dr. Abednego Oswald Gwaya, PhD

JKUAT, Kenya

Signature Date:

Prof. Titus Kivaa Peter, PhD

JKUAT, Kenya

DEDICATION

This thesis is dedicated to:

My Almighty God, Lord, Creator and Master;

My lovely wife, who leads me through the valley of darkness with light of hope and support;

My family in general, the symbol of love and giving;

My friends who encouraged and supported me;

And anyone who touched my heart in my life.

ACKNOWLEDGEMENT

First, I am immensely thankful to the Almighty God who granted me the wisdom, health and strength to undertake this research work from its start to its completion. This research work was completed with the contributions and support of many people to whom I wish to address my high appreciations. Foremost, I am highly appreciative to Jomo Kenyatta University of Agriculture and Technology, School of Architecture and Building Sciences and the Department of Construction Management for giving me the opportunity to pursue this master's course.

I owe special thanks to my supervisors Dr. Abednego Oswald Gwaya and Dr. Titus Kivaa Peter for their patience, motivation, enthusiasm, and immense knowledge disseminated before and during this research work. I much appreciate their professional guidance in all during this journey. I feel blessed to have better advisors and mentors for my Masters study.

I wish also to extend my gratitude to my classmates for their willingness to give a hand wherever a need be. I would further like to thank the industry participants for providing me with the necessary data. The essential the blood is for life, the essential the data is for the study of a researcher. I cannot forget to express my gratitude to all Rwanda Housing Authority technical team including Architects, Engineers, Quantity Surveyors and other construction professionals for their valuable interaction during data collection period. I record my thanks to my mother, brothers, sisters, father-in-law and mother-in-law for their love, prayers, caring and sacrifices for educating and preparing me for my future. I am very much thankful to my wife Mrs. Janvier Barakagwira for her love, understanding, prayers and continuing support to complete this research work. I extend my thanks to those not mentioned expressly, but contributed in this research work in one way or the other, kindly accept my high appreciation for your valuable contribution to this achievement. Finally, I wish to graciously acknowledge any unexpected errors that can be found in this study.

TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENTS	v
LIST OF TABLES	xiii
LIST OF FIGURES	xv
LIST OF APPENDICES	xvi
LIST OF ABBREVIATIONS AND ACRONYMS	xvii
ABSTRACT.....	xxi
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background to the Problem.....	1
1.2 Statement of the Problem	2
1.3 Objectives of the Study	4
1.3.1 General Objective	4
1.3.2 Specific Objectives	4
1.4 Research Questions	5

1.5 Justification of the Study	6
1.6 Significance of the Study	8
1.7 Scope of the Study	9
1.8 Definition of Terms	10
1.8.1 Construction Project Management	10
1.8.2 Front-End Construction Project Management.....	10
1.8.3 Project.....	10
1.8.4 Project Management.....	11
1.9 Organization of the Thesis	11
CHAPTER TWO	13
LITERATURE REVIEW	13
2.1 Introduction	13
2.2 Construction Industry and Project Management.....	14
2.2.1 Worldwide Construction Industry	14
2.2.2 Construction Industry of Rwanda.....	15
2.2.3 Project Management.....	15
2.3 Front-End Construction Project Management and the Project Life Cycle	19
2.3.1 Front-End Construction Project Management.....	19

2.3.2 Project Life Cycle	24
2.4 Procurement of Construction Projects.....	29
2.4.1 Construction Project Process	29
2.4.2 Procurement of a Construction Project	30
2.4.3 Methods of Procurement for Construction Projects	31
2.4.4 The Role of Procuring Entity and Consultant in Project Development ..	32
2.4.5 Construction Dispute	33
2.5 Theories Related to the Front-End Construction Project Management	34
2.5.1 Public Sector and Value for Money	34
2.5.2 The Concept of Suicide Bidding	34
2.5.3 The Concept of Cover Pricing	35
2.6 Theoretical Framework	36
2.7 Conceptual Framework	39
2.8 Measurement of the Variables in the Study	41
2.9 Literature Gap	1
CHAPTER THREE	4
RESEARCH DESIGN AND METHODOLOGY	4
3.1 Introduction	4

3.2 Research Strategy.....	4
3.3 Research Design and Research Methods	6
3.3.1 Research Design	6
3.3.2 Research Methods	8
3.4 Population, Sample And Sampling	8
3.4.2 Sample and Sampling Methods	11
3.5 Data Collection Methods and Instruments.....	13
3.5.1 Source of Data	13
3.5.2 Types of Data	14
3.5.3 Research Instruments.....	17
3.5.4 Method of Data Collection	17
3.6 Validity and Reliability	18
3.6.1 Data Validity	19
3.6.2 Data Reliability.....	19
3.6.3 Data Replicability	20
3.7 Ethical Consideration.....	20
CHAPTER FOUR.....	22
RESULTS AND DISCUSSIONS	22

4.1 Introduction.....	22
4.2 Data Analysis	22
4.3 Response Rate and Background Information	24
4.3.1 Response Rate	24
4.3.2 Background Information on the Respondents	25
4.4 Effectiveness of RHA Organization Structure.....	30
4.4.1 Effects of Current Vacant Positions on Staff Functions.....	31
4.4.2 Major Challenges of the Existing RHA Organizational Structure	31
4.4.3 Proposed Changes to the Existing RHA Organizational Structure to Enhance Efficiency and Effectiveness	32
4.4.4 The Capacity of RHA Personnel in Construction Project Management	34
4.4.5 Enhancement of RHA Staff Relationship.....	35
4.4.6 Extent of Decision-Making Enhancement and Information Flow Within RHA	36
4.5 Front-End Construction Project Management Factors and Techniques Applicable In RHA.....	37
4.5.1 Front-End Construction Project Management Factors Hindering Project Performances in RHA	37

4.5.2 Construction Project Management Tools and Techniques Frequently Used in RHA.....	38
4.5.3 The Main Causes of Construction Project Failure in Rwanda and Related Recommendations	40
4.6 The Extent to Which the Front-End Construction Project Management is Currently Applied in RHA.....	41
4.6.1 Technical staff training policy	41
4.6.2 The Main RHA challenges and staff issues.....	42
4.6.3 Staff Training opportunities in RHA	43
4.6.4 Project Management Skills Recommendations in RHA	44
4.6.5 Basis of RHA Project Management Guides	45
4.6.6 Consequences of Defective Terms of Reference.....	46
4.6.7 Rating of How RHA Manage Construction Performance Indicators	47
4.6.8 Indicators Proofing that RHA is Indeed Overwhelmed	48
4.6.9 RHA Workload.....	49
4.6.10 Effect of Vacant Positions on Staff Workloads.....	51
4.7 Front-End Construction Project Management Framework	51
4.7.1 Project Inception Stage.....	55
4.7.2 Project Approval Stage.....	55

4.7.3 Project Documentation Stage	56
4.7.4 Project Tendering Stage.....	56
4.7.5 Start of Project Execution.....	57
4.8. Summary of Research Findings	57
4.8.1 Findings on the effectiveness of RHA’s organizational structure in terms of management of public building projects; Research Objective No. 1	58
4.8.2 Findings on the identification of front-end construction management factors affecting project performance and evaluate its tools, techniques applicable in RHA; Research Objective No. 2	59
4.8.3 Findings on the extent to which front-end construction project management is currently applied in RHA; Research Objective No. 3	60
4.8.4 Formulation of framework for front-end construction project management at the RH; Research Objective No. 4	62
CHAPTER FIVE	63
CONCLUSIONS AND RECOMMENDATIONS.....	63
5.1 Introduction.....	63
5.2 Conclusions.....	63
5.3 Recommendations.....	64
5.4 Areas for Further Study	65

REFERENCES.....	67
APPENDICES.....	81

LIST OF TABLES

Table 2.1: Variables of the Study and Proposed Measurement Techniques	42
Table 3.1: Existing staffing of RHA and current vacant positions (cont')	9
Table 3.2 : Comparison of primary and secondary data	14
Table 4.1: Respondent Rate	24
Table 4.2: Challenges of RHA Organizational Structure	32
Table 4.3: Proposed Changes to RHA Organizational Structure.....	34
Table 4.4: RHA Construction Project Management Capacity Rating	35
Table 4.5: Staff Relationship Level	36
Table 4.6: RHA Decision Making Intensification Level	37
Table 4.7: Factors of front-end construction project management.....	38
Table 4.8: Construction Project Management Tools and Techniques used in RHA	39
Table 4.9: Causes of Project Failure and Recommendation to Overcome Project Failures.....	40
Table 4.10: Who is in charge of RHA training policy?	42
Table 4.11: Main RHA challenges and staff issues	43
Table 4.12: Training opportunities in RHA.....	44
Table 4.13: Recommendation for skills improvement.....	45

Table 4.14 :The basis /guide of project management in RHA.....46

Table 4. 15: Consequences of the defective terms of reference47

LIST OF FIGURES

Figure 2.1: Construction Project stages vs project management level of effort	26
Figure 2.2: The influence of front-end development on the Value of a Project	37
Figure 2.3: Project Value Influence Vs Project Expenditures	38
Figure 2.4: Conceptual framework: Independent, dependent and intervening variables in the study.....	40

LIST OF APPENDICES

Appendix I: The Researcher's Introduction Letter To Respondents.....	81
Appendix II: Research Questionnaire	83
Appendix III: Jkuat Recommendation Letter For Data Collection.....	98

LIST OF ABBREVIATIONS AND ACRONYMS

ACIF:	Australian Construction Industry Forum
AFINO:	Assistant Finance Officer
AHRO:	Assistant of Human Resource Office
AM&EO:	Assistant Monitoring and Evaluation Officer
APA:	Assistant Project Architect
APCSE:	Assistant Projects Civil and Structural Engineering
APEME:	Assistant Electro-Mechanical Engineering
APM:	Assistant project Manager
APQS:	Assistant Projects Quantity Surveyor
ASIMS ICTO:	Assistant Information Management System and ICT Officer
C/SE:	Civil/Structural Engineer
CPM:	Construction Project Management
FECPM:	Front-End Construction Project Management

FINO: Finance Officer

GDP: Gross Domestic Product

GoR: Government of Rwanda

HOA: Head of Architecture

HOC&SE: Head of Civil and Structural Engineering

HOD : Head of Department

HOEME: Head of Electro-Mechanical Engineering

HOFIN: Head of Finance

HOHR: Head of Human Resource

HOIMS ICT: Head of Information Management System and ICT

HOM & E: Head of Monitoring and Evaluation

HOPM: Head of Project Management

HOQS: Head of Quantity Surveying

HRO: Human Resource Officer

HVAC: Heat, Ventilation and Air Conditioning

MEO: Monitoring and Evaluation Officer

MINECOFIN: Ministry of Economic Planning

MININFRA: Ministry of Infrastructure

PA: Project Architect

PC&SE: Projects Civil and Structural Engineering

PEME: Project Electro-Mechanical Engineering

PM: Project Manager

PQS: Projects Quantity Surveyor

PRD: Project Requirement Definition.

QS: Quantity Surveyor

RDB: Rwanda Development Board

RHA: Rwanda Housing Authority

RII: Relative Importance Index

RPPA: Rwanda Public Procurement Authority

SA: Senior Architect

SC&SE: Senior Civil and Structural Engineering

SEME: Senior Electro-Mechanical Engineering

SFINO: Senior Finance Officer

SHRO: Senior of Human Resource Officer

SIMS ICTO: Information Management System and ICT Officer

SIMS ICTO: Senior Information Management System and ICT Officer

SM&EO: Senior Monitoring and Evaluation Officer

SPM: Senior Project Manager

SQS: Senior Quantity Surveyor

USA: Unite States of America

ABSTRACT

In the Construction industry of Rwanda, front-end construction project management is not well practiced. Although the term “front-end construction project management” is a fairly new expression in the project management body of knowledge, it simply means intense construction project management action in the early stages of the construction project. Accordingly, relatively greater attention and thoroughness are given to the project at the very inception and formulation of the project in order to set a more concrete basis for the project implementation and evaluation. The degree to which the front-end management concept is adopted in a project determines the probability of the project success. Persistence of project delays, cost overruns and other aspects of poor project performance in Rwanda can therefore be attributed to this lack of keenness in the earliest construction project management. Review of the literature related to project performance and construction project management practice reveals that front-end management of construction projects remains scanty in many construction industries and Rwanda is one of them. In a bid to address that situation, the aim of this study is to develop a management framework for enhancing the front-end construction project management in the public construction sector of Rwanda, particularly at the Rwanda Housing Authority (RHA). The specific objectives of the study are to: (i) examine the effectiveness of the organizational structure of RHA in assuring front-end construction project management on building projects; (ii) identify front-end construction project management factors affecting project performance and evaluate its tools, techniques applicable in RHA; (iii) explore the extent to which front-end construction project management is currently applied in RHA and (iv) formulate or develop a framework for front-end construction project management for government building construction projects in Rwanda. Data for the study were both qualitative and quantitative. They were collected mainly from the RHA workers, using a questionnaire and an interview guide. Data analysis has been done using descriptive statistics and thematic analysis. It was observed that the RHA institutional set-up, staff capability and project management procedures inhibit front-end construction project management practice there. Additionally, the people expressed the need for change towards the more effective project management practices. From the data analysis results, a framework that might enhance front-end construction project management at the RHA was synthesized. From this study, it can be concluded that the practice of construction project management at the RHA is professional but rather weak. It does not measure to the standards of intensity associated with the front-end construction project management concept. The researcher therefore recommends enhancement of the project management function of the RHA, through adoption of the framework developed in this study, boosting of the staffing level and further training of the existing staff. This way, project performance should be improved in the public construction sector of Rwanda.

CHAPTER ONE

INTRODUCTION

Background to the Problem

Construction industry is one of the largest industries in the world and it is more of a service than a manufacturing industry (Gruneberg, 1997 & Hillebrandt, 2000). The industry accounts for 6% of global GDP and it serves almost other industries (World Economic Forum, 2016, p. 9). In the UK, construction contributed 8% to the country's Gross Domestic Product (CIOB, 2010). A number of studies have revealed that construction industry generally accounts for between 6% and 10% of GDP. For instance, Chitkara (2004) asserts that it accounts from 6% to 9%. Additionally, Bhimarayan (2001) observes that the construction industry can reach up to 10 % of the GDP in most of the countries worldwide. This clearly indicates the significance of the contribution of the construction sector to the economy of any country in the world.

Rwanda is not an exception; almost a tenth of Rwanda's annual budget is committed to infrastructures (RDB, 2018). The construction sector in Rwanda contributes more than 7% to the national GDP (GAHIGI, 2017). It generates employment and therefore contributes to the poverty reduction and development of Rwandan's economy. The Government of Rwanda recognizes the importance of construction industry. All in all, the construction sector plays an important role in the economy of any country. The activities of this sector are also vital to the achievement of national socio-economic development goals such as providing shelter, infrastructure and employment to the citizens. It is then clear that construction activities affect almost every aspect of the economy and that the industry is vital to the continued growth of any country's economy (Construction Magazine Rwanda, 2017).

Despite of much investment in this sector and its contribution to the national economy, nowadays, the Rwanda Office of Auditor General of State finances indicates a trail of

failed / abandoned construction projects (OAG, 2002-2018) whereas the Rwanda Public Procurement Authority publishes a list of many blacklisted construction companies (Mugisha, 2017). This implies that performances of construction projects and firms are rather low. However, these industry challenges are not limited to the Rwanda construction industry. They have been observed elsewhere in the developing and developed countries. Previous researchers elsewhere have investigated this issue and made observations and conclusions, where Rwanda can borrow a leaf from. For example, over 30 years ago, the USA put up a well-developed body of knowledge for planning, development, and execution of major engineering and construction projects, after facing cost and time overruns challenges for several years. The Seminal Business Roundtable study of 1984 found that an increased **emphasis on the critical early stages** of a project was missed out though it was something very important to the performance of the project. (Westney Consulting Group, 2008). This concept is termed as front-end construction project management.

Additionally, in the Australian construction industry, it was realized that the skill and rigour with which the early phase of project initiation is undertaken has the greatest influence on the long-term performance of the asset. Hence, the industry leading practice emphasizes the need to “**hasten slowly**” in the front-end phase of construction projects. This is because, the costs of making changes grow markedly the later changes are made (ACIF, 2010).

1.2 Statement of the Problem

The problem investigated in this study is that front-end construction project management is not well practiced in the construction industry of Rwanda. In the public sector particularly, the attention paid to project formulation and preliminary planning is rather inadequate. According to Safari (2012), the Kigali International Arbitration Center (KIAC) was established in 2011 to sort out the highlighted construction disputes or conflicts observed by the Rwanda National Tender Board. He asserted that those disputes

result from poor project design stage, contract preparation stage, as well as the signing and implementation stages. This state of affairs raises eyebrows, and is a matter of concern to policy implementers, professionals and researchers in the industry.

The genocide against Tutsi occurred in Rwanda in 1994 extremely destroyed infrastructures in the country. The Government of Rwanda therefore continues to heavily invest in the construction industry for especially the development of the city of Kigali as well as secondary cities. In line with the Auditor General annual reports to the parliament of Rwanda from year 2002 -2016, the persistence of cost and time overruns as well as project failures remain a recurring feature in the reports as follow:

- The 2004 report points out the problem of lack of value for money for public institution since the hired consultants to fill the professional skill gap in public entities were not performing due to lack of proper management supervision and that there were no local staff to understudy or verify the consultants work (Rutagwenda, 2004, p. 6)
- The 2014 report counts **14** failed/abandoned projects out of **78**, that is to say, **17.95%** of Government construction projects are abandoned by contractors.
- The 2015 report counts a case of 12 abandoned contracts out of 58 delayed contracts, that is to say, **20.68%** of the Government projects are abandoned.

Additionally, the Rwanda Public Procurement Authority publishes a list of blacklisted companies due to forgery of documents or poor performance. Accordingly, 65 companies out of 203 (32%) are blacklisted due to poor performance of the contract. In general, the failure of a construction project usually results in disputes and the methods of disputes resolutions are normally highlighted in the contract. The settlement of such disputes necessitates additional cost to each party to the contract.

The abandonment of construction projects and the blacklisting of companies (due to poor performance) arise from among other things, the fact that there is lack of a developed

front-end construction project management framework in Rwanda. Moreover, especially in Rwandan government agencies, some performance contracts are signed including delivering construction projects without thorough consultation on how long it will take. This brings a lot of pressure mainly while closing the annual budget and as a result, the preconstruction stages are inevitably affected. Since adoption of the front-end construction project management concept has been found practicable and beneficial elsewhere, it is a good idea to explore the possibility of embracing it in the public construction sector in Rwanda.

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of this study is to develop a construction project management framework in Rwanda that helps clients, developers, consultants and contractor improve front-end construction phase of a construction project.

1.3.2 Specific Objectives

The specific objectives of the study are to:

1. Examine the effectiveness of the organizational structure of Rwanda Housing Authority in assuring front-end construction project management on building projects.
2. Identify the front-end construction project management factors affecting project performances and evaluate its tools, techniques applicable in Rwanda Housing Authority.
3. Explore the extent to which front-end construction project management is currently applied in Rwanda Housing Authority.

4. Formulate a framework for front-end construction project management for Government building construction projects in Rwanda.

1.4 Research Questions

The following are the research Questions:

(1) *Questions for Specific Objective No. 1:* to examine the effectiveness of the organizational structure of RHA in assuring Front-End Construction Project Management on building project.

- Are there some vacant posts in the Current RHA organizational structure that affect the functions of the department or staff position? Is the number of RHA technical Staff enough to handle assigned projects?
- What are the major challenges or problems of the current RHA organizational structure? Is the structure flexible to allow for staff relationships?
- Are there any proposals for changes in the organization structure for the sake of improving the FCPM on government construction projects?

(2) *Questions for Specific Objective No. 2:* to identify front-end construction project management factors affecting project performances and evaluate its tools, techniques applicable in Rwanda Housing Authority.

- What are the major project management factors hindering the project performances in RHA?
- What are project management tools and techniques frequently used in RHA?
- What are the main causes of the project failure in RHA? Is there any recommendation to minimize project failures in RHA?

(3) *Questions for Specific Objective 3:* to explore the extent to which front-end construction project management is currently applied in RHA.

- Is there any training policy for technical staff in RHA? Who is in charge of such policy?
- What are the main challenges and issues of the RHA technical staff? Are the staff overwhelmed? If yes, what should be the effect on the staff performance?
- By what materials the project management is currently guided in RHA?

(4) *Questions for Specific Objective No. 4:* to formulate a framework for front-end construction project management for government building construction projects in Rwanda.

- How can a framework be formulated to involve all key construction professionals in RHA?
- How can the framework intensify the FECPM practice in RHA?
- How can RHA technical towards other government entities /Project end users be incorporated in the framework?

1.5 Justification of the Study

The complexity of construction projects relies on the division of tasks and responsibilities among project parties and involvement of different construction professionals or specialists. During the project definition stage, designs, specifications, intense team coordination and communication among project parties is highly required. Therefore, any failure by the project team leader will much affect the quality of the work produced by different professionals (Architect, Quantity Surveyor, Geotechnical, structural, electrical, mechanical, IT engineers etc.). A proper team coordination is highly required in order to avoid or minimize errors or omissions which would lead to unexpected change orders, delays and changes of the wholesale scope of works, of course with cost implication. This early coordination entails the front-end project management skills.

According to Safari (2012), the main cause of construction disputes in Rwanda is the cost overrun due to the unwillingness or inability of the project owner to pay, even when the cost overruns result from legitimate project scope changes and / or project upgrades by the owner. There is no doubt that project costs, quality and or time estimates generated based only on assumptions would not result in significant scope changes. Gitau (2015) asserts that, in Rwanda, the initial construction project cost and schedule estimates are often prepared based on incomplete information. Accordingly, in public procuring entities, the Rwanda Public Procurement Authority (2017) noticed the weaknesses and challenges in the preparation of the tender documents including terms of reference and technical specifications which are part of contract documents. Further weakness was noticed in the preparation or setting of technical requirements to guarantee the desired project performances and RPPA asserts that this weakness leads to some disputes between procuring entities and contractors or consultants during the contract execution stage.

This study focused on investigating the current RHA construction project management practice and development of a front-end construction project management framework that should be adopted in order to improve on project definition, all for the purpose of minimizing the possible construction disputes for public projects in Rwanda.

This research work fills the existing literature gap related the early project management practices in RHA through the development of a front-end construction project management framework that shall be used not only in RHA but also other government entities during the elaboration of a new construction project. The framework ensures the contribution of various construction professionals and will help in making informed decision at any stage of a construction project. Finally, change should be made on how the practice of front-end construction project management is carried out in RHA. The study recommendations provide a contribution in knowledge through the adoption of a new management framework within RHA.

The developed framework provides a practical comprehensive decision-making tool that should help in solving problems that occur during the front-end construction phase with respect to the project objectives. Moreover, the framework also provides tools for improving relationships throughout the project supply chain.

1.6 Significance of the Study

As it was earlier noted that the construction industry has a great impact on the national economy, it is therefore to be managed effectively and efficiently.

This study is very important as its results recommend the improvement for critical aspects of construction project management during early stages of a construction project. This fulfills the objectives of Rwanda vision 2050 regarding improvement on public facilities. Hence, the study will contribute to the attainment of the rapid growth of social economic activities. Improved construction project management practices during early stages of building projects will ensure the accuracy and reliability of project documents before awarding the tender for executing the project. The researcher is with the opinion the effective front-end construction project management will also lead to reduction of construction project time overruns, cost overruns and project abandonment resulting from construction projects with inadequate designs.

The findings from this study have helped in developing a framework to guide pre-construction project management practice in Rwandan construction industry. The coherent construction project management framework was developed by referring to the identified critical factors affecting pre-construction project stages and putting them together. When adopted, this framework will serve as a guide that can be adopted by the government officials in managing assigned construction projects. This research work contributes valuable knowledge to public and private Clients, developers in building

projects, contractors, consultants as well as investors in the field of construction. In this regard, the outcome of this research work will be useful to:

- Client / Developers to effectively make decisions when construction projects are well defined;
- Foreign and local Contractors to effectively deliver designs and build construction projects;
- Construction professionals for the best practice;
- Academic institutions for further researches

Finally, the study will contribute to the knowledge of future readers or researchers as a source for reference for further researches related to the construction project management.

1.7 Scope of the Study

The study focused on the practice of construction project management during early stages of construction project in RHA. The study also assesses the capability of RHA to oversee all public building projects. The study involved technical staff of RHA (Architects, Quantity surveyors, Engineers). The research covers public building project with estimated value is equal to or is above five hundred million francs (RWF 500,000,000). The variable scope of the study relies on the effectiveness of the new organizational structure of the Rwanda Housing Authority, the competencies of the Human resource, the actual workload for RHA technical team, project management tools and equipment.

According to the letter No. 358/MOS/Trans/017 dated on 16 March 2017, 2017 from MININFRA implementing the resolution of the 14th National Leadership Retreat took place on 25th February 2017 at Gabiro, Rwanda Housing Authority was tasked to manage all public housing projects. Therefore, RHA acts as a construction consultant to all other ministries and departments. The study was carried out in RHA to represent other public entities involved in the public construction projects.

Finally, the scope was limited to project management during pre-construction phase (i.e., Planning & designs). I did not consider the project management practice during project execution and maintenance phases. This was done in order to concentrate on the front-end of the project(s).

1.8 Definition of Terms

1.8.1 Construction Project Management

Although construction project management do not differ much from the project management itself, it can be defined as the direction, regulation and supervision of a construction project from early development to completion. Construction Project Management is with an ultimate goal of attaining the full satisfaction of client's demands for a viable project both in terms of functionality of the facility and the project budget. There is a wide range of construction project types, such as commercial, residential, industrial and heavy civil (GenieBelt, 2018).

1.8.2 Front-End Construction Project Management

The front-end of a construction project can be defined as the early Construction project stages when crucial and binding decisions are to be made. In other words, the early stages of a construction project comprise a pre-construction phase of a construction project.

1.8.3 Project

A project is defined as a group of interrelated work activities constrained by a specific scope, schedule and budget to deliver capital assets needed to achieve the strategic goals of an Agency (Kam, 2012). Many scholars defined a project in different and commentary terms. For example, Ralph and Ludin (1998) defined a project as a discrete set of activities performed in a logical sequence to attain a specific result. They also ascertain that each activity and the entire project, has a start and stop date. This was emphasized not only by

Hojatolah (2015) who defined a project as it is temporary effort for making a product, service, or unique result but also by Prakash (2018) who defined a project as a temporary endeavor undertaken to create a unique product, service or result. A project has unique and temporary goal since it is made by gradual progress.

1.8.4 Project Management

Project management is defined as the techniques, tools and processes for defining, planning, organizing, controlling, and leading a project as it completes its tasks and delivers the results (Summer, 2008).

2 Organization of the Thesis

This study is divided into five chapters, as follows:

Chapter I which is introduction gives the background to the problem and describes the problem of the study in details. The chapter also addresses and states and defines the main and specific objectives of the study. It further provides the research questions and assumptions made by the researcher. The justification, significance, scope and limitation of the research are also explained in this chapter.

Chapter II which is the Literature Review discusses the background information from various authors in relevant literature. This chapter also examines the extent to which previous researches have dealt with similar problem stated in this study. The chapter also discusses the factors related to front-end construction project management practices for mainly public building projects in Rwanda. Other concerns such as RHA organizational structure, project management tools and equipment, the effectiveness and suitability of the RHA organizational Structure are also discussed in this chapter. The chapter further discussed on a conceptual framework by putting together key variables that make an effective project management of public construction projects in Rwanda.

Chapter III which is the Research Design and Methodology adopted for the study discusses on research approach and research strategy as well as research design. It further discusses the target population, sample determination, sampling techniques, source and type of data for the study. The chapter also discusses on the methods adopted to collect data and the techniques used to analyze the data. The chapter finally discusses on the validity, reliability of the data and variables of the study as well.

Chapter IV deals with the collection, organization, and analysis of the primary data, response and discussion on the results aligned with the secondary data detailed in chapter two. It also addresses the findings arising from the analysis of the data collected during the study.

Chapter V discusses the study findings. Its summary provides the conclusion and recommendations to the study. It also highlights areas uncovered in the study and recommend for future research.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter provides an understanding to the concept of front-end construction management and the importance of putting a lot of effort in the earlier stages of a construction project. It focuses on subjects that are available in literature and related to the front-end construction management. It begins by defining the construction industry and the project management, providing insight of the worldwide construction industry and the construction sector of Rwanda, defining characteristics of a construction project, project team and construction contract. All of these components reflect the key consideration of the front-end management in every construction project. The chapter further highlights the project life cycle by emphasizing on the initiation and planning stages of a construction project as main part of the front loading. Under this section, project designs, project management planning, contract management planning, procurement planning, procurement methods, the concept of value for money, suicide bidding, cover pricing in bidding are fairly discussed for the attempt to understand the front-end management aspect.

Under this chapter, a theoretical framework was provided based on the understanding that the front-end development of a construction project has a great influence on the project value and this influence reduces as the project progresses. A conceptual framework was also developed to identify the dependent variables, intervening variables as well as independent variables. The literature gap was also identified in this chapter.

2.2 Construction Industry and Project Management

The construction sector plays an important role in economy worldwide. Mogbo (2001) asserts that in almost all countries of the world, the construction sector is always used to invigorate the national economies. The products from this industry include but not limited to housing, water supply, transportation, communication, power supply, manufacturing, waste disposals and the acquirement of these facilities defines the economic growth of a country.

2.2.1 Worldwide Construction Industry

Worldwide, the construction industry is the largest industry contributing to the growth of the economy of countries (Elbeltagi, 2009). Although the contribution of the construction industry to the national economies, it considerably varies amongst various economies with geographical locations.

This industry accounts 6% of global GDP and it serves almost other industries (World Economic Forum, 2016, p. 9). This general contribution is large enough to justify its rigorous impact to the achievement of the national socio-economic development settings by providing shelter, employment, infrastructure and other aspects of poverty reduction. In UK, construction contributed 8% to the UK's Gross Domestic Product (CIOB, 2010). Generally, various studies revealed that construction industry accounts for between 6% and 10% of GDP. For example, Chitkara (2004) asserts that the construction industry accounts from 6% to 9%. Other researchers assert that the maximum contribution of the construction industry is 10% of the GDP in many countries (Bhimarayan, 2001). According to Lowe (2003) the contribution of this industry ranges from 7% to 10% in the developed countries and from 3% 6% for developing countries.

2.2.2 Construction Industry of Rwanda

The construction industry in Rwanda is experiencing a huge boost due to the annual population growth rate of 2.7%. Accordingly, Rwanda is experiencing a massive scale of the growing demand in the construction and real estate sectors (EXPOGROUP, 2019). The Rwanda Development Board reported that from 2015, the construction sector growth is at 10% against 7 per cent of the real estate sector (GAHIGI, 2017). In Rwanda, almost a tenth of Rwanda's annual budget is committed to infrastructures (RDB,2018)). It generates employment, provides shelter and infrastructure with a significant contribution to the development of the national economy. Accordingly, the construction activities affect almost every aspect of the economy and that the industry is vital to the continued growth of any country's economy (Construction Magazine Rwanda, 2017).

2.2.3 Project Management

The Project Management Institute (2000) defines Project Management as the application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements.

As every project has a specific beginning and an end, the same applied to the project management. In Kam Shadan (2012) view, the project management process begins with identification of the user requirement, project constraints, resource needs, and establishment of realistic objectives to meet the strategic goals. In most of the times, the project management process is iterative as new information becomes available through efforts by various professionals assigned on the project and input from third parties, communities, users, and agencies all having jurisdiction. Project management process necessitates to have inputs, tools and techniques, and outputs as well. In construction, inputs refer to documents, plans, and designs in general. Whereas, tools and techniques

are those mechanisms that are applied to the inputs. Finally, the outputs may be either documents or products, a facility or any other type of project results

a) Construction Projects

A construction project as any other project can be defined as a temporary achievement which has a beginning and an end. It means that a project cannot go on indefinitely timelines and must have a defined purpose.

Every construction project must have the owner known as client. This is the project partner who has initiated the project or who have thought the need of the project, organized the project funding and who has been convinced that it is a worthwhile investment. In most of cases, the clients are the sponsors of the whole construction process and provide the most important perspective on project performance. In other words, client implies one person or one organization to whom all other parties are to consult. However, in large complex organizations, users, decision makers and financiers may all work in quite separate departments with client, each project partner with its own procedures, priorities and project attitudes. Every Construction project is unique as it is one-off products designed to satisfy the needs of a specific client at a particular time. It is entirely down to objectives and needs. It is therefore understandable that the client's knowledge in construction project is a paramount key of a project success as he will need to make informed decisions to ensure best value for money.

b) Construction Project Team

The construction is a dynamic process, requiring members of the project team to work together to continually fine-tune and adjust the detailed project requirements, designs and construction methods, sequence, resources and logistics (ACIF, 2010).

The project team must comprise People from different disciplines or specialization for the sake of team performance. The companies are normally engaged to design and construct

different elements of each construction project. Problems of different kinds are inevitable during development of a construction project. However, problem solving is a key part of managing construction projects to foster innovation, avoid waste, reduce rework, and reduce risks including those issues escalating to become disputes requiring arbitration or litigation to resolve. (ACIF, 2010).

The strategic approach for problem solving requires mutual trust and an open relationship between parties to the project in order to achieve improvement and best practice.

A construction project team comprises a project manager or a team leader backed with technical professionals such as Architect, Quantity Surveyor, a Civil & structural Engineer, a Geotechnical Engineer, a Land Surveyor, a Mechanical Engineer, an Electrical Engineer, an Environmental Engineer, an IT Engineer etc. Each of these professionals provides his/ her input to the project based on the project stage and required inputs.

c) Characteristics of a Construction Project

Every construction Project is unique and it is characterized by its **scope** normally detailed in the bills of Quantities determining the project **budget**. It is also characterized by its **schedule** which is the agreed period to execute the project. It is further characterized by the **quality** of the materials and workmanship. For example, the RHA is to undertake a project to design and build a new training facility for its technical staff (this is the scope), at an estimate of USD 5 million (preliminary budget) over a two-year period (schedule) as per the elaborated terms of Reference (quality specification). This time schedule specifies a defined beginning and end of a project. The schedule determines the project life cycle comprising the project phases which are typically: initiation, planning, design, construction, commissioning, and closeout. (Kam, 2012).

d) Construction Contracts

A construction project is a complex net of contracts and other legal obligations, each of which must be carefully considered. In its simplest form, a contract may be an oral agreement by the parties and for most projects it is in written form whereby printed standard forms are used as the basis of the contract so that all parties may have a clear picture of their rights and obligations (Maarouf, 2011, p. 7). Accordingly, a construction contract is a kind of formal and legally binding agreement that must be observed during the project implementation.

The formation of a contract necessitates different stages of the project definition and approval by the concerned parties. Maarouf (2011) asserts that an understanding of the implications of a construction project design decisions during early stage of a construction project assures good value for the money to be expended. This understanding of the project at early stages reflects the front-end construction management aspect while the value for money entails the project performance.

In the same spirit, Sertyesilisik (2007) considers a contract as the most important tool in construction sector contributing to the successful completion of projects as it comprises various aspects, obligations and relations between each party which are necessary to reach a common expected goal. However, the researcher is with the opinion that its contribution to the project success depends on how the contract was drafted, the accuracy, efficiency and effectiveness of the contract documents. This brings the necessity of the effort required during pre-construction stages of the projects where the contract defining the project scope is drafted. However, Usta (2005) found that contracting parties should be aware of all activities involved in a proper contract management and also importance of it in order to achieve a successful completion of the construction project. The researcher believes that although an understanding and importance of the contract management may impact on the project success; this relies on the contents of the contract itself.

During the evaluating the construction professionals based on their contract knowledge, Smith (2003) found that many of the construction professionals do not understand the importance of the contract language that forms the basis of the relationship between project parties. From this view, knowing the importance of the contract should be a fact that should push construction professionals to put more effort in front-end management of a construction project. Grutters (2007) also realized the weakness of the construction professionals in legal and commercial skills and asserts that it stretches the engineers who do not have the required training in this area. Although the input of the lawyers is necessary during the contract preparation, the lawyers cannot monitor construction projects due to lack of technical capability in construction. Hence, a construction project manager is responsible for construction contracts whereby he /she will be required to be familiar with construction laws and regulations.

2.3 Front-End Construction Project Management and the Project Life Cycle

2.3.1 Front-End Construction Project Management

a) Stages in Which Front-End Construction Project Management Principles Are Applicable

Summer (2008) categorized the Construction project management processes into five groups:

- Initiating;
- Planning;
- Executing;
- Controlling and Monitoring;
- Closing.

The front-end construction project management entails the two first groups namely project initiation and project planning. These two groups constitute a preconstruction phase which

is ought to be done based on reliable standards for easy reference by other professionals. The term standard can be defined in different ways depending on the interpretation. It can be referred to as something that is set up or established by a competent authority as a rule, regulation or measure of quality, quantity, weight, extent and or value. The standard can also be defined as a benchmark, a criterion or touchstone. The PMI (2004) defines the standard can as a document approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for products, processes or services with which compliance is not mandatory.

The primary Project Manager's role in front-end construction project stage is to guide the entire process from the inception to the implementation and handover stages. Gichunge (2000) also highlighted the need of a project manager by explaining that the design and production of buildings are complex processes that requires multi-skilled manpower with proper coordination skills in order meet the project objectives. The art of Project Management should be borrowed from the Bible, the Book of Exodus chapter 18 verse 2 stating that you shall teach those ordinances and laws and shall show them the way wherein they must walk and the work they must do. Some studies abound with focus on the relationship between project performance and standardized project management practices. Various studies recommend companies to establish standard project management practices throughout their organizations. Of course, RHA is of no exception. The front-end phase of a project commences the time when the project idea is conceived. This phase ends when the final decision to finance the project is made when the project is ready to start. The main objective of the front-end management is to get the strategic perspective right. It is the management with potential possibility to reduce possible additional and amendment costs during implementation. But again, possibility to increase the projects long-term utility is higher in the front-end phase than during implementation. This front-end management can be therefore considered as a paradox that textbooks, circulars in project management, and lectures in universities tend to restrict their focus on the more detailed planning and implementation phase.

b) Front-End Loading

A well-designed construction project stands a better chance to succeed than inadequately designed one. In Rwanda, Cases of Failed construction projects of the Ministry of health due to inadequate designs were critically discussed during the 17th national leadership retreat. Thus, investing more resources in the initial stages seems to minimize the project failure.

The conclusion of a study of 1,125 projects by the World Bank (1996) on the importance of quality at entry was that project with better or adequate project identification, preparation, and appraisal resulted in an 80% satisfactory rate versus 35% for projects that were deficient in all the said aspects above. The study indicates that the formal definition of the main characteristics of a project seems to matter, but also the project designs in qualitative terms matters. This means that a project design based on a thorough pre-study and appraisal is more likely to succeed than a project based on less systematic analysis of reality or design on hurry or rush. Gichunge (2000) observed that the most serious source of cost and time risks in building projects during the construction period was ‘extra work’ technically termed as variations and normally occurred in 73.50% of the building projects studied. This means that project is not well studied to determine the scope and reduce risk of these extra works. Indeed, well defined and carefully thought-out projects clearly have a better chance of success than do those that are ill conceived and sanctioned in haste. In reality, decisions made based on good information are certainly better than those that are based on optimistic assumptions.

So, what’s the problem? Why do today’s projects not enjoy the predictability that practitioners of Front-End Loading surely have a right to expect? Mega-projects present new challenges and much has been said about “mega-projects”; projects so large that conventional approaches are insufficient to ensure success. Many people define a mega-project as one that cost \$1 billion or more. The past decade has shown that even the best

owners and contractors have been largely unable to scope, define, plan, estimate and execute these mega-projects with any sort of predictability. Cost overruns of 100% or more have been widely reported, along with years of schedule delays (Westney Consulting Group, 2008, p. 3). Without proper planning, the job will, at best, cost more and take longer than it should. At worst, it will fail (Tim, 2011). He urged that failure is rare while wasted time and money as well as unnecessary worry are not. He also urged that only better management and upfront planning can ensure against that rare failure, pare down budgets, and calm nerves. On the other hand, Biraro (2015) reported that problem of abandoned / failed projects still perisit in Rwanda.

Despite the efforts furnished by all industry players, many construction projects in Rwanda and generally in the region and the world run a high-risk poor performance by being well over budget and significantly late (Gitau, 2015). In general, the construction industry has poor cost and schedule performance demonstrated by a reputation for time and cost overruns. One of the reasons of this poor performance in the construction industry is that this industry is one of business type with highest risk (Clough, A.Sears, & Sears, 2005). In his study, Gitau (2015) allocated these high risks at construction project planning Stage and found that the generating roots of the most identified risks in construction project relies on poor scope definition, poor estimation of project budget based on incomplete data or inadequate designs. The term Front-End-Loading refers to a project management process that involves developing sufficient project definition so that owners can make investment decisions, minimize risk and maximize the potential for success. Depending on the industry, FEL is also known as Front-End Construction (FEC), Pre-Project Planning (PPP) or Front-End Engineering Design (FEED) (Jens, 2013).

Front-End Loading is also known as a gated process / front-end engineering (FEE)/ front-end engineering design (FEED) or Front-End Construction (PPP) (Tim, 2011). Good project management at the early stages of a project (the “front-end”) has been found to

provide potentially significant opportunities for eliminating, or reducing, several problems that prevent the achievement of project success (Faniran , 2002)

Front end loading provides foundation for smarter project execution (Luigi, Rob, & Alvaro, 2008). In their publication, they stated that a recent analysis of project management literature generated alarming results; approximately 70% of projects in the last five years were not completed on time or within budget. They also urged that Meeting this challenge requires strategic know-how from the very beginning of a project. They further defined Front End Loading (FEL) as a methodology that takes a deliberate approach to capital project planning and requires exhaustive identification, optimization and screening of all possible development scenarios; it proactively avoids costly rework at later project stages.

The Front-End Loading is built on the principle that the more completely a project is defined, the less likely it is to experience cost overruns (Westney Consulting Group, 2008). Although this principle was criticized that even when projects are well defined at sanction, cost overruns are likely to occur, this study will find out the extent at which construction projects are well defined in early stages. It was realized that simply by following Front End Loading, best practice, predictable outcomes are assured. Several studies revealed that front-End loading is the most crucial factor for project success though it is associated with other three factors namely project team, technology, value-improving techniques (Vasconcelos, Moraes, & Paulo Penna, 2010). The professional services required before a construction contract is signed consume resources (time and money). Unfortunately, some clients do not much consider the need of the need services and thus found not willing to spend such resources before the project start or commit themselves to spend scarce resources to the services in need.

Morgan (1987) in his study found that the resources to be consumed during front-end stages of a construction project are ranging from 1% to 3% of the total project cost.

Considering that the front-end stage is a project phase where resources have to be expended without any guarantee of return, the project owner has to make investment decisions with assurance of minimization and maximizing the potential for success. The researcher therefore asserts that this range of resource expenditure seems to be not high in respect of risk mitigation exercise that is likely to take place during this stage of a construction project. Jens (2013) is of the same view this added cost in front-end stages of a project is minor compared to the potential cost and effort required to make some changes later in the project.

Despite of the monetary resources, the time to be spent is also a major concern. Ogunlana (1996) also recommended that the construction process would benefit if the parties to the construction project spend more time and effort in front-end planning. Nevertheless, an effective project management for the front-end activities is paramount and it leads to the preparation of tender and contract documents for a construction project.

2.3.2 Project Life Cycle

A project is conceived through the organization's strategic planning process and documented in a Capital Improvement Plan (CIP). The main reason why construction projects initiated is to deliver capital assets the Agency in need. The asset facility may be needed in order to:

- Sustain the service or improve quality of service
- Expand service to meet growing demand
- Comply with regulatory requirements

A CIP consists of a number of planned projects that when implemented will provide the Agency with the assets needed to achieve its strategic objectives. In Rwanda, every public institution or agency have to the sign an annual performance contract subject to evaluation

at the end of each financial year. The realization of this performance contract may necessitate additional or new construction facility whose need will be documented in what is called CIP. The life Cycle of a project begins when it is authorized to move from the CIP into implementation. For an Agency, the authorization is often a resolution and approval of the Agency's board to allocate funds for the project or to hire professional consultants to work on the project. In most of the times, the entity will have to come back to the board prior to beginning the next phase of the project. This is because the scope and costs will be more defined through the efforts made in the preceding phases.

As detailed in the figure below, the project life cycle begins with the initiation of planning. During these phases the project evolves through consideration of various alternatives and the concept for the preferred alternative is formed. The design phase continues through the preliminary engineering effort to further analyze, validate, and define the preferred alternative and arrive at the baseline scope, budget, and schedule. Then the design phase concludes with the final design, which further details the design features to provide the permitting agencies and the contractor a set of construction drawings and specifications to permit and build the project. The construction phase proceeds with the bid and award process (Kam, 2012).

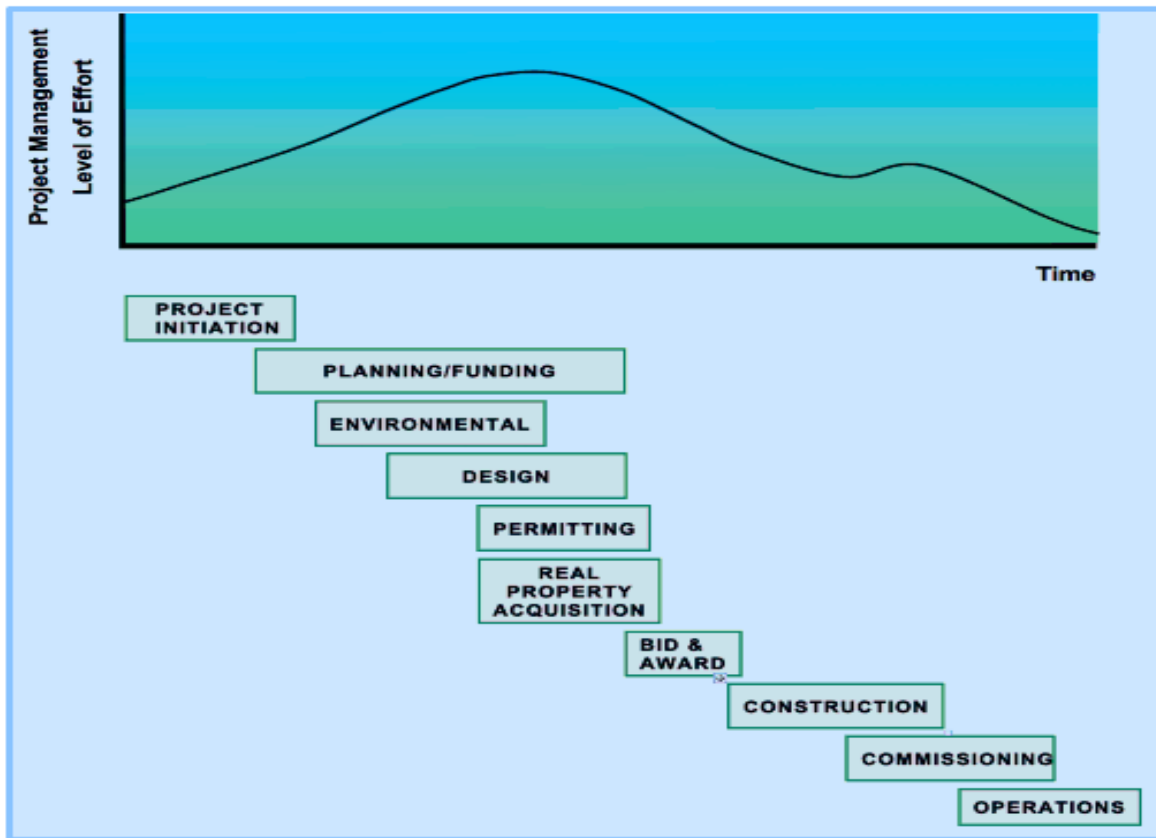


Figure 2.1: Construction Project stages vs project management level of effort (Source: Fleming, 2009)

a) Project Initiation, Planning and Funding

In this section the attention is to be made on how to plan an authorized project. This planning entails the generation of two planning documents:

- Project Requirements Definition (PRD) Document describing what the project will deliver (in other words, it is the Statement of Work) and
- The Project Management Plan (PMP) which clearly indicates how the project is expected to be delivered.

During project initiation phase of a construction project, the Agency plans how the authorized project is to be implemented. Planning begins by fleshing out what the project

is to deliver and documenting the result in the PRD. The Agency then considers what approach to take to manage and carry out the work to implement the project, selects the project delivery method, assesses the type and size of resources needed for the project, and documents these in the PMP. The Planning concludes by establishing or planning to select the project management organization. The project management organization or consultant works where the procuring entity does not have staff resources with the necessary skill and experience. In this phase, the project management organization is responsible for the planning the project capability and capacity assessment. The PM therefore assesses the levels of resource capabilities and capacities needed to accomplish the project defined by the PRD. The Capability is a measure of human resource's skill, levels, experience, and ability to perform a specific assigned task. Capacity is a measure of the quantity of the resources. The project manager may need to consult with peers or consultants who have prior experience with similar projects to accurately determine the necessary resources.

a) *Project Designs*

The project design phase is a project stage whereby the project performance indicators are determined and detailed by selected design professionals. It entails generating the execution plans, project costs, specifications and development of work programme.

b) *Project Management Planning*

During planning period, the project manager has to provide the project team with a road map on how to get the project done. The Project Management Planning sets out how the project is to be managed, executed, monitored, controlled, and closed through the phases of its life cycle.

c) *Contract Management Planning*

The project manager's choice of project delivery strategy determines what products or services are to be delivered by the project team and those that will be contracted out. In

this case, the attention is to be turned to the development of the project's contract management plan for the contracted works. Depending on the size of the project, the contract management plan may be a section within the Project Management Planning.

d) *Contract Procurement Planning*

Procurements for most projects are undertaken by the Agency's procurement department that has in place associated procurement procedures. The project manager's role is to make certain that the department's procurement activities on behalf of the project fit in with the project plan. The contract management plan sets out how this is to be achieved, by addressing:

- Types of contracts to be used. Choice of contract type depends on the nature of service/product purchased and choices on the division of risk between the contractor and owner;
- Who estimates the expected contract price?
- Who develops the scope of work statement for the contract?
- Use of standardized procurement documents and any special documents needed.
- Integration of procurement lead times into the project schedule.
- Incorporating contractual delivery dates into contracts that coordinate with the project schedule.
- Use of performance bonds and/or insurance contracts to meet the project's risk management objectives, including liability and insurance conditions and minimum limits to be met by the contractor.
- Establishing evaluation criteria to assess the selection of contractors;
- Definition of the procurement procedures for: preparation of procurement documents, advertising, bidder conferences, any bidder pre-qualification, receipt of proposals/bids, bidder interviews, selection, contract price negotiation, contract award and handling of protests. (In many instances, the procedures used for project procurements will be those the Agency already has in place).

One of the main objectives of the front-end loading in construction is the development of the project budget. In his research in Rwanda, Gitau (2015) found that the preliminary budget development process in most projects was done without the involvement of professionals. He also found that there were some projects that were closed before construction works, as the initially anticipated budget was not feasible. He also added that in many projects, contractors and consultants were forced to work within unfavorable client financial schedules resulting in incomplete and poor design and delay in construction works. This is an indicator of poor project conception and consequently, the expenditure incurred on the design may become wasteful, especially if the designs developed for this project are not put to use by Government.

Project management concerns the management of people, time and costs to ensure the efficient commencement, progress and closure of a project. In construction, construction projects project managers' responsibilities include design, procurement, planning authorities, contractors, clients, budget, contractors, clients, changes, the lifecycle of the project, management of document and other areas, to ensure that the construction project reaches desired goals (RICS, 2014).

2.4 Procurement of Construction Projects

2.4.1 Construction Project Process

The construction of every building project involves unique design, procurement and construction challenges. Every project has a different location and site conditions, construction methods, equipment and materials, technology and the assembly and management of a project team to design, procure and construct each asset invariably mean the construction process is one of creating a prototype (ACIF, 2010).

Construction project as other projects can only be achieved in phases or stages of the project. Vasconcelos, Moraes & Paulo Penna (2010) argued that each phase ends with a gate review, which works as a clear transition point, where the project, after being

examined, is either allowed to move to the next phase, return for a better definition or canceled. They also stated that at each front-end loading stage, a set of deliverables is defined, and that in the beginning of each stage, its planning is re-visited.

2.4.2 Procurement of a Construction Project

The procurement of construction project is vast in scope and requires a deep understanding of the construction industry. This is because it involves the gathering and organizing of many separate individuals, firms and companies to design manage and build construction facilities.

The Dictionary.com defines procurement as the act of procuring, obtaining or getting by effort, care, or the use of special means. It is also defined as the act of obtaining equipment, materials, or supplies. Moreover, procure means to obtain or get by effort, care, or the use of special means. In this context, project procurement of a construction project is very much concerned with the organized methods or process and procedure of obtaining or acquiring a construction facility. It also involves arranging and coordinating various people in order to achieve prescribed goals or objectives. The process of obtaining a building by a client involves a group of people who are brought together and organized systematically in term of their roles, duties, responsibilities and interrelationship between them.

Procurement methods have become an important issue in the construction industry for two reasons. First, the procurement of construction projects involves a series of interrelated and sequential processes. The effectiveness and efficiency of these processes have a considerable impact on the success or failure of a project. Second, there are several procurement methods available for a developer to adopt when procuring a project. For this reason, one major challenge faced by project developers is deciding which method to adopt among the available procurement options (Idoro, 2012).

The government remains to be the major client of construction projects. In most of cases, the front end-construction Management starts when the client procures the services for construction project. Once the study is fully done, the client may contract another party to implement or execute the project. Construction project performance is influenced by many factors due to the interactions and interrelationships of the stakeholders. A construction project is commonly acknowledged as successful, when it is completed on time, within budget, profitability to contractors, absence of claims and court proceeding and “fitness for purpose” for occupiers have also been used as measures of project. Improved standards of participant’s performance particularly by the client or employer and his consultants, would clearly reduce contractual incompleteness (Yates, 1998)

2.4.3 Methods of Procurement for Construction Projects

The importance of procurement of a construction project cannot be underestimated as it has impact on the success of a construction project. The Chartered Institute of Building (2010) asserts that an overwhelming majority of 87% believe that good procurement is a synonymous of a successful project whereby a construction project is not of difference. This concern entails further emphasis on ensuring the procurement method chosen as well as advice given to clients and the emphasis should assess whether the selected procurement and advice given to the client are entirely relevant to the needs of the intended project.

In order to ensure good procurement, Partnering has an important part to play. It is always associated with a successful project, because each party learns from mistakes and issues arising in procurement method adopted on previous projects undertaken to achieve the highest standards of the next procurement methods.

Some studies recommended suitable methods of procurement in construction. In terms of value:

- On projects up to £5m, the Traditional procurement route is highly recommended followed by Design and Build and Partnering.
- On projects between £5m-50m, Design and Build is highly recommended to be suitable, followed by Partnering. Design and Build, PPP, and Construction Management also are recommended.

The traditional procurement route accounts 86 % and it is the most commonly used in UK (RIBA, 2013). The most used procurement method, according to the RICS Contracts in UK survey (2007) is the Traditional method of procurement. It is described as a method enhancing the separation of design and construction but having its weaknesses as all other methods of procurement do. Notwithstanding of its weakness, the construction industry has used the Traditional process for so long that it has become the most understood method of procurement. Indeed, it is before any construction has even begun. The Value for money must be clearly defined so that it does not automatically create the assumption that the lowest bid should be accepted. Otherwise, industry and clients risk poor quality projects that will result in unplanned increases in cost and time, all of which contribute to a poor position for the construction industry (CIOB, 2010).

2.4.4 The Role of Procuring Entity and Consultant in Project Development

The procuring Entity and Consultant are the two parties that are much involved in the front-end stage of a construction project. Both parties have to work hand in hand in order to harmonize the concerns of a project in matter. In some cases, the procuring Entity may act as a consultant on his own risk depending on his capability and expertise in the field of construction.

One of the responsibilities of the procuring entity is to prepare Strategic planning which will require input from various departments within the procuring entity for instance, Technical and corporate departments. The procuring Agency may also choose to outsource the services of qualified consultants to deliver the assignment. The role of the

consultant will be therefore to assist the procuring Entity in technical planning, identify required project finance and advise on appropriate procurement method to be adopted.

2.4.5 Construction Dispute

In United Kingdom, Public sector accounts for approximately 40% of the entire turnover generated by the UK construction industry. Although the construction industry is developed at some extent in UK, disputes also still persist. Based in his experience in UK construction industry, Tolson (2013) is of the opinion that disputes are inevitable and the construction industry as any other business. He also affirms that the main cause of the disputes is money in the wrong pocket and/or money being tight, closely followed by all attempts at single point responsibility where the client interferes with the project. Therefore, disputes in construction can be considered as diseases that can be prevented. In reality, prevention is better than cure thought it requires a significant effort and attention.

Cases of disputes were found on various construction projects in Rwanda such as Kivu Watt Project, Grand Pension Plaza projects. Construction Magazine Rwanda (2017) stated that Rwanda as a developing country, its construction industry is still struggling with a lot of intrinsic challenges, ranging from inadequate technical and managerial know-how to insufficient financial, material and equipment capital base.

The fact that the construction industry suffers the most to meet deadlines and budgets necessitates a great attention to identify critical success factors where by the front management practice is concerned. A critical review of the annual Auditor General's reports for the period 2002 – 2017 shows a trail of underestimation, variations, over payment and abandonment of on many states financed projects in Rwanda. The same situation applies to private projects as well. The audit found that there is need for proper definition of contract scope, market analysis for relevant pricing information and proper tender evaluations during the procurement process to minimize instances of significant contract variations, delays or price undercuts that significantly contribute to abandonment

of contracts. Further, there is need for improved supervision of contracts to minimize unexpected delays or abandonment of work. Further, public entities need to improve cash flow planning to ensure that they pay contractors on timely in accordance with agreed payment schedules to address cases of abandoned or delayed works. However, delays are likely unavoidable to occur in every construction project due to uncertainties and other factors as many studies indicated. However, the magnitude or the level of these delays varies considerably from one construction project to another. Some construction projects delay by a few days, others delays for years while others are even abandoned.

2.5 Theories Related to the Front-End Construction Project Management

2.5.1 Public Sector and Value for Money

Generally, the severity of the resource spending review usually results in a focus on the lowest cost rather than greatest value. In other words, the pressure to reduce resource spending especially in government entities where most of officials fear the explanation that the procurement team would give to the auditor, could lead to less importance placed on quality and whole life costs. However, the lowest cost is not always the best value for money as revealed by a number of studies. For instance, the study of Palaneeswaran et al (2003) concluded that, on a public project, the best value for money could ultimately be defined as not only improved maintainability and lower operating costs but also by earlier project completion. It therefore means that the whole life costs of a construction project must be considered thoroughly by the client or procuring entity before going out to tender. This reflects the effort required on a project during front-end stages.

2.5.2 The Concept of Suicide Bidding

In construction, some technicalities are being done by some contractors during tendering or bidding for a construction project. The suicide bidding is the practice of bidding lower than competitors in order to obtain work (CIOB, 2010). Construction companies do this simply to ensure they have work for their skilled staff to undertake, to avoid idles of their

equipment and even if it means only breaking even on a project or, in some cases, making a loss. According to Wade (2020), the suicide bidding leads to widespread insolvencies as contractors and subcontractors are bound by unsustainably low prices, as results, they go out of business. In case clients accept lowball bids, they will be at the risk of being bound to contractor who will always be cutting corners in order to minimize the intended loss. Byarugaba (2020) asserted that where there is low bid, there no doubt that shoddy work will be done somewhere and that at the end of the day, it is the end user who will suffer. The Chartered Institute of Building (2010) reported that the suicide bidding practice is prevalent within the construction industry and recommends the clients or project owners not to always be seduced by only the lowest bid, predominantly when the said bid is suspiciously low. The Institute further asserted that many researchers found that when the lowest bid is 10% below the average, it is suspiciously low and should be carefully treated.

2.5.3 The Concept of Cover Pricing

The tendering process usually encounters many tactics by contractors in contractor's views of making huge money depending on the competition that is in place. Cover pricing is a form of bid rigging referred to as the act of placing a high bid at tender stage to clients or project owners. In this case, the contractors work in collusion to agree unrealistic prices to be submitted to the client. According to Tripp (2011), this practice occurs when the bidder wishes to be seen in the the bidding process as a participant but without any intention to seek winning the job . Here, the client is advised to always have an open eye on the realistic project cost, otherwise, client will tend to pay unnecessary cost based on the greed contract figures. During cover pricing process, contractors agree themselves on a base price that the other contractors will place a serious bid for. They enter in the tendering knowing the contractor whose bid is likely to be accepted know as serious bidder. Other contractors will intentionally increase their own price by even above 10% higher than the serious bidder. This will be like a game that contractors play knowing that the client will select one among them. This technique occurs when there is prior agreement among contractors themselves, in most of cases there is always a share common interest

that each contractor participating in the bidding will have from the one who will win the tender.

The issue with cover pricing is that clients will receive a false price indication of tenders. This hinders tender competition levels and impact on value for money concept. In UK, the Office of Fair Trading (OFT) conducted a 4 - year investigation into covering pricing. These investigations ended in in 2008 and 103 construction firms being found guilty of cover pricing were fined a total of £129 million (CIOB, 2010). The cover pricing is punishable by the law in many countries. For instance, in Australia, company may be charged fine of 10% of company's turnover or even about three times of the business gain (Tripp, 2011).

2.6 Theoretical Framework

A number of scholars advocated that a key determinant in overall construction project performance is the proper execution of its front-end development phase. For example, the Project Management Guide of 1986 was revised or updated in 2001 to incorporate the project management approach whereby much attention is to be done in the earlier phases of a project. Of course, a construction project is of no difference. The level of efforts in terms of time and resources spent in the front-end stage of a construction project determines the probability of project success or failure. Westney Consulting Group (2008) asserts the influence of the front-end loading on the project success rate is higher than any other efforts spent in all other phases of projects.

Hutchinson and Wabeke (2006) developed a graph illustrating how importance of front-end loading in terms of project value (Figure 2.2). The graph shows that when the front-end loading of a project is well executed, the project usually results in high value or success irrespective of whether its execution was well done or poorly done. In this case, if the project is poorly executed, there would be a slight project value reduction (Figure 2.2 A & B). Contrarily, when the front-end loading of a project is poorly executed, the

project results in low value or the project is subject to fail irrespective of whether its execution was well done or poorly executed (Figure 2.2 C & D). Thus, the project front-end stage (project planning and definition) is very crucial than the project execution stage. The graph further shows that first three phases entail the front-end project stages (Project Values Identification) while the last other two phases reflect the project execution and operation (Project Values Determination).

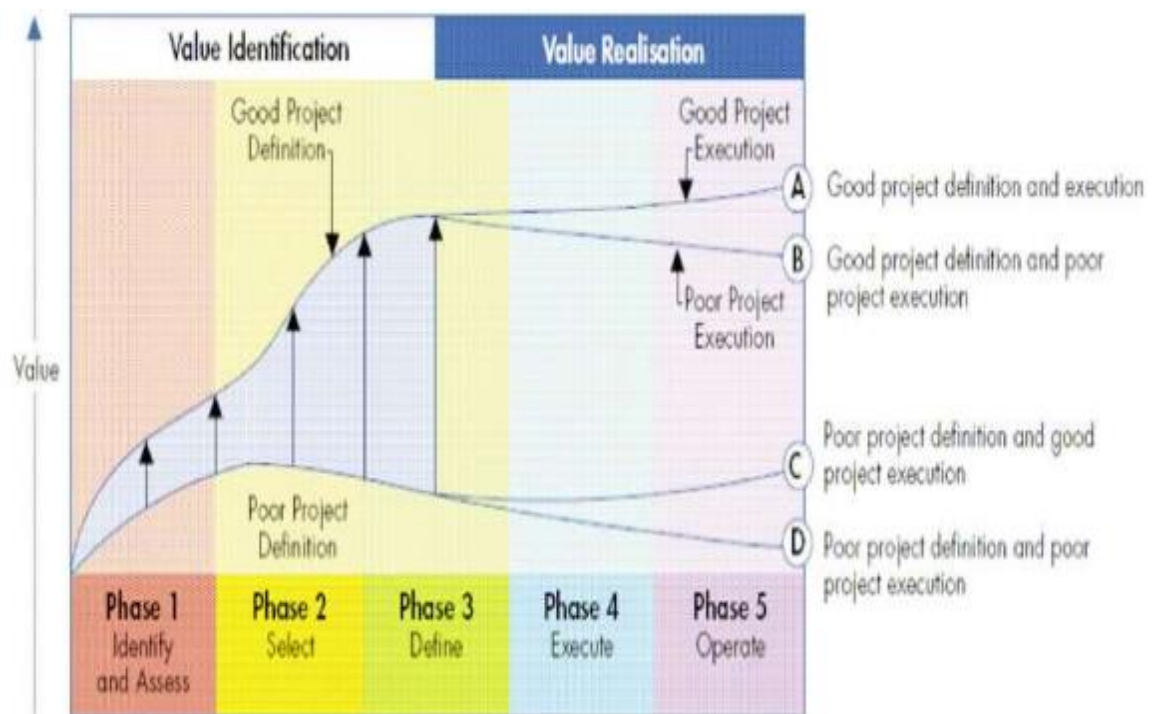


Figure 2. 2 The influence of front-end development on the Value of a Project (source: Hutchinson & Wabeke, 2006)

The 1st Phase (Identify and assess) and the 2nd phase (Select) all belong to the identification of business or need of the project. In the 3rd phase, the project owners or stakeholders start involving specialist or professionals such as Architects, Engineers, Quantity Surveyors, and Project Managers etc. The 4th phase is all about project execution (construction) and project management. The last 5th phase entails going back to the business or project objectives and highlight the lessons learnt and assess how the project succeeded or failed.

The ability of the project owners or developers to influence or change the project direction without significantly impact on the project cost decreases as the project progresses. This ability to bring changes into the project is high during front-end stages and significantly low during project implementation (Figure 2.3).

COST INFLUENCE CURVE

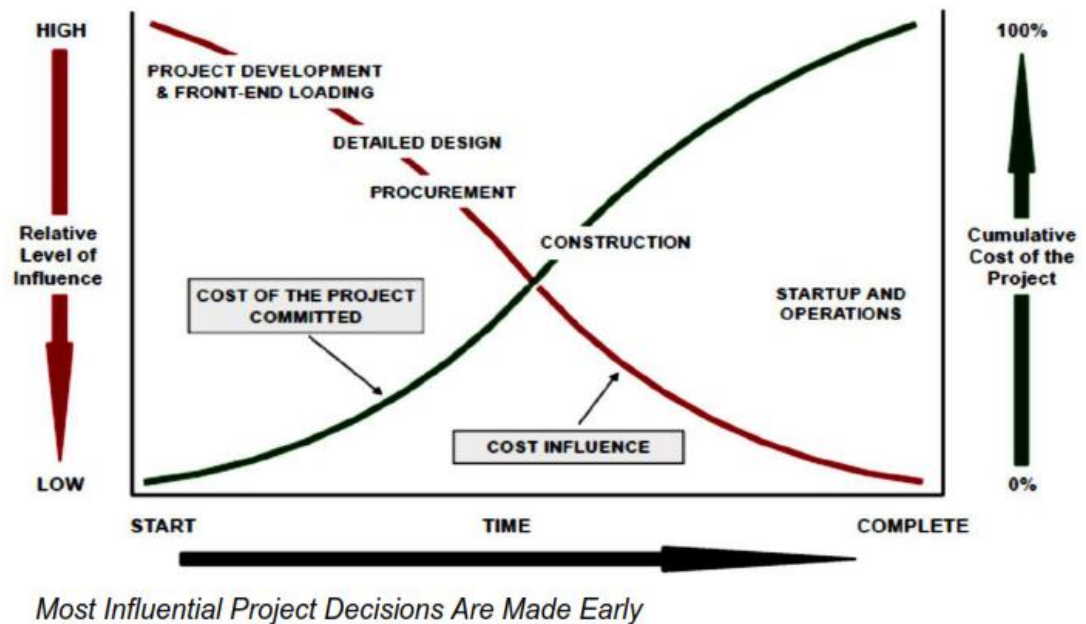


Figure 2.3 Project Value Influence Vs Project Expenditures (Source: Prakash, 2018)

The figure 2.3 above shows that it is much easier to influence the expected outcomes of the project during front-end planning when expenditures are relatively low than providing influence once a project moves into execution stage. Once a contract for project execution is awarded, the level of influence on the project low, this means that whenever a change occurs during project execution, the project manager has to investigate its impact to the overall project before issuing a change-order to the contractor. This change impact is to be discussed and agreed by both contract parties and that is why the influence to change is low as it requires involvement of the project implementer.

One of the major reasons of project failure is the cost-overruns. Safari (2012) found that cost overruns are the main cause of construction disputes in Rwanda. Poor project scope determination or underestimation can be attributed to one of the generating roots of the cost overruns. However, this can be avoided or minimized as far as front-loading is concerned. Al-Saffar (2018) found that the project cost-overruns can be avoided during the front-end project stage while estimating the project budget. The Construction Industry Institute (2012) found that a project with a well-executed front-end loading results in 10% lower cost and 7% quicker project delivery with 5% fewer changes. However, some studies rejected this view and have criticized the relationship between front-end loading and project success. Although this rating of front-end loading effect on project performance was criticized to be high, many studies were in strong agreement that the effort spent in front-end project stage reflect the predictability of the project success. The Westney Consulting Group (2008) found that the front-end loading had been successful on conventional or traditional project management practices but had not been successful enough for unconventional projects such as software development projects.

2.7 Conceptual Framework

A conceptual framework also known as a research paradigm is the researcher's idea on how the research problem was explored. The researcher is with an idea that the ineffectiveness of the existing organizational structure for RHA, poor project performances in RHA, poor application of FECPM as well as lack of proper FECPM framework in Rwanda are the major problems that RHA is currently facing known as independent variables in this study. Intervening variables were identified as indicators to investigate the said major problems of RHA. Dependent variables aligned with the study objectives were therefore as shown in the figure 2.4

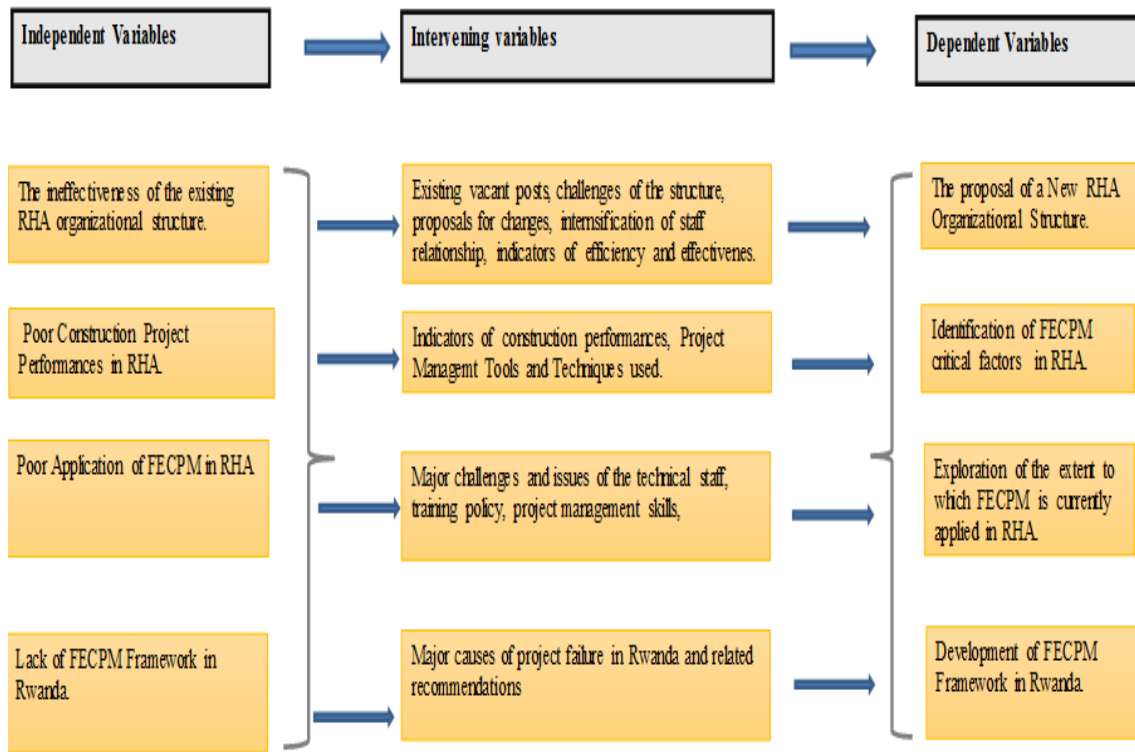


Figure 2.4 Conceptual framework: Independent, dependent and intervening variables in the study (Source: Author, 2021).

The variables above were identified in line with the objectives of the study. In order to propose a new organization structure for RHA, the study was to evaluate the effectiveness of the existing organizational structure of RHA through evaluation of the existing vacant positions, existing challenges of the structure, assessing if the staff really wishes the restructuring, the flexibility of the structure to intensify the communication and relationship between the staff etc.

In order to identify the critical factors for FECPM in RHA, the poor project performances were to be evaluated through indicators of project performances, project management tools and techniques applicable in RHA. Furthermore, the exploration of the extent to which the FECPM is currently applied in RHA was to be done through an investigation of the major challenges of the technical staff, project management skills and availability

of the training. Finally, the framework was to be formulated based on the explored major causes of the project failure and recommended resolutions by the study.

2.8 Measurement of the Variables in the Study

The independent variables for this study are the identified problems aligned with the study objectives. The table below summarizes the proposed measurement techniques for the variables identified in the conceptual framework:

Table 2.1 Variables of the Study and Proposed Measurement Techniques

S/N	Variables For The Study	A Measure Of The Variable
1	Ineffectiveness of RHA organizational structure	<ul style="list-style-type: none"> - Check if the existing vacant posts in the RHA organization structure affect the routine functions of technical personnel. - Investigate the challenges or problems that the current organizational structure of RHA is facing. - Find out if there are some proposals for changing the RHA organizational structure from the respondents
2.	Poor construction project performances in RHA	<p>Evaluate how the RHA organization structure intensify the staff relationship, communication and decision-making process. Identify the most frequent factor affecting the project performance among the following:</p> <ul style="list-style-type: none"> - Clarity of project goals / objectives - Adequacy of Project Terms of reference - Adequacy of project brief and scope determination - Availability of adequate project funds - Realistic / adequate timelines for assignment delivery - Clear communication channels - Adequate professional Consultation
2.	r construction project performances in RHA	<ul style="list-style-type: none"> - Adequate experience of project team - Timely Decision making/Approvals from top management - Thorough project documentation & designs
3	r application of FECPM in RHA	<p>Facilitation and payment of project team Rating the RHA performance in terms of the following:</p> <ul style="list-style-type: none"> - Project time planning & management - Project cost planning & management - Project scope planning & management - Project quality Planning & management - Check the capability of RHA technical staff in terms of required skills and workload for the team. - Find out if the project management tools / Guiding manual are available in RHA - The training policy for capacity building in RHA - The main challenges of the technical staff for RHA
4	k of FECPM framework in Rwanda	<p>Recommendations from the respondents to be attributed to the following causes of project failure:</p> <ul style="list-style-type: none"> - Inadequate skills - Lack of professionalism - Poor construction contract preparation and management - Inadequate project documentation & designs - Lack of thorough project management during early stages of the project.

Source: (Author, 2021)

The measure of the above variables is the thoroughness of their application during project development phases specifically the pre-construction stage.

2.9 Literature Gap

The profession of construction management is very challenging and demanding as it requires the involvement of different professionals for the attempt to predict the success of the project. Construction managers should be equipped full understanding of the need, the role and responsibilities of each professional among the project team as well as applicable laws against unprofessional practice. Lack of proper working knowledge on the roles of each profession, appropriate laws regulating the professional practice or misinterpretation of the roles of each profession brings a confusion in the construction industry. In the opinion of Anyanwu (2013), such knowledge gap results in non-engagement of appropriate and qualified professionals during the design and execution process of a construction project.

In Rwandan construction sector, practice is based on the law no.26/2012 of 29/06/2012 governing the professions of Architecture and engineering and establishing the Rwanda Institute of Architects (RIA) and Institute of Engineers (IER) in Rwanda. Although this law lacks the recognition of other allied professions such as Quantity Surveying, Land Surveying, Urban Planning, there are no tangible measures taken to ensure that the works or services are being offered by respective professionals. In fact, required construction professionals are only requested during tendering stages when the clients look for consulting firms or contractors. The Office of Auditor General of State Finance (2004) reported that there was no local staff in government entities to understudy or verify the consultant work. Consequently, after winning the tenders, consulting firms tend to reduce expenditures by engaging unqualified persons, who are either technicians, craftsmen, artisans or just people with basic technological knowledge of the construction process to undertake project designs or supervision.

, are carrying out the production process. In the same line, the Rwanda Skill Survey of 2012 reported that there were limited qualified architectural and quantity surveying professionals to meet the high demand from both public and private sectors. This was due to the fact that the architecture and Quantity surveying programs were not offered in Rwanda before January 2009 and January 2010 respectively (RDB, 2018). However, despite of the fact that the first batch of these new professions joined the industry since 2013, professional gaps are still persisting especially in government entities as the major clients of construction projects. This is because, the organizational structures, job profiles and laws in those governmental institutions related to construction such as one stop centers, districts, ministries, agencies etc. are still almost the same.

The front-end construction project management reviewed in this paper covered construction projects in general. However, there is no specific research conducted in Rwanda to investigate the practice of the front-end construction project management or to formulate the management framework that should involve core construction professionals. In fact, the term ‘Front-End Construction Project Management is likely to be new in terminology in the project management body of knowledge. Similar reviews related to the front-end management reflects what is so called “front-loading” which also emphasizes the importance of focusing on the earlier stages of a construction project. Therefore, a management framework in the front-end stages is developed and the framework provides suggestions for the utilization of research knowledge in development of the professional practice in Rwanda especially on government projects. In this framework, a reflection on construction professional practice is regarded as a key characteristic of an effective project development with the aim to increase the chance of the project success. Such reflection does not only focus on which professions should be involved, but also on why they should be consulted in the earliest stages of a construction project.

The Rwanda Building Code (2019) states that the professional liability for project designs, supervision or execution is ten (10) years from the date of final acceptance. The code recommends all professionals to secure themselves with professional indemnity insurance. In this regard, the expertise of each construction professional should be carefully exercised as professionals assigned to the project are answerable to any sinfulness that may occur during project designs, supervision and execution. Unfortunately, the professional practice in Rwandan construction sector is not merely taken into consideration as the practice does not care who is supposed to undertake the assignment, who does it and what is the quality of the work or services rendered to the client.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

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

3.2 Research Strategy

In this study, the research strategy adopted is the quantitative one. It entails the collection of numerical data from a group of people and provision of a generalization of the results from the studied small group to a larger group of people just for the purpose of explaining a phenomenon (Bhatia, 2018). This research process followed the scientific process of the hard sciences whereby the theory precedes the data. However, the data collection method and analysis are both quantitative and qualitative. This because, in some of the cases, the data or the results were to be presented in a narrative form.

The study further used semi-structured interviews and questionnaires with analysis of various documents as the primary methods of data collection. The study assessed the managerial capability of RHA to oversee all government construction projects in Rwanda. Apart from numerical data, the research questions included some exploratory or confirmatory questions. This dictated the use of both qualitative and quantitative methods of data collection.

The qualitative method assisted the study in getting a deeper understanding on the issues being studied. This method has enabled the research questions to be answered to reflect the actual conditions surrounding the research problem. According to Gray (2004), qualitative research is a highly-contextual approach where data is gathered in natural real-life settings. This kind of research can answer how and why questions rather than giving a brief view about the phenomenon studied. Berg (2001) asserts that qualitative refers to the meanings, concepts, definitions, characteristics, metaphors, symbols and descriptions of things, while quantitative research refers to the measures and counts of things. This approach 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 decision to choose a specific methodology should be based on its suitability to answer the research questions (Bryman, 2016). The data collected from the field and various literatures were in form of numerical data but the figures represented human beings and human behavior as well.

The selection of qualitative research results from a reflection on the nature of the problem identified. In fact, abilities, motivation, attitudes, skills, accommodation of changes such as embracing project management principles of RHA technical staff all reflect the human behavior. In other words, the assessment of the managerial capability in RHA in the construction of public construction projects using face-to-face interview methods were therefore preferred to qualitative methods as they give personal details to the qualitative phenomena.

The qualitative interviews have some advantages as shown below:

- Qualitative interviews actively involve the respondents in the research process and therefore empower the respondents.
- They allow free interaction between the interviewer and the interviewee.

- They allow opportunities for clarification so that relevant data is captured.
- They maximize description and discovery.
- They offer researchers access to people's ideas, thoughts and memories in their own words, rather than in the words of the researcher. (Bless, Higson-Smith, & Kagee, 2006)

3.3 Research Design and Research Methods

A research design can be considered as a plan prepared for the purpose of having the research questions answered while a preferred strategy to implement such plan can be referred to as a research method. In fact, the better the research design is, the better the research questions are answered in effective way

3.3.1 Research Design

This study adopted a survey with a case study research design. The case study is the RHA and the units of observation are the technical workers in such institution. This study is a survey of knowledge, information and professional practice by which RHA have on building construction projects during preconstruction stages. The study further surveyed the effect of current practice in RHA, the effectiveness of the existing organization structure, the workload of the technical staff, the managerial capacity of the RHA technical staff and proposed an accommodative organization structure as well as a framework for the FECPM whereby all key construction professionals will be involved in various projects.

The study entailed a detailed and intensive analysis of a single case namely RHA. The selection of RHA as a case study had been attributed to a number of reasons since a case study has a distinctive advantage over other research strategies especially when the research questions are posed using how or why, just for the purpose of discovering new facts (Yin, 2003). It offers the opportunity to explain why certain outcomes may happen more than just finding out what those outcomes are (Denscombe, 2008). This approach is

particularly useful in revealing the casual relationships between the phenomenon and the context in which it takes place (Gray, 2004).

The study was carried out in RHA as a government institution in charge of setting up building regulations, planning and implementation of all building construction projects whose value are equivalent or above to five hundred million Rwandan francs (500,000,000 RWF: Approx. USD 500,000). In fact, RHA is a public institution established by the Law N°40/2010 of 25/10/2010 overseen by the Ministry of Infrastructure. It was established in a bid to improve the quality of life of Rwandans through planning, organizing and spearheading rural settlement, urban settlement, public building construction, affordable housing; management of public office space and Government Assets; and regulation of the construction industry (RHA, 2010).

The above institution was chosen purposely as it is the sole project management government entity for all building project falling under the specified threshold above. Furthermore, the below core functions of the RHA have a big influence in the Rwandan Construction industry:

- Planning of urbanization, human settlement and construction
- Establishment of regulatory framework
- Awareness and capacity building
- Management of public projects construction
- Law enforcement, inspection and regulating permitting services
- Government assets management
- Promotion of housing investment
- Research on building technology and materials
- E-Services for the construction industry

From the above core functions of RHA, it would be easy to implement the recommendations of the study so that the desired changes in the Rwandan construction industry can be adhered to.

3.3.2 Research Methods

The research methods entail the methods of data collection and data analysis. This study adopted the both quantitative and qualitative ones.

a) Data Collection Techniques

The study used questionnaires, documentary search and interviews as techniques or tools for the data collection. The data were sourced from the RHA technical staffs who understand and much involve in the current practice of the construction sector of Rwanda.

b) Data Analysis Procedures

The collected data were analyzed based on computations by the use of MS excel tools. The data were presented in the form of the tables, diagrams with explanatory notes.

3.4 Population, Sample And Sampling

3.4.1 Target Population

The target population was the construction technical staff of RHA working under the following units as per the RHA organization chart 2017. The table 3.1 shows the existing permanent technical staff with the existing vacant positions in RHA. The number of existing permanent staff was obtained by taking the overall number of required staff as per the organization structure less the vacant positions.

Table 3. 1 Existing staffing of RHA and current vacant positions (cont')

Departments / Units / Division	Positions	Number of staff
Social and Affordable Housing Design and Development Division	<ul style="list-style-type: none"> - Division Manager (1) - Affordable Housing Senior Engineer (2) - Affordable Housing Senior Architect (1) - Quantity Surveyor (1) (Vacant) - Affordable Housing Architect (1) (Vacant) - Affordable Housing Electrical Engineer (1) (Vacant) - Affordable Housing Mechanical Engineer (1) 	8-3 = 5
Urban Planning and Development Division	<ul style="list-style-type: none"> - Division Manager (1) (Acting) -Urban Design Senior Engineer (1) -Urban Informal Settlement Upgrading Senior Engineer (1vacant) -Green and Smart City Development Senior Engineer (1) -Urban Development Senior Economist (1) (Vacant) - Urban Physical Planner (2) 	7-1 = 6
Rural Settlement Planning and Development Division	<ul style="list-style-type: none"> - Division Manager (1) - Rural Settlement Planning Senior Engineer (1- IDP Model Village Senior Architect (1) (Vacant) - Public Awareness & Mobilization Officer (1) - Rural Settlement Planning Engineer (3) (Vacant) - Rural Development Senior Economist (1) (Vacant) 	8-5 = 3
Government Buildings Design & Construction Division	<ul style="list-style-type: none"> -Division Manager (1) (Acting) -Building Construction Senior Engineer (1) (Vacant) - Building Design Senior Architect (1) - Building Construction Engineer (1) - Building Design Architect (1) (Vacant) - Building Construction Electrical Engineer (1) (Vacant) - Building Construction Mechanical Engineer (1) - Building Construction Quantity Surveyor (1) (Vacant) - Building Construction Structural Engineer (1) 	9-4 = 5
Government Buildings Rehabilitation, Institutions Accommodation and Office Space Management Division	<ul style="list-style-type: none"> -Division Manager (1) - Building Rehabilitation Senior Engineer (1) -Building Rehabilitation Electrical Engineer (1) -Building Rehabilitation Mechanical Engineer (1) -Building Rehabilitation Structural Audit Engineer (1) (Vacant) 	5-1 = 4
Public Accommodation & Office Management Unit	<ul style="list-style-type: none"> -Director (1) - Government Assets Data Management Specialist (1) (Vacant) 	6-4= 2

- Property Valuation Specialist (1)
 - Office Allocation & Management
Engineer (1) (Vacant)
 - Government Assets Data Management Officer
(2) (Vacant)
-

*Source: (Rwanda Housing Authority, 2019)*As per the table above, the total number of technical staff is 70. However, 30 positions were vacant at the time of the field study, that is to say the targeted population was 40 comprising all construction professionals (Architects, Engineers, Quantity surveyors etc.) of RHA.

3.4.2 Sample and Sampling Methods

a) Sampling Methods

A purposive sample is a non-probability sample that is selected based on characteristics of a population and the objective of the study. Purposive sampling is also known as judgmental, selective, or subjective sampling (Crossman, 2018).

Sampling can be defined as the process of finding people or places to study; to gain access to study and to establish a rapport so that participants can provide relevant data. During sampling process, the aim is to get a sample that was as representative as possible of the target population (Mouton, 1996).

This research work adopted a non-probability sampling strategy using purposive sampling technique which enabled the study to select and study a case that would serve the purpose of the study and answer the research questions. The Purposive sampling is about selecting rich cases for in-depth study. By adopting these sampling techniques, the study used personal judgment to select cases that will best meet the research questions and objectives (Saunders, Lewis, & Thornhill, 2003). This study followed the three main guidelines for selecting a purposive sample (Rubin & Rubin, 1995).

The study selected the respondents who are knowledgeable about the issues being investigated, willing to talk and representative of the range of points of view. A purposive technique should be well suited to small-scale and in-depth study (Ritchie, Lewis, Nicholls, Ormston, 2014). This method is recommended under certain conditions, particularly when the research question seeks an in-depth investigation of a small population. According to Mugenda and Mugenda (1999), the 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. Thus, the subjects were selected because they are informative or possess the required characteristics. In this study, the sample size of the subjects consisted only technical staff of RHA.

b) Sampling Techniques

By adopting a purposive sampling method, the researcher chose a sample subjectively, taking into account the need for the sample to be as much as possible representative of the study population. The technical staff of RHA is currently working under 13 units, including department and divisions as indicated in the organization structure.

The study targeted at least 1 individual from each working unit or department that is either the unit or head of department or an officer or technical staff. The technique focused on RHA individual professionals believed to be rich in the information on issues of effective and efficient construction project management.

Yamane (1967) provides a simplified formula to calculate sample sizes. This formula was used to calculate the sample sizes as shown below:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n: Sample size

N: Population size

e: Margin of error (5%)

c) Sample Size Determination

Based on the above data, the representative sample is therefore calculated as follow:

$$n = \frac{40}{1 + 40 * 0.05^2}$$

$$n = 32.18 \approx 37$$

n= **33** RHA technical staff including Civil Engineers, Architects, town planners,
Quantity Surveyors and other allied professionals

The researcher contacted all the 37 RHA construction professionals through telephone conversation, a follow up with questionnaires, face to face with assurance of information confidentiality to the respondents. The researcher also gave clear guidelines on how to fill a questionnaire

The idea behind assuring confidentiality of the information to the respondent and providing clear guidelines is based on the fact that this significantly reduces the likelihood of obtaining biased responses (Sekaran, 2003).

3.5 Data Collection Methods and Instruments

The survey was conducted using questionnaires; open for 6 weeks between 28 January 2019 and 11 March 2019, which respondents could access through email or hand delivery. Face to face interview also was used. Respondents were asked general demographic questions regarding their age, professional background, educational level and years of experience. The survey was only open to the technical staff working in RHA under various departments. There were both qualitative and quantitative questions in the survey, to allow respondents the opportunity to openly express their opinions.

3.5.1 Source of Data

The primary data were sourced from sampled technical staff of the RHA involved in management of construction projects under RHA docket. The researcher targeted the directors of division or units, the heads of departments or unit leaders because these are people or informants who are knowledgeable about the issues being investigated and are custodian of any information that researcher may need in RHA. In other words, these are people with experience in the industry and within the organization. The interviewees included two (2) architects, seventeen (17) structural engineers, three (3) electrical engineers, two (2) mechanical engineers, one (1) geotechnical engineer, one (1) quantity surveyor, one Geomatic / land surveyor, and two (2) building technologists. The documentary data served as secondary data for the study.

3.5.2 Types of Data

This research relied on two complementary types of data: primary and secondary data.

The table 3.2 shows the comparison between the two types of data:

Table 3.2 Comparison of primary and secondary data

S/N	BASIS FOR COMPARISON	PRIMARY DATA	SECONDARY DATA
1	Meaning	Primary data refers to the first-hand data gathered by the researcher him /herself.	Secondary data means data collected by someone else earlier.
2	Data	Real time data	Past data
3	Process	Very involved	Quick and easy
4	Source	Surveys, observations, experiments, questionnaire, personal interview etc.	Government publications, websites, books, journal articles, internal records etc.
5	Cost effectiveness	Expensive	Economical
6	Collection time	Long	Short
7	Specific	Always specific to the researcher's needs	May or may not be specific to the researcher's need
8	Available	Crude form	Refined form
9	Accuracy and Reliability	More	Relatively less

Source: (Ajayi, 2017)

a) Primary Data

The Primary data is information gathered directly from respondents using the questionnaire or face to face interviews or through telephone conversation. Face to face interviews served as effective research instruments with researcher's expectation of getting deep insights about how people feel experience and interpret social world. Somba (2015) recommended the Interviews to be much flexible so that researcher can add or remove any questions from schedule. This flexibility helps the researcher not required to follow a specific order of the questions and allow for interchangeability of the questions order depending on flow of conversation. Flick (1998) pointed out the importance of

face-to-face interview asserting that the researcher will be with much expectations of getting more accurate data than non-face-to face questionnaire. This is because a face-to-face interview allows the interview participant to give his point of view in interactive and friendly environment. During data collection, the researcher followed specific stages in order to ensure the success of the intended face-to-face interviews:

Stage 1: The selected RHA technical staffs were initially surveyed by using pre-arranged telephone discussions with RHA senior officials, stating the intent and importance of the study and therefore seeking for a formal consent of the study participants. The researcher went ahead and booked the appointments with respondents at their convenient time and place. In order to prevent any possible misunderstanding of the respondents, the researcher explained the questions set for the study as well as its purpose.

Stage 2: The researcher sought from RHA Human resource department the names and contact details for technical staff who are handling government construction projects. Thus, the researcher contacted the RHA technical staffs to determine their willingness to participate in the study. A total of 37 respondents were purposively targeted by the study for the interview or to fill the questionnaire.

Both interviews and questionnaires were used to collect data from the respondents. Face to face interviews were only conducted to persons considered as custodian of crucial and relevant information for the research. Based on tangible clarification given by the researcher, the interview resulted with accurate and clear answers from the respondents.

The researcher started each interview by introducing himself to the interviewee, stating his name, profession, education background and organization that is currently serving as well as some details related to his university. The introduction was followed by the explanation of the research aim in order to formalize the interviewee with the study topic.

After explaining the aim and topic of the research, the researcher intended to create a good atmosphere with the respondent by asking him or her questions related his/her work position and his / her responsibilities, educational background and experience in the field.

The researcher assured full confidentiality of information to all interviewees. At the end of each interview, the researcher deeply thanked each participant and promised to be availed with a report of the study results whenever requested to do so. The researcher further appreciated and acknowledged the effort of the respondents.

b) Secondary Data

The secondary data was also collected as documentary data for this study. According to Corbetta (2003), a document is defined as any substance that gives information about the investigated phenomenon and exists independently of the study's actions. Normally, a document is produced for specific objective /purpose depending on the wish of the author. Notwithstanding of the purpose of the document, its contents can be used by the researcher for cognitive or reference purposes. A document has a number of advantages over other research instruments:

- a) The information given in a document is not subject to a possible distortion. It is therefore a non-reactive technique.
- b) A document helps the researcher to study the past as a reference to improve the current situation and predict the bright future.
- c) A document is a cost-effective method since the information has already been produced rather than re-conducting a field work.

Unfortunately, a document may have some limitations such as a doubt of the accuracy and completeness of the information contained in the document. During this research work, a number of documents were thoroughly analyzed, including: RHA minutes of construction projects transfer from all public institutions to RHA; reports from office of Rwanda

auditor general from 2002 to 2017; performance contracts documents; Economic Development and Poverty Reduction Strategy (EDPRS), Rwanda building code. These documents were very important to this study as they enrich the researcher's knowledge related to the front-end construction project management for public building projects in Rwanda.

The research work was executed in a deductive way: In order to get some insight in the theory of the procurement, tender documentation, contract management, a literature review in chapter 2 was investigated first. Previous studies in the area of project management, more specifically, construction project management provided insights on the theoretical background of procuring entity / employer or client, consultant involvement, contractor selection procedures and project performance and construction project stages.

3.5.3 Research Instruments

This research work used interviews and questionnaires as research instruments as appended in Appendix no.3. These instruments were prepared and refined through a pilot interview with three project managers working in RHA. Five scale likert study questions were set and relative importance matrix was used during data analysis.

3.5.4 Method of Data Collection

As earlier stated, the research data was collected through exploratory desk studies and semi-structure interview as well. In this research, face to face semi-structured interviews were found to be the richer and most useful technique to collect data. This is because, the semi-structure interviews involve the administration of interview schedules with the same set of research questions to all interviewees. This facilitates in aggregating the replies from respondents.

A set of questions related to the objectives of the study were set and used to gather the data from the respondents.

By using Relative Importance Index (RII), the challenge of inflexibility of the structure was ranked number one as a main challenge.

3.5.5 Relative Importance Index (RII)

The study adopted the use of relative importance index

According to Tam and Le (2006), the following formulae is for the RII:

$$\text{Relative Importance Index (RII)} = \frac{\sum W}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N}$$

Whereby:

W: the weight given to each factor by the respondent ranging from 1 to 5

n₁: number of respondents for not important (i.e., strongly disagree)

n₂: number of respondents for little importance (Disagree)

n₃: number of respondents for somewhat important (Neither agree nor disagree)

n₄: number of respondents for important (Agree)

n₅: number of respondents for very important (Strongly agree)

A: is the highest weight (it means 5 in the study)

N: is the total number of the selected sample for the study

The Relative Importance Index (RII) ranges from 0 to 1

3.6 Validity and Reliability

The quality of the research is evaluated based on the concepts of reliability and validity.

3.6.1 Data Validity

This study discussed on the data validity in the view of Winter (2000) whose view is that Data Validity concerns the two main issues described below:

- (i) The accuracy of the instruments used for measurement of the data
- (ii) The targeted measurement; it means to assess if the researcher is measuring actually what he/ she wants to measure.

In order to come up with validation of the findings of this study, the researcher used the following three procedures in order to check the accuracy of the data:

- (i) **The first Procedure:** The researcher used a member checking method which is a method of knowing how far the data obtained in the findings is appropriate in comparison with the data from informants. In this case, data were returned to some participants who were very flexible to check for data accuracy and provide their inputs (if any) based on their experiences with Rwandan construction sector.
- (ii) **The second Procedure:** five pilot questionnaires were validated and rechecked with the interviewee to ensure the understanding of the research questions in order to anticipate correctness and the accuracy of the data.
- (iii) **The third Procedure:** the researcher initially assessed the secondary source of data used in order to determine the validity of the information received.

Hence, the study applied the above three procedures and expected to have the accurate research data.

3.6.2 Data Reliability

Reliability can be defined as the extent to which the study results can be reproduced when the study is repeated under the same conditions (Middleton., 2020).

Some measures were therefore undertaken by the researcher to enhance the reliability of data for this study:

- (i) **The first Measure:** Research Questions were clearly formulated and asked in a polite way. In case of any misunderstanding during interview, the question was to be repeated in order to enable the interviewee well understand what she/he was asked for.
- (ii) **The second Measure:** The researcher gave an opportunity for each interviewee to freely express his or her own beliefs and thoughts without any intervention with either comments or gestures. This was done to avoid some bias in the response of the interviewee to the question being asked.

Regarding the reliability of the research data, the researcher made effort at each process in order minimize errors in data collection and analysis.

3.6.3 Data Replicability

In order to allow for replicability of the research data as the need may arise, the design and methods of this research were well articulated. The replicability of the research data is very important as a researcher may choose to replicate the findings of other researchers for different reasons (Bryman, 2008).

In line with the purposive sampling adopted, similar purposive sampling may be preferred elsewhere as the situation of the case studied in Rwanda may be similar to any other country. Therefore, based on time constraints of the researcher, findings of previous studies may be replicated in order to provide short-term solutions to the identified problem while waiting for long-term solutions in case a deep study is well conducted.

3.7 Ethical Consideration

According to Mugenda & Mugenda (2003), the ethic is a code of conduct. The researcher was therefore supposed to obey the ethics. In this spirit, the researcher sent written request

to the RHA human resource management with a copy of a recommendation letter from the JKUAT asking permission to collect data. Additionally, before distributing the questionnaires or conducting interviews, the researcher had to politely request for permission to do so. Furthermore, the research ensured the privacy and confidentiality of that data collected and assured the respondents that the data was collected for academic purpose only.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter entails the analysis and discussion of research findings based on the data collected from the field surveys conducted during this research work. The section presents thematic analysis and arrangement of main issues that the research objectives were set for. It discusses subjects such as the effectiveness and efficiency of organizational structure of RHA, the competency or capability of current RHA technical personnel, the actual practices of construction project management, tools and equipment available for the technical staff as well as the actual work load or assigned construction projects to RHA technical personnel. The research data were collected using interview, documents, field notes, and any other research materials to enable the researcher to clearly present the research discoveries or findings.

Finally, a framework for instituting front-end construction project management at the RHA is synthesized from the data analysis results.

4.2 Data Analysis

The term data analysis can be defined as the process extracting a useful information from the collected data through data inspection, rearrangement, modification or and data transformation.

This study adopted quantitative and qualitative analysis methods. The quantitative method entails the presentation of frequencies or percentages and ranking of importance using the relative importance index. The qualitative method entails the thematic analysis or textual exposition.

The collected data was subject to reduction, display and drawing a conclusion as a simplified way of analyzing and presenting the research data (Miles & Huberman, 1994). The data analysis process adopted by the study is indicated in the figure 4.1

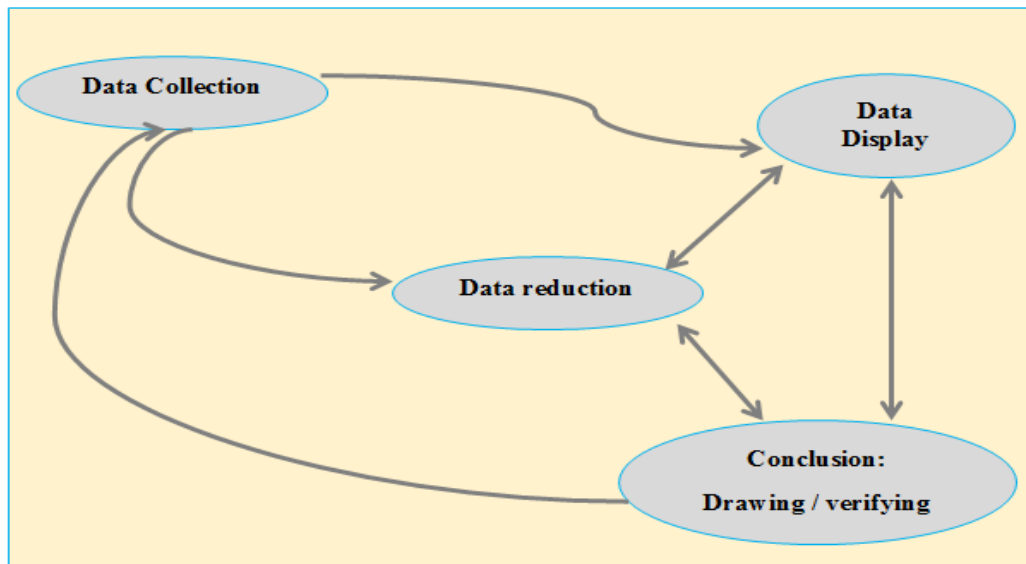


Figure 4.1 The interactive model of data analysis components (source: Author, 2021)

The primary data for this study were obtained from field interviews and questionnaires. Such data were sourced from different groups of professionals in various disciplines like architects (7%), civil/ structural engineering (60%), electrical engineering (10%), mechanical engineering (7%), geotechnical engineering (3%), quantity surveying (3%), land surveying (3%) and building technology (7%). Additionally, the secondary data were sourced from documentary analysis. Data were therefore taken from the paper and entered in the software for analysis. The data were sorted in a manner that the important items remained and therefore displayed.

According to Miles and Huberman (1994), the qualitative data is mostly displayed in the form of the narrative text. The qualitative data in this study were also displayed in narrative text. However, the qualitative data were displayed in in form of frequency tables

prepared by using the Microsoft Excel spread sheet. Finally, the data was presented into charts, pie diagrams or graphs. The conclusion was then drawn through data.

4.3 Response Rate and Background Information

Interviews and questionnaires with particular respondents were undertaken and noted down in order to obtain data to be used as answers to the study questions. The hand-written notes taken during the interviews with respondents were formatted on Microsoft excel sheets to reflect the questionnaire provision.

During this research work, the following challenges and constraints were encountered:

- i. Some of the respondents were reluctant to cooperate and not willing to provide information, while others were willing not to provide full information as expected.
- ii. Some respondents failed to meet the appointment schedule with the researcher after agreeing and arranging everything required for the appointment event. In this case, some respondents were either changed their minds and refused to be interviewed or went elsewhere. A second round of appointments was therefore to be requested and, in some cases, the researcher had to look for an alternative respondent so that the targeted number of respondents can be met.

In order to overcome challenges and constraints, the research was with a lot of patience that lead him to receive the targeted number of respondents and get information that the researcher was looking for.

4.3.1 Response Rate

The response rate indicates the percentage level of response by looking at the targeted number of respondents against the actual number of individuals who participated in the study. The results on response rate are displayed in table below:

Table 4.1 Respondent Rate

	Number of respondents sampled for interviews	Actual number of respondents interviewed	Response Rate (%)
Number	37	30	81.1 %

Source: (Author, 2021)

This study used a purposive sampling technique and 33 respondents (sample obtained from the population of the RHA as a selected case study) were hand-picked for inclusion in the study. From the results displayed in table above, it is shown that 30 out of 33 of the targeted respondents were actually interviewed hence translating to 90.6 % response rate for this study.

4.3.2 Background Information on the Respondents

This section entails the establishment of general information of the respondents contacted including respondent age, level of education, profession, actual work position or years of experience in the field.

a) Professional Background of the Respondents

The Results indicated in figure 4.1 below show that the largest group of RHA technical staff in technical departments is of civil/ structural Engineering background. The group represents 56.67% of the total technical staff in the building departments. Based on that figure, the researcher is with the opinion that RHA as a purely technical entity or organization whose technical staff do have all necessary professional background to deliver on its mandate subject to some improvement.

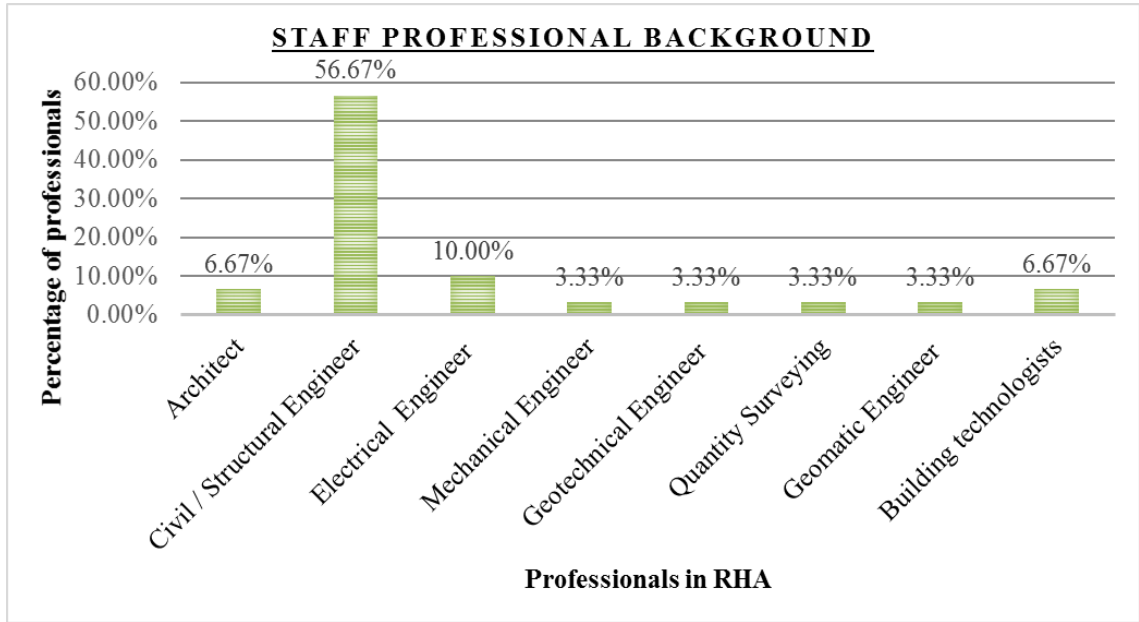


Figure 4.2 Respondent Professional Background (Source: Author,2021)

b) Work Positions of the Respondents

The Results indicated in figure 4.2 below show that the largest group of RHA technical staff in technical departments works as projects Engineers, representing 46.67% of the total technical staff in the building departments.

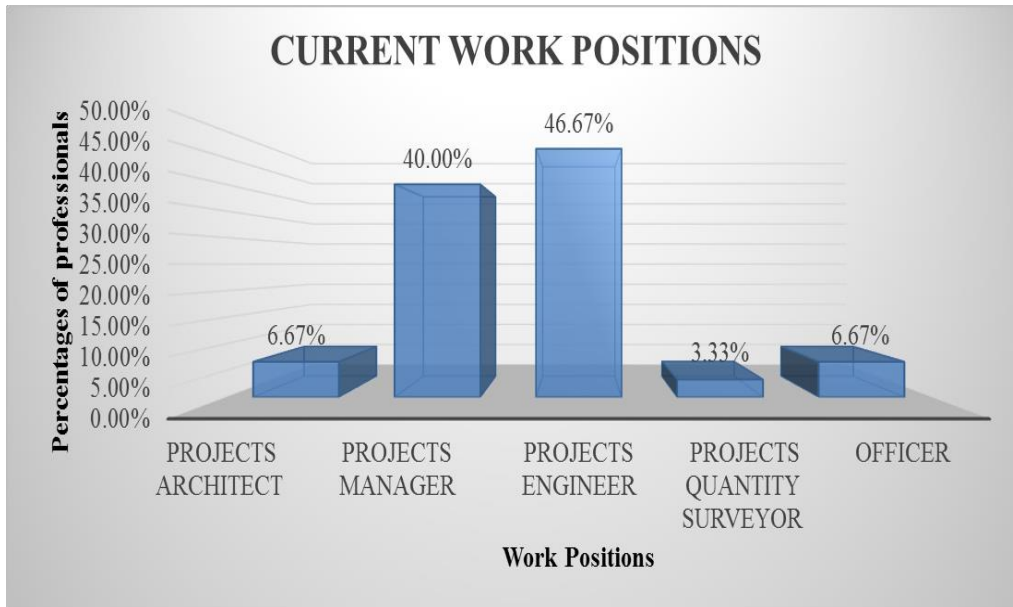


Figure 4.3 Current RHA Employment positions (Source: Author,2021)

c) Age of the Respondents

The Results displayed in figure 4.3 below show that the largest group of RHA technical staff in technical departments is ranging between 46 and 55 years old, representing 46.67% of the total technical staff in the construction departments. The other lager group of remaining staff is ranging between 36 and 45 years old, Constituting 33.33%

The results further indicate that a small number of the experienced labour in RHA is going to retire in the coming years. The retirement age is 60 years of old and since only a small number of the staff is about to retire, this will not affect much the functioning of the technical departments.

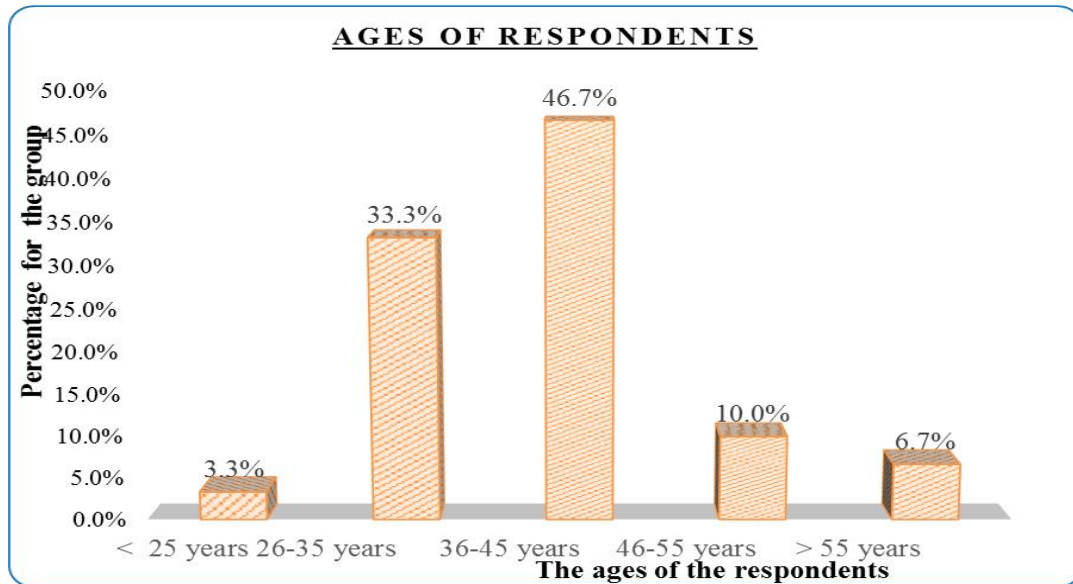


Figure 4.4 Age of respondents in RHA (Source: Author,2021)

d) Work Experience

The results illustrated in figure 4. 4 below indicate that the largest group of the RHA technical staff, in technical departments is ranging between 11 and 15 years of experience in the field. This group represents 41% of the total technical staff in construction departments. However, 83% of the RHA technical staff has work experience of above 6 years. Despite the vast work experience of the RHA 'technical staff, government construction projects continue to suffer from scope, cost, time and quality issues as reported by the auditor general of state finances. As explored in the literature review in this study, quality work experience needs to be combined with necessary construction project management skills, equipment tools, construction resources and staff motivation as well among others success factors to ensure effective construction project management.

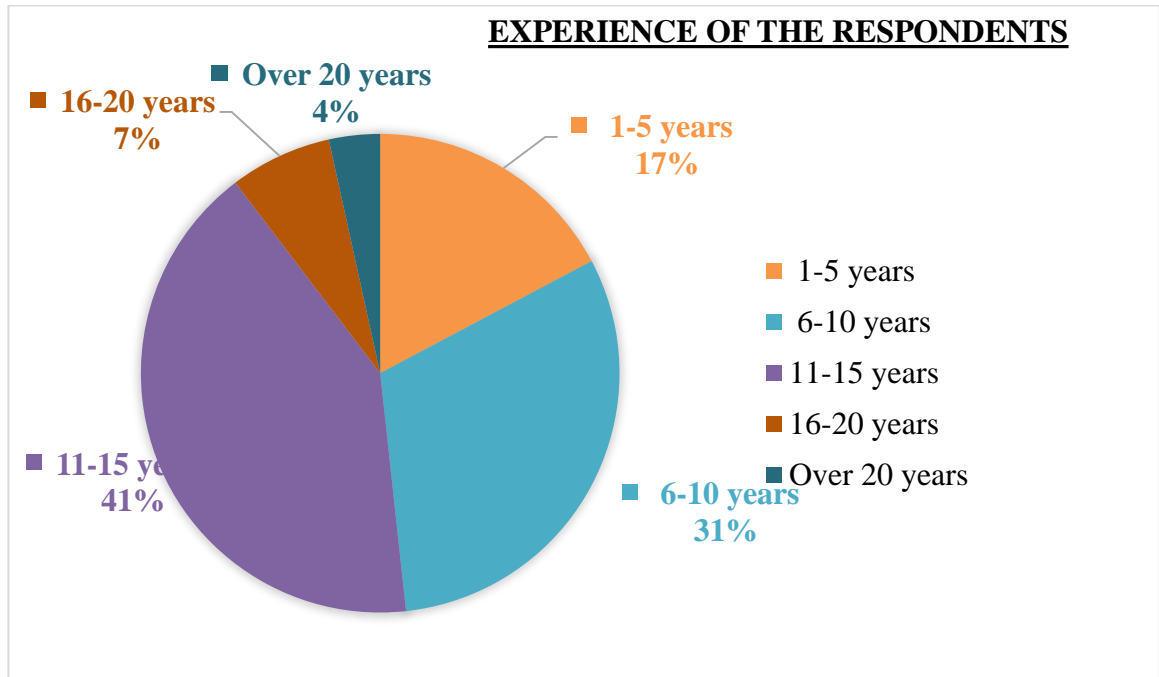


Figure 4.5 Experience of the respondents in RHA (Source: Author,2021)

e) Education Level of the Respondents

The results illustrated in figure 4.5 show that 90 % of the RHA technical staff have both degree and post graduate studies in various technical fields like architectural, structural engineering, mechanical engineering, civil engineering, Quantity Surveying and construction project management. The rest of the RHA staff had diplomas in various technical fields. Diploma holders were mostly the RHA technicians or assistant's engineers.

The reviewed literature shows that adequately qualified and well-trained industry practitioners are key factors for an effective construction industry.

The researcher is also of the opinion that on that from a diploma, university degree or post graduate degrees of the technical staff, officers are well equipped to undertake the mandate

of their positions. This removes some doubt on the technical capacity of RHA’s technical team to effectively oversee construction project though the number is still questionable. However, these findings seem to contradict opinion of Egbu (1999) who asserted that although the skills are acquired through appropriate education and training, the acquisition of relevant skills, knowledge and competencies for the day-to-day management of construction activities is crucial.

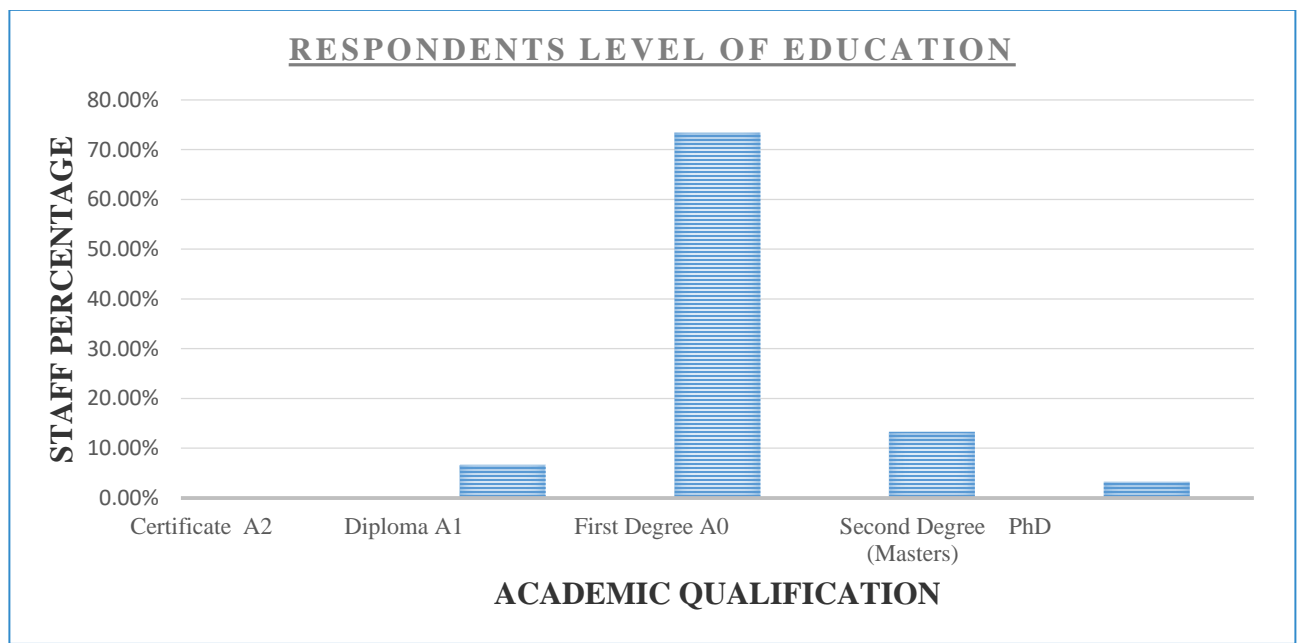


Figure 4.6 Respondents level of Education in RHA (Source: Author,2021)

4.4 Effectiveness of RHA Organization Structure

The aim of this section was to examine the overall efficiency and effectiveness of the current RHA organizational structure in construction project management in terms of the extent to which the current structure enhances staff relationship, sound decision making and communications as well. This section deals with data related to the research Objective1 which is to examine the organizational effectiveness in assuring front end

construction management on building construction projects in Rwanda Housing Authority.

4.4.1 Effects of Current Vacant Positions on Staff Functions

The study wanted to look at the extent to which the existing vacant positions on the new RHA structure affect the current the functions of some staff. The study therefore found that 83.33% of the technical staffs are in agreement that their current functions are being affected by the vacant positions (for those who are in agreement representing 36.67% and for those who are in strong agreement representing 46.67 % as per the fig.4.7).

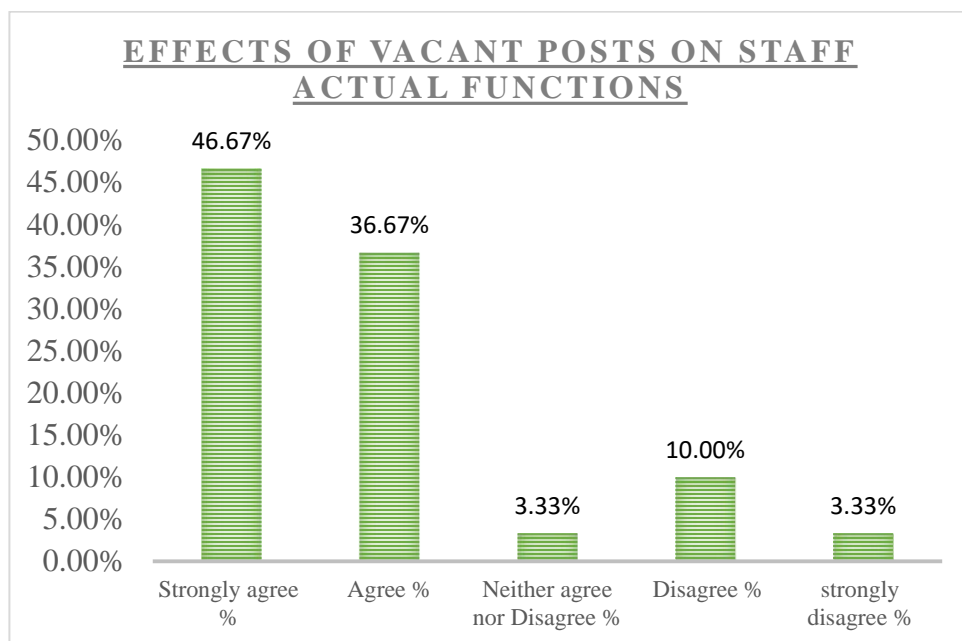


Figure 4 .7 Effect of vacant posts on staff performance (Source: Author,2021)

4.4.2 Major Challenges of the Existing RHA Organizational Structure

Table 4.2 below indicates some of the issues of the organizational structure of as mentioned by the respondents. The average score on the existence of the 5 main issues was about 64 %.

Table 4.2 Challenges of RHA Organizational Structure

RHA organizational structure major challenges	RII	RANK
Inflexibility of the structure	0.69	1
Centralization	0.65	3
Rigidity in handling people and problems	0.61	4
Rules and regulation	0.67	2
Staff stagnation	0.60	5

Source: (Author, 2021)

4.4.3 Proposed Changes to the Existing RHA Organizational Structure to Enhance Efficiency and Effectiveness

Table 4.3 indicates the outcome of responses on the indicators referred to in order to determine the extent to which the organizational structure of RHA enhances the efficiency and effectiveness as well. The assessed variables show that the technical staffs of RHA are not satisfied with the responsiveness of the current structure in regards to the items investigated by the study.

Results shown in figure 4.8 indicate overwhelming need for organizational restructuring of the current RHA organizational structure. All the six variables assessed indicated an average score of about 51 % indicating a need for restructuring. The necessity of this restructuring recommended not also based on the respondents view but also based literature review as a good organizational structure should intensify the following:

- (i) Facility in identifying problems among the staff;

- (ii) Ability of sharing organizational goals in effective way, i.e., easy communication among staff;
- (iii) Promoting the teamwork by developing team collaboration to achieve common goals;
- (iv) Promoting the staff morale at Highest level by allowing for development of personal issues, valuing the employee so that employees wish to work in the organization a long time;
- (v) Opportunity for training for workers in to promote capacity building;
- (vi) Quickly adoption of opportunities to grow, technological and operational changes;
- (vii) Clarity in structure definition in a way which does not limit innovations and growth for organization
- (viii)) Promoting efficiency at all levels of the structure.

Table 4.3 Proposed Changes to RHA Organizational Structure

Proposed Changes to the RHA organizational structure	RII	RANK
Fill in vacant posts	0.73	1
Reduce staff stagnation	0.52	6
Increase the number of staff on existing posts	0.56	5
Decentralization of authority	0.60	4
Create new posts	0.63	3
Create departments based on various construction professions such as Architecture, Quantity surveying, Civil & Structural Engineering, Construction Project Management, Building service Engineering etc.)	0.67	2

Source: (Author, 2021)

The analysis of the data in the table 4.3 justifies the reformulation of the RHA organizational structure as detailed in section 4.6 of this chapter.

4.4.4 The Capacity of RHA Personnel in Construction Project Management

In this Section, the results related to capability of RHA in managing all public construction projects are displayed. These projects under RHA dockets are the ones with budget estimates equivalent or above five hundred million Rwandan francs (500,000,000 RWF Equivalent to approximately 500,000 USD). Table 4.4 below shows that RHA had capacity to plan, coordinate as well as reporting capacity in the management of building projects as it ranks number one with RII of 0.67. The capacity of the RHA to manage all building projects was lowest with respect to project plant and equipment, project staffing because the score was less than 50%.

Table 4.4 RHA Construction Project Management Capacity Rating

Project management aspect	RII	RANK
Construction Project Planning and coordination	0.67	3
Construction Project Monitoring	0.52	5
Construction Project Staffing	0.41	7
Construction Project Budgetary allocation	0.60	4
Construction Project Plant and equipment,	0.39	8
Construction Project Staff facilitation	0.80	1
Construction Project Reporting	0.73	2
Construction Project Evaluation	0.50	6

Source: (Author, 2021)

4.4.5 Enhancement of RHA Staff Relationship

The teamwork promotion and improvement in professional development is highly recommended in the RHA. This is because building construction projects comprises a number of different components or building elements that require input from various construction professionals. For example, the project team will comprise Architect, civil Engineer, structural Engineer, Quantity Surveyor, Electrical Engineer, Plumbing Engineer, HVAC Engineer, Waterproofing specialist etc.

Referring to the research findings, RHA is fairly good in allocating the responsibilities to the technical personnel, work delegation and relationship intensification as shown in Table 4.5.

Table 4.5 Staff Relationship Level

Areas related to staff relationship that RHA should intensify.	RII	RANK
Professional Development	0.38	1
Allocating work responsibilities to staff	0.67	5
Delegate the staff on project	0.52	4
Promote Team work	0.41	2
Relationship related to reporting	0.60	3

Source: (Author, 2021)

4.4.6 Extent of Decision-Making Enhancement and Information Flow Within RHA

Table 4.6 below indicates the level at which RHA intensify the process of making decision and ability to develop and evaluate alternatives in finding solutions. The results revealed that RHA is good in making decisions and in develop and evaluating policy alternatives. However, it is recommended that not only communication structures should be improved but also the problem identification structures should be improved.

Table 4.6 RHA Decision Making Intensification Level

Areas related to information flow and decision making that RHA should intensify.	RII	RANK
Decision Making process	0.67	4
Ability in developing and evaluating the alternatives in solving problems.	0.52	2
Communication structures	0.41	1
Identification of the problems	0.60	3

Source: (Author, 2021)

From the data analyzed in sub-section 4.4.1; 4.4.2; 4.4.3;4.4.4; 4.4.5 and 4.4 6, it can be concluded that the objective no.1 of the study was achieved since the existing organizational structure was not effective in assuring FECPM in Rwanda Housing Authority.

4.5 Front-End Construction Project Management Factors and Techniques Applicable In RHA

This section deals with data related to the research objective 2 which is to identify front-end construction management factors hindering the project performance and evaluate its tools, techniques applicable in RHA.

4.5.1 Front-End Construction Project Management Factors Hindering Project Performances in RHA

Table 4.7 indicates the ranking of the factors for front-end construction project management that affect project performance.

Table 4.7 Factors of front-end construction project management

Critical factors in early stages of a construction project	RII	RANK
Clarity of project goals / objectives	0.620	4
Adequacy of Project Terms of reference	0.607	6
Adequacy of project brief and scope determination	0.627	3
Availability of adequate project funds	0.587	10
Realistic or adequate timelines for the assignment delivery	0.580	11
Clear communication channels among staff	0.607	7
Adequate professional Consultation before decision making	0.620	5
Adequate experience of project team in the field	0.593	9
Timely Decision making and Approvals from top management	0.600	8
Thorough project documentation & designs	0.640	1
Facilitation and payment of project team	0.633	2

Source: (Author, 2021)

4.5.2 Construction Project Management Tools and Techniques Frequently Used in RHA

In order to enhance the project, oversee or project management exercise, Project management tools and techniques are very crucial. Indeed, the techniques give a systematic layout on how the management of construction projects should be done while tools aid in project management exercises

Table 4.8 indicates the tools and techniques that are currently used in RHA. The objective here was to assess application project management tools and techniques in RHA and identify the available tools and equipment for RHA technical staff. Tools and techniques were identified during this study. Although Microsoft Project Software is currently used by some RHA staff, the study recommended the improvement of application of project management tools and equipment within RHA.

The study found that RHA has no in-house project management handbook/manual. It is therefore important to note that no manuals available at RHA as a guide for effective construction project management for related skill improvement

Table 4.8 Construction Project Management Tools and Techniques used in RHA

Project Management tools and techniques frequently used in RHA	RII	RANK
Construction project management softwares	0.620	1
In-house construction project management manual or handbook	0.610	3
The techniques of making informed decisions	0.627	2
The techniques of using cost benefit analysis	0.587	5
The technique of analyzing decisions	0.580	6
Sensitivity analysis techniques and risk assessment	0.607	4

Source: (Author, 2021)

4.5.3 The Main Causes of Construction Project Failure in Rwanda and Related Recommendations

Table 4.9 shows the main causes of project failure in Rwanda as revealed by the study. They include inadequate skills, lack of professionalism, poor construction contract management, lack of thorough project management during early stages of the project, inadequate project documentation and designs. The respondents also proposed some solutions to reduce or overcome project failures in Rwanda. Some of the recommendations include the development of capacity building to improve on construction management skills, the employment of various construction professionals and by enhancing thorough project team supervision during early stages of a construction project.

Table 4.9 Causes of Project Failure and Recommendation to Overcome Project Failures

Experienced causes of project failure in Rwanda	Recommendation	Frequency
Inadequate skills	Develop capacity building, quality control courses. The important training is required in construction methods courses, material control courses planning courses and Scheduling courses	8
Lack of professionalism	Employ adequate construction professionals in each government entity.	6
Poor construction contract management	Increase training in contract management	4
Lack of thorough project team supervision during early stages of the project	Increase project team supervision during the designs	3

Source: (Author, 2021)

From the data analyzed in sub-section 4.5.1; 4.5.2 and 4.5.3, it can be concluded that the objective no.2 of the study was achieved not only because the FECPM factors affecting the project performances in RHA were identified but also because the application of FECPM tools and techniques within RHA was also evaluated. The evaluation revealed such tools and techniques were not well practiced within RHA.

4.6 The Extent to Which the Front-End Construction Project Management is Currently Applied in RHA

This section explores the extent to which the front–end construction project management practice is done within the RHA. It investigates the existence of the training policy for capacity development purpose, the challenges and issues of the RHA technical personnel, the available training opportunities, the available guides of project management practice in RHA, the indicators of overwhelming of technical personnel, personnel workload, vacant positions in RHA, the main causes of project failures in Rwanda, as well as the rating of the RHA construction project management.

4.6.1 Technical staff training policy

The study indicated that there is a training policy in RHA. This policy aims at capacity building for not only RHA technical staff but also for other staff. The Human resource management department is the one in charge of implementation of the said training policy as reported by the majority of the respondents in the RHA. The study was interested to know who is responsible to implement training policy.

Table 4.10 Who is in charge of RHA training policy?

People in charge of implementation of training policy	RII	RANK
It is responsibility of RHA Human resource manager to put in action the training policy for RHA technical staff	0.81	1
It is responsibility of RHA Heads of Departments to implement the training policy for RHA technical staff.	0.52	4
It is responsibility of Rwanda Development Board (RDB) to training policy for RHA technical staff and other public officials.	0.41	3
It is the responsibility of National Capacity Building secretariat (NCBS) to implement the training policy of RHA technical staff	0.60	2

Source: (Author, 2021)

4.6.2 The Main RHA challenges and staff issues

As indicated in the table 4.11, the staff with limited technical capacity was ranked number one, followed by Poor hierarchy in planning and management of construction projects.

Table 4.11 Main RHA challenges and staff issues

Main RHA challenges and staff issues	RII	RANK
Inadequate technical staff comparing to the existing workload	0.67	5
Insufficient budgetary allocation for staff welfare	0.52	7
Lack of adequate budgetary provision for certain programmes	0.41	9
Dilapidated equipment (in ruin state) and obsolete equipment (no longer produced)	0.60	6
Poor hierarchy in planning and management of construction projects	0.80	2
Staff with limited technical capacity	0.81	1
Poor working environment	0.71	4
Lack of tangible collaboration among the project team	0.50	8
Extended Bureaucracy in the procurement of goods and services	0.73	3

Source: (Author, 2021)

4.6.3 Staff Training opportunities in RHA

One of the specific objectives of this study was to explore the extent to which front-end construction project management is currently applied in RHA. This include assessing the skills related the technical and construction project management aspects possessed by RHA staff in the aim of gauging their capability and technical capability to oversee all public building projects competently. The interest here therefore is first to examine whether the existing training opportunities for capacity building are relevant or not. The

study was also interested to know the management and technical courses attended by RHA staff in the last two years.

Table 4.12 Training opportunities in RHA

Training opportunities	RII	RANK
Construction Project Management courses	0.67	1
Technical courses related to construction	0.52	4
Seminars related to construction project management (Short courses)	0.41	3
Workshops related to construction project management	0.60	2

Source: (Author, 2021)

4.6.4 Project Management Skills Recommendations in RHA

Management is results oriented. Therefore, one cannot be an effective project manager without project management skills. The study sought from the respondents what Management skills are available in RHA and recommendations from are tabulated in table 4.13 below:

Table 4.13 Recommendation for skills improvement

Recommendations for skills improvement	RII	RANK
Train current technical staff on construction management skills	0.67	1
Train current technical staff to acquire construction management skills.	0.52	2
Hiring external construction project managers	0.41	3

Source: (Author, 2021)

4.6.5 Basis of RHA Project Management Guides

During early stages of any construction project, one of the crucial success elements is the project management which is done mainly based on terms of reference drafted by hired consultants as shown in Table 4.14. This implies the need of a guide on construction project management as manual or handout to the technical staff. Due to lack of this guiding document, construction project management by RHA technical staff relies on the individual professional judgments to carry out managerial assignments on construction projects. In other words, there implied lack of a standardized construction project management methodology for all public buildings, quality standards are questionable.

Table 4.14 The basis /guide of project management in RHA

The basis of project management in RHA	RII	RANK
Terms of reference drafted by the hired consultants	0.67	1
Circulars or Government orders	0.41	6
Architects / Quantity Surveyors or Engineers personal judgments	0.60	2
Construction Project management experience	0.51	5
Instructions issued by superior authorities	0.39	7
Architects / Quantity Surveyors or Engineers personal judgments	0.59	3

Source: (Author, 2021)

4.6.6 Consequences of Defective Terms of Reference

The table 4.15 below indicates that main consequence from defective terms of reference is the project re-designs resulting from ambiguities in ToR, followed by the delays in getting approval of alternative design proposal from client, the last one being the rejection of the proposed design due to different design interpretation.

Table 4.15 Consequences of the defective terms of reference

Effects of defective terms of reference	RII	RANK
Project Re-design resulting from ambiguities in Terms of Reference	0.65	1
Delays in obtaining required clarification from client or Employer	0.61	4
Delays in getting approval of alternative design proposal from client	0.64	2
Changes in Initially Estimated Cost due to alternative materials being proposed.	0.59	5
Rejection of the proposed design due to different design interpretations	0.58	6
Additional professional fees claim due to client changes	0.63	3

Source: (Author, 2021)

4.6.7 Rating of How RHA Manage Construction Performance Indicators

The table 4.16 below indicates that the construction project quality management ranks the number one project performance indicator that RHA is keen on. It is followed by the construction project cost management with scope management. The project time management ranks the last one as many projects suffer from delays.

Table 4.16 Rating of how RHA manage construction projects

Project performance indicators in RHA	Relative Importance Index	RANK
Construction Project time management	0.600	4
Construction Project cost management	0.620	2
Construction Project scope management	0.607	3
Construction Project quality management	0.653	1

Source: (Author, 2021)

4.6.8 Indicators Proofing that RHA is Indeed Overwhelmed

All public entities known as line institutions must report to RHA for any new project intended for construction. The number of projects to be overseen by RHA is comparing to the number of technical workers in RHA.

Apparently, the actual number of construction projects to be handled by RHA is already overwhelming. If the case remains the same, then RHA will tend to experience high turnover of technical staff.

Table 4.17 Indicators of RHA overwhelming

Indicators for RHA overwhelming	RII	Rank
There are many projects and few technical staff	0.67	1
There are many projects and many technical staff	0.52	4
Huge imbalance between staff recruitment and staff leaving service (retrenchment, early retirement, death, resigning and transfers)	0.41	5
Subcontracting work to private consultants and contractors	0.60	2
Stalled projects and prolonged delays in completion	0.59	3

Source: (Author, 2021)

As indicated in the table above, there are many projects to be handled by RHA technical staff. In fact, a number of construction projects increases as the population demand and following the fact that the construction section in Rwanda is experiencing a huge boost due to 2.7% annual population growth (EXPOGROUP, 2019).

4.6.9 RHA Workload

The study was with the intent of finding out the level of staff workload in RHA. This was done by comparing the number of construction projects that RHA is expected to handle verses available technical staff that would serve as project managers. Information was gotten from respondents as well as minutes of all governments project transferred to RHA. The results are presented and discussed hereafter.

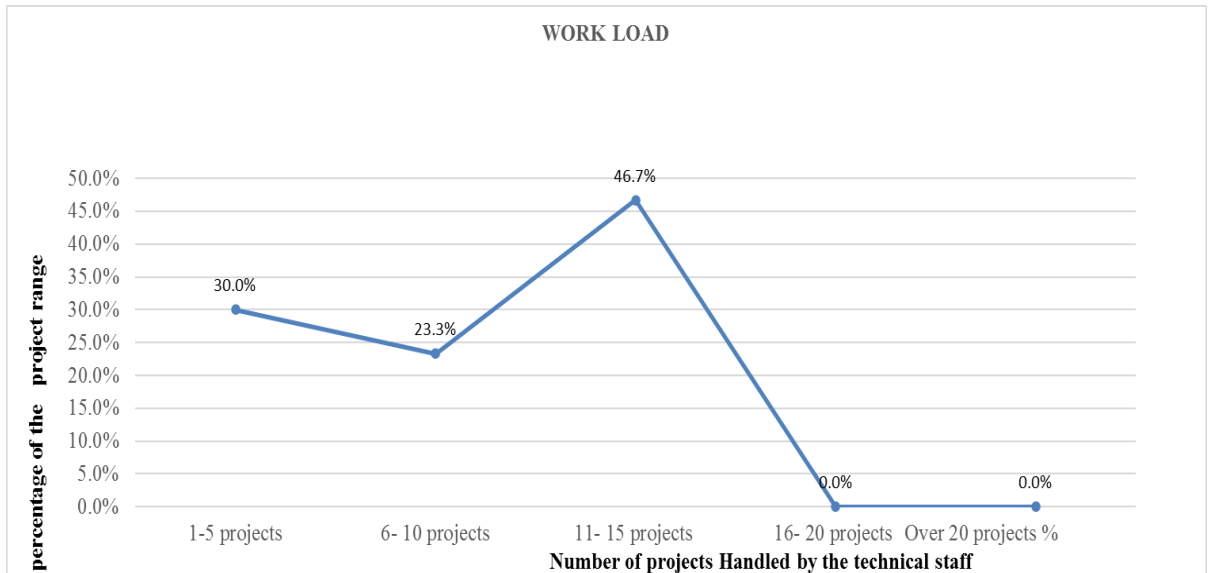


Figure 4. 8 RHA Workload for technical personnel (Source: Author,2021)

The study further sought to know if the RHA mandate is achievable with the available resources such as available equipment and tools, technical staff, facility in transport, available printers, computers, photocopiers etc. The study found that this cannot work without further recruitments of other technical staff

In order to measure the workload of RHA technical staff, the researcher adopted projects to staff ratio as a measure to determine workload. The figure 4.8 above indicates that the majority of the technical staff handles about 6-11 construction projects. According to Cabanis-Brewin(2016), the study done on high performing companies revealed that a project management staff handled about 8 projects whereas in low performing companies, the project management staff handled about 11 projects. However, high performance of the companies based on the number of projects handled by the management staff depends on a number of other factors such as the management capability of the staff. From these observations, it can be concluded that the number of the projects expected to be handled by the staff is high and may affect the project performances despite of other factors.

4.6.10 Effect of Vacant Positions on Staff Workloads

Based on the data received from Human resources department of RHA, the researcher is with the opinion that there is a huge technical staff vacancy. As per the new organizational structure, the required total number of technical staff is 70 against existing technical staff of 40. This means that there is a gap of 30 posts in the technical aspect that need to be filled up by recruiting new staff. It is therefore understandable that this disparity creates a huge workload on the existing staff as the huge number of construction projects have to be handled by the few available technical staff.

From the data analyzed in sub-section 4.6.1; 4.6.2, 4.6.3; 4.6.4; 4.6.5; 4.6.6; 4.6.7; 4.6.8; 4.6.9 and 4.6.10, it can be concluded that the objective no.3 of the study was achieved since the study revealed that the FECPM was not well practiced at RHA.

4.7 Front-End Construction Project Management Framework

This section proposes a RHA re-structuring and formulate a framework for enhancing front-end construction project management at RHA. The framework entails refinement of the project initiation and planning procedures at the RHA, during the earliest stages of every construction project. However, this framework cannot work well in the existing organization structure of the RHA. The figure 4.9 indicates the proposed new organization structure for RHA that will involve various construction professionals on a project.

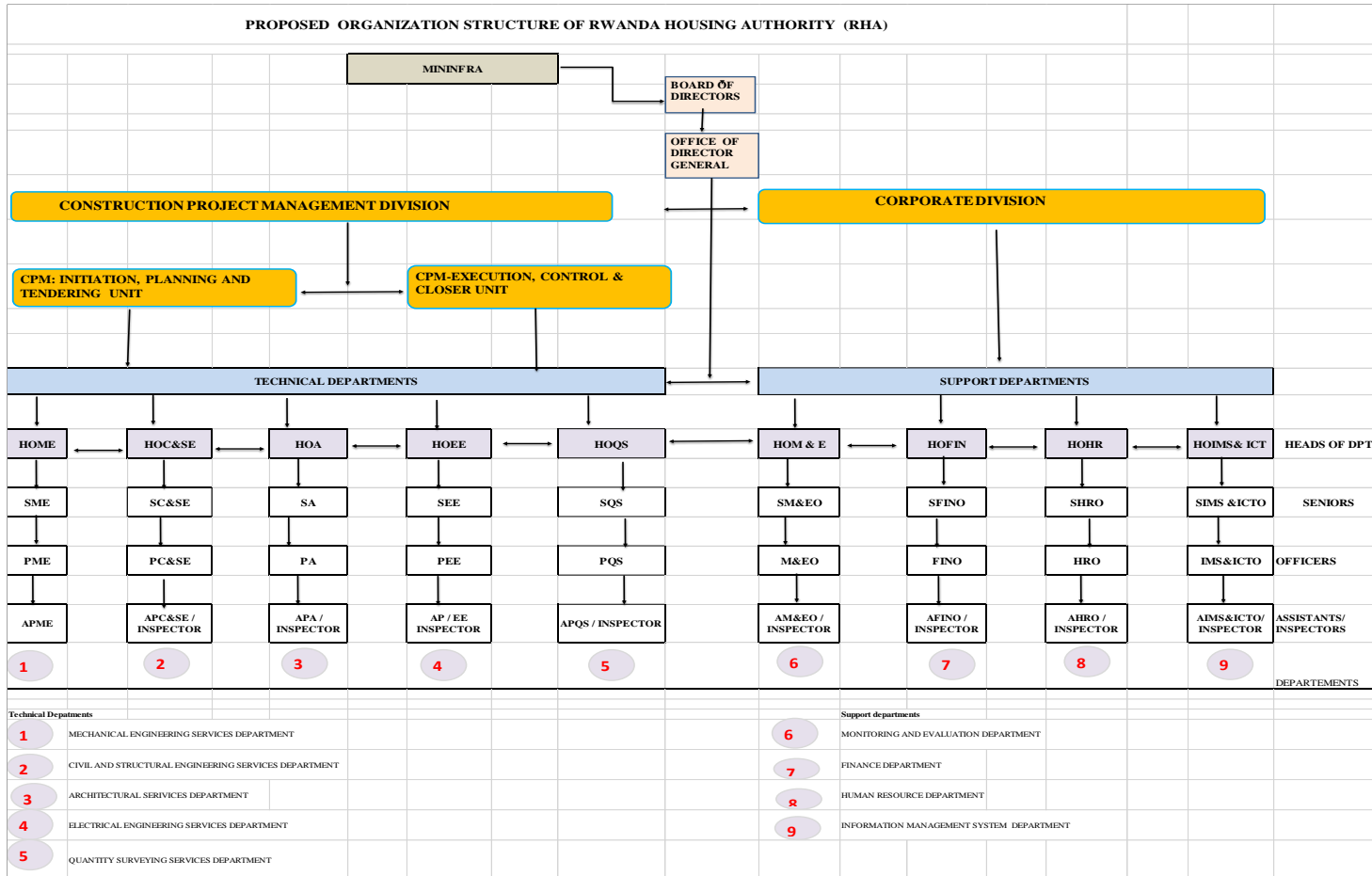


Figure 4.9 Proposed new RHA organizational Structure (Source: Author,2021)

The followings are some improvements or refinements made to the existing organizational structure: Involvement of all construction professionals into the projects (Project managers, Architects, Quantity Surveyors, Civil and Structural Engineers, Electrical Engineers, Mechanical Engineers, IT Engineers with other support professionals such as finance experts, human resource management etc. This is because from the observation made in section 4.3.3, the highest score indicated the need for restructuring. Additionally, according to Szymczyk (2017), in order to keep its market position, changes in the environment where the organization operates force the organization to react and quickly respond to the new challenges. Such organizational reaction and response entail the restructuring which involves significant changes especially in the departments of the organization. Theoretically, the restructuring usually leads to a more modernized and efficient organization. On the other hand, the restructuring may lead to the deletion of some job posts and subsequent layoff of personnel.

In order to make the Government of Rwanda more profitable through RHA integration in new structure, the proposed new structure will help in:

- Promoting the RHA efficiency and effectiveness
- Reducing the workload in RHA as the main cause of the overwhelming of RHA technical staff
- Implementing new technologies as may be recommended from various professionals
- Promoting the professionalism within RHA and across the country.

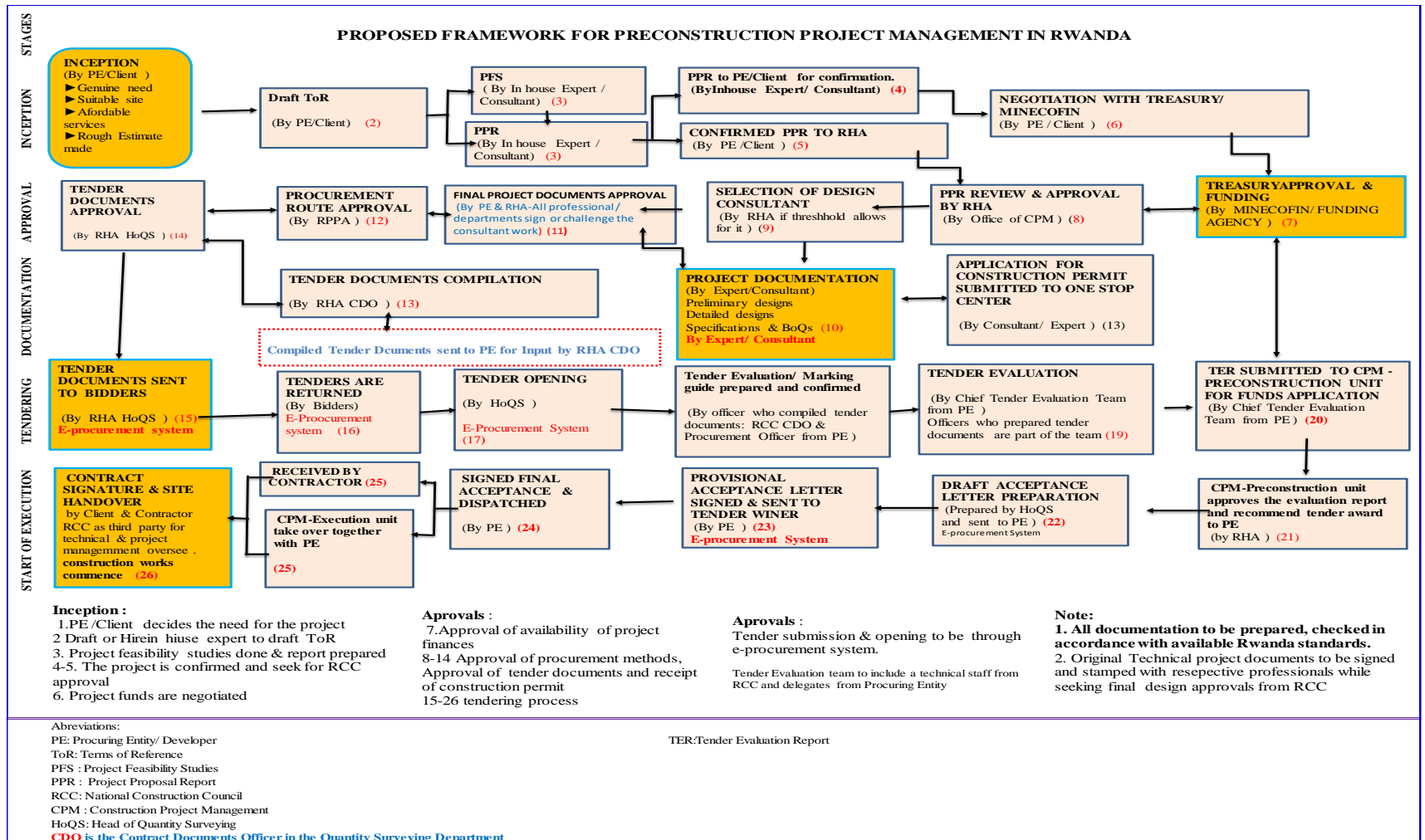


Figure 4. 10 Developed Front-end construction Project management framework in Rwanda (Source: Author,2021)

The developed framework shown in figure 4.9 above comprises five stages namely:

- i. Project Inception stage
- ii. Project Approval stage
- iii. Project Documentation stage
- iv. Project tendering stage and
- v. Start of project execution

The framework also indicates how various construction professionals within RHA would be involved in the project. Furthermore, the framework shows the interaction between RHA technical staff with the line institutions or public entities known as project beneficiaries.

4.7.1 Project Inception Stage

The line institution referred to as Client is to clearly explain the project need, identify project site, prepare terms of reference or hire an expert to prepare it on his behalf. The expert will undertake project feasibility and draft a project proposal report (PPR) for RHA and Client Confirmation.

During preparation and confirmation of PPR, the client also has to liaise with financing institution / treasury or other project stakeholders.

4.7.2 Project Approval Stage

After checking and approval of PPR and project treasury, the client will continue the process to hire a design consultant or a contractor for design and build procurement system. The client/Line institution is to liaise with Rwanda Public Procurement Authority or proceed as per procurement laws in procuring the intended services or works. This procurement route is to be approved by RHA through RHA chief Quantity Surveyor.

4.7.3 Project Documentation Stage

This stage entails the preparation and approval of tender documents for intended construction project including detailed drawings, Bills of Quantities, specifications, general conditions of the contract and particular conditions as well.

The contracted expert /consultant will first prepare preliminary designs and preliminary project cost estimates. The expert has to further prepare the detailed drawings and BoQs for project execution purposes. These are subject to RHA check and approval. The consultant also has to liaise with one stop center in getting construction permit. The approved tender documents will be compiled by the contract document officer in the office of Chief Quantity Surveyor.

4.7.4 Project Tendering Stage

The approved tender documents will be distributed by RHA Chief QS or procurement specialist office in the office of CQS. Tenders will be returned and stored in a specified room at the line institution or client. The tender opening meeting will be chaired by the RHA chief Qs in presence of representatives of Client and bidders. The attendance list will be filled and signed by all attendants. The tender will be evaluated by tender evaluation team (TET) comprising at least two officers who participated in the preparation of tender documents. This committee will prepare tender evaluation report, sign on it and submit it to the Chief Tender Evaluation Committee (CTEC) who will review the report and submit it to the RHA chief Architect and to the funding Agency. The Contract document Office will draft an acceptance letter and sent it to the CQS who will submit it to the line institution / Client for signature. After signing the acceptance letter, the line institution will send it to the RHA CQS who will forward it to the selected contractor.

The client will have to apply for the project funds as per the intended contract amount.

4.7.5 Start of Project Execution

After receiving a letter of acceptance from line institution, with stipulated time, the contractor will be called for contract negotiation. The minutes of negotiation will therefore form part of the contract document. Within stipulated time in the signed contract, the client will fully hand over the site to the contractor and then the project execution will have to take place.

From the elaborated figure 4.10, it can be concluded that the objective no.4 of the study was achieved since the FECPM framework was formulated to involves various construction professionals and emphasizes the front-end stages of a construction project where the government of Rwanda as the major construction client will have much influences to the project

4.8. Summary of Research Findings

The study aimed at developing a front-end construction project management framework in Rwanda. The study was carried out in RHA which is a public institution with a mandate to oversee all building construction projects on behalf of the Government of Rwanda. In order to achieve the main objective of this study, the researcher first assessed the front-end construction project management capability of RHA to handle all construction projects. The researcher was also with a view of identifying the issues and difficulties that RHA faces during the process of handling construction project under RHA docket. The study had specific objectives such as to examine the effectiveness of the organizational structure of RHA in the management of construction projects; Identify Front-End construction Management factors affecting project performance and evaluate its tools, techniques applicable in RHA., to explore the extent to which s front-end construction project management is currently applied in RHA and to formulate a framework for front-end construction project management.

This section provides research findings in a summarized form. The findings are aligned with the research objectives which the study set out to determine.

4.8.1 Findings on the effectiveness of RHA's organizational structure in terms of management of public building projects; Research Objective No. 1

The study set out to examine the RHA's organizational effectiveness in material aspects of public building projects. This was done by looking at the adequacy of organizational structure capacity and therefore finds out whether the current RHA's organizational structure enhances efficiency in management of public building construction projects.

The study found that the existing RHA's organizational structure comprises a number of vacant posts which are affecting staff performance. The study also found that there is inflexibility as a major challenge of the organizational structure and that the set deadlines form the critical factor that is affecting construction project management in front-end stages in RHA. This is because, if an assignment is given unrealistic or very tight deadline, this would result in inadequate project documentation or documents containing numerous errors.

The research further found that RHA had adequate capacity in facilitating its technical Staff, to undertake construction Project planning, coordination, monitoring Reporting. However, RHA was found to be poor in construction project staffing.

On the other hand, it was established that the organizational structure of RHA was good at allocating responsibilities to the technical staff and reporting relationships. The study findings also indicated that RHA's organizational structure is fairly effective was fair with regards to the set parameters.

The study further recommended some changes to the existing organizational structure of RHA so that construction project management can be improved. The proposed changes included; filling in vacant positions, create departments based on professions involved in construction projects such as Quantity surveying, Architecture, Quantity surveying, Civil/Structural Engineering, building service Engineering, Project Management), create new posts, decentralize the authority to help in quick decision, increase the number of staff within the current organizational structure.

4.8.2 Findings on the identification of front-end construction management factors affecting project performance and evaluate its tools, techniques applicable in RHA; Research Objective No. 2

In this section, the aim of the researcher was to identify common factors of front-end construction project management affecting the project success and assessed construction project management tools and techniques that are currently used in RHA.

The research results indicated that the early stages of a construction project comprise a number of factors which affect the project implementation phase. The factor of having realistic / adequate timelines for assignment delivery was ranked number one. This is because if the assignment is delivered on hurry, there is a chance of submitting incomplete report or unrealistic project documents. The other parameters included Clarity of project goals or objectives , Adequacy of Project Terms of reference, Adequacy of project brief and scope determination , Availability of adequate project funds, Realistic / adequate timelines for assignment delivery, Clear communication channels, Adequate professional Consultation , Adequate experience of project team , Timely Decision making/Approvals from top management, Thorough project documentation & designs and Facilitation and payment of project team.

The researcher also intended to establish the existence of construction project management tools such as having in-house project management handbook or manual that can be referred to by its technical staff. The researcher also was with a wish to establish the level of application of front-end construction project management tools and techniques; to identify the techniques used by RHA to track progress project progress mainly during early stages of a construction project.

The study found that the application of construction project management in early stages of a construction project was generally low in RHA. The use of MS Project management software was found to be the main project management tool extensively applied in RHA. This implies the need of further training in other softwares.

The other identified project management techniques were expressed in ascending order to include: techniques related to Decision making, decision analysis, cost benefit analysis and sensitivity analysis as well.

The study findings revealed that RHA did not have a building construction Project management manual to guide in projects management.

4.8.3 Findings on the extent to which front-end construction project management is currently applied in RHA; Research Objective No. 3

This section entailed at examining the technical skills possessed by RHA project management team. The study also assessed the capability of the human resources to undertake construction project management of all government building projects whose budget are equal or above RWF 500,000,000. The key parameters used for assess the competencies of RHA included; extent to which capacity building policy is applied for technical team, to assess the relevancy of the training attended by the technical team. The implementation of the training policy was found to lay heavily with RHA human resource

management department though other organs mentioned such as NCBS, HoDs, RDB; all have a role to play in implementing the training policy in RHA.

The study found that majority of the respondents had attended management courses, with minority attending technical courses and short courses. These results indicate the need for building projects management in the RHA to undergo constant refresher courses on management improvement to equip them with latest skills that would help them enhance their performance.

According to the study results, the Construction Project managers relied majorly on Terms of reference drafted by the hired consultants as well as Architects / Engineers or Project manager' subjective judgments.

The study also investigated the effects of using defective Terms of reference on a construction project. The necessity of project re-design from ambiguities in terms of reference ranked the highest followed by payment claims for additional cost and time spent on a project due to employer' changes. The rejection of the proposed design due to different design interpretations by clients also was an issue discussed together with Delays in getting approval of alternative design proposal from client. Other issues investigated included Changes in Initially Estimated Cost due to alternative materials being proposed and delays in obtaining required clarification from client /Employer.

As regards the project management skills related to project performance available in RHA, the study findings revealed that the construction project management skills exist at moderate scale such as project quality management skills; project scope management skills, and project time management skills and project cost management. The list of management skills deemed lacking included project risk control management skills, project integration management skills and project procurement management skills.

The study findings established that RHA had a huge backlog of construction projects to be managed. It is expected that number of construction projects will be increased as per growth of Rwandan construction industry.

Regarding the workload for RHA technical staff, the study found that the current technical staff 40 are to undertake 52 construction projects though anticipated new number of technical staff as RHA organizational structure is 70. This indicates an average staffing gap of 50%. The researcher considers this staff gap to be too high specifically in in the architectural and quantity surveying fields.

4.8.4 Formulation of framework for front-end construction project management at the RH; Research Objective No. 4

As described in the section 4.6 of this study, the framework for the overall front-end construction project management and process was generated referring to a preconstruction process flow chart of the ministry of public works of Kenya as indicated by Munano (2012). If adopted, the developed framework will contribute to the development of the RHA and Rwanda in general.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter dwells on research findings from which conclusions and recommendations are drawn. The researcher is of the opinion that the recommendations herein addressed will be used in making policy and strategies for effective construction project management within RHA.

5.2 Conclusions

The research findings revealed that the application of construction project management techniques and tools in RHA are at low level. The study further indicated that no construction project management handbook or manual available in RHA. As a result, construction project management is being applied by following individual subjective judgments.

The study also pointed out the need of skill development and professional development in the management of project quality, cost, time and scope as well. The improvement should also be extended to the risk control, procurement of construction project as well as contract administration skills. The study further revealed that that most of terms of reference used for construction projects are general, same as technical specifications and it can be found as a copy and paste exercise from one construction project to another. However, since every project is unique, the terms of reference should be specific for a particular construction project.

Finally, the study found that the current workload in RHA was huge as the cumulative number of projects stood at over 52 projects against 40 technical staff. This workload is

moderate to civil/structural engineers but critically higher to the remaining professions. The staffing gap was found to be averaging 50%.

In a nutshell, front-end construction project management is poorly practiced at the RHA. The current organization structure, staffing levels and project management procedures in the institution inhibit the practice. However, the respondents are supportive of changes that might remove these hindrances and bring this practice into the RHA, in order to reap the benefits which, the front-end project management concept promises in theory. Therefore, change of the organization structure and refinement of the construction project initiation and preliminary planning procedures in the solution of this mismanagement.

5.3 Recommendations

This section includes the recommendations of the study in accordance with the study findings. Rwanda recently set the Vision 2050 after expiry of the previous 2020 vision. This new vision of the nation recognizes the contribution of construction industry to the socio-economic transformation as mentioned in its EDPRS 3 whereby Rwanda is expected to have modern infrastructure and livelihoods (Gatete, 2016). Therefore, the researcher believes that the recommendations of this study will much contribute to the attainment of the VISION 2050 if RHA put them in actions.

The study recommendations are detailed below:

(1) RHA should consider re-structuring of the current organizational structure in order to increase its effectiveness in management of government construction projects.

This can be achieved by:

Increasing the number of technical staff;

- Creating more work positions to enable other professions to join RHA;
- Creates departments/ work units based on professions required in the construction industry;
- Creating a specific construction project management department within RHA.

In line with the reasons and views of the respondents for the proposed re-structuring of the current structure, a better organizational structure has been formulated in this study. It entails integration of technical teams and amplification of construction project initiation and preliminary planning procedures that will enhance effective delivery of public building projects at the RHA.

(2) RHA should promote staff training policy for capacity building purpose. RHA should also ensure that technical staff working as construction project manager is thoroughly trained on a regular basis as the technology and management practices are being updated day to day.

(3) RHA should put in place a comprehensive construction project management handbook or manual to guide its technical staff in the routine management of construction project. This would lead to the uniformity and standardization of construction management practice in Rwanda and quality assurance as well.

(4) RHA should find ways to close the existing staffing gap so that the heavy workload found on technical staff in RHA.

(5) RHA should adopt the front-end construction project management framework synthesized in this study.

5.4 Areas for Further Study

This study entailed construction management practices at early stages of a construction project. Future studies should be done to extensively explore these practices during project

execution i.e., during construction stages. Additionally, a study to explore best practices of procedure manuals for public construction projects should be done, in order to assist implementation of recommendation (3) above.

REFERENCES

- ACIF, A. (2010). *A Guide to Project Initiation for project sponsors Client and Owners*. Australian Construction Industry Forum Limited, Australian Procurement and Construction Council.
- Ajayi, O. V. (2017, September). *Primary Sources of Data and Secondary Sources of Data*. Retrieved from ResearchGate:
https://www.researchgate.net/publication/320010397_Primary_Sources_of_Data_and_Secondary_Sources_of_Data
- Al-Saffar, A. (2018). *An Investigation into the Project Scope of Work Role and Characteristics, and its development Process Enablers and Barriers in the Oil and Gas Sector: a comparative case study, Saudi Arabia* (Doctoral dissertation, University of Manchester).
- Anyanwu, C. I. (2013). The role of building construction project team members in building projects delivery. *Journal of Business and Management*, 14(1), 30-34. Retrieved from <http://www.iosrjournals.org/iosr-jbm/papers/Vol14-issue1/E01413034.pdf>
- Australian Construction Industry Forum, A., & Australian Procurement and construction Council, A. (2015, June). *Guide to successful project and Asset-Delivery: Getting Right up Front*. Retrieved from <http://www.apcc.gov.au: http://www.apcc.gov.au/ALLAPCC/2015%20July%20Guide%20to%20Successful%20Project%20and%20Asset%20Delivery.pdf>
- Berg, B. L. (2001). *Qualitative research methods for the social sciences* (4 ed.). Boston: Allyn & Bacon.

- Bhatia, M. (2018, 6 11). A Complete Guide to Quantitative Research Methods. Retrieved from <https://humansofdata.atlan.com/2018/06/quantitative-research-methods/>
- Bhimaraya, A. (2001). *Critical success factors for construction firms* (Vol. 5). The Indian concrete journal.
- Biraro, O. (2015). *Annual report - the office of the Auditor General of States Finances*. KIGALI: The Office of Auditorial General (OAG).
- Bless, C., Higson-Smith, C., & Kagee, A. (2006). *Fundamentals of Social Research Methods: An African Perspective* (4 ed.). Juta and Company Ltd.
- Bryman, A. (2008). *Social Research Methods*. (4 ed.). New york: Oxford University Press.
- Bryman, A. (2016). *Social Research Methods* (5 ed.). New York: Exford University Press.
- Byarugaba, B. (2020, March 10). *Crack down on suicide bidding*. Construction Manager Magazine . Retrieved from <https://constructionmanagemagazine.com/crack-down-suicide-bidding/>
- Cabanis-Brewin, e. (2016, January 27). *How Many Projects Per PM? It Depends*. Retrieved from <https://www.pmsolutions.com/blog/view/optimal-project-manager-load>
- Chitkara, K. K. (2004). *Construction Project Management : Planning, Scheduling and Controlling* . Tata McGraw Hill Publishing Company Ltd .
- CIOB. (2010). *A report exploring procurement in the construction industry*. London: Chartered Institute of Bulding. Retrieved from

https://www.ciob.org/sites/default/files/CIOB%20research%20-%20Procurement%20in%20the%20Construction%20Industry%202010_1.pdf

Clough, R. H., A.Sears, G., & Sears, S. (2005). *Construction Contracting, a practical guide to company management* (7 ed.). London: Wiley.

Construction Magazine Rwanda. (2017, April 29). *The Role of Construction Industry in Rwanda's Economic Growth*. Retrieved from abagamers.rw: <http://abagamers.rw/cmr/2017/04/29/the-role-of-construction-industry-in-rwandas-economic-growth/>

Corbetta, P. (2003). *Social Research: Theory, Methods and Techniques*. SAGE .

Crossman, A. (2018, September 28). *Understanding Purposive Sampling*. Retrieved from Thoughtco: <https://www.thoughtco.com/purposive-sampling-3026727>

Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of mixed methods research*, 2(3), 270-283.

Edwards, P., & Bowen, P. (2005). *Risk Management in Project Organisations*. Burlington: Butterworth Heinemann.

Egbu, C. O. (1999). Skills, knowledge and competencies for managing construction refurbishment works. *Construction Management & Economics*, 17(1), 29-43.

Elbeltagi, E. (2009). Construction project management. *Lecture notes Faculty of Engineering, Structural Engineering Department, Mansoura University*. Retrieved from http://www.dphu.org/uploads/attachements/books/books_2569_0.pdf

EXPOGROUP. (2019, April 10). *construction and development of housing sector, growing in Rwanda*. Retrieved from www.expogr.com: https://expogr.com/detail_news.php?newsid=5604&pageid=2&t=CONSTRUCTION%20AND%20DEVELOPMENT%20OF%20HOUSING%20SECTOR,%20GROWING%20IN%20RWANDA

Fleming, G. (2009). *Construction project management handbook*. Washington DC 20590: Federal Transit Administration Office of Research , Demonstration and Innovation-US Department of Transportation.

Flick, U. (1998). *An Introduction to Qualitative Research*. London/Thousand Oaks/New Delhi: Sage Publications.

Gahigi, M. (2017, January 16). *Rwanda's construction sector on the rise in 2017*. Retrieved from *The EastAfrican*: <https://www.theeastafrican.co.ke/rwanda/Business/Rwanda-construction-sector-on-the-rise-in-2017-/1433224-3519734-as4fj5z/index.html>

Gatete, C. (2016). *The Rwanda we want:Towards"Vision 2050"*. Ministry of Finance and Economic Planning. Kigali: MINECOFIN. Retrieved from http://www.minecofin.gov.rw/fileadmin/user_upload/Hon_Gatete_Umushyikira_n_o_Presentation_2016.pdf

GenieBelt. (2018, July 23). *Construction Project Management Processes: Everything You Need to Know*.

Gichunge, H. (2000). *Risk Management in The Building Industry in Kenya*. Nairobi, Kenya : University of Nairobi.

- Gillham, B. (2008). *Developing a Questionnaire-Real World Research* (2 ed.). London: Continuum.
- Gitau, L. M. (2015). *www.jkuat.ac.ke*. Retrieved from Jomo Kenyatta University of Agriculture and Technology: <http://www.jkuat.ac.ke/campuses/kigali/wp-content/uploads/2014/04/Mwangi-Lawrence-Gitau-2015The-Effects-Of-Risk-management-At-Project-Planning-Phase-On-Performance-Of-Construction-Projects-In-Rwanda.pdf>
- Gray, D. E. (2004). *Doing Research in the Real World*. London: Sage Publications Ltd.
- Gruneberg, S. L. (1997). *Construction Economics: An Introduction (Building & Surveying series)*. London: the Macmillan Press Ltd.
- Grutters, L. (2007). *Claim Management*. Centurion, South Africa.
- Gunnigan, L. (2013). *From Concept to Bid*. International Construction Project Management Association . Dublin: Dublin Institute of Technology.
- Hillebrandt, P. M. (2000). *Economic Theory and the Construction Industry* (3rd ed.). London: the Macmillan Press Ltd.
- Hindle, R. (1996). Do we need the professions. *ProjectPro*, 6.
- Hojatolah Moradi Prdanjani, N. H. (2015). Project Management (Concept, Definition, Methods). *MAGNT Research Report (ISSN. 1444-8939)*, 3, 1303-1312.
- Hutchinson, R., & Wabeke, H. (2006). *Opportunity and Project Management Guide (OPMG)*. The Hague: Shell International Exploration and Production B.V.

- Idoro, G. I. (2012). The Influence of Project Documents on the Outcome of Construction Projects Procured by Traditional Contracts in Nigeria. *Journal of Construction in Developing Countries*, 17. Retrieved from http://web.usm.my/jcdc/vol17_1_2012/Art%201_jcdc17-1.pdf
- IER. (2018, May 2). *List of Approved Engineers*. Retrieved from <http://www.engineersrwanda.rw>:
http://www.engineersrwanda.rw/approved_engineers.php
- Jang, Y. (2020, April 28). *Survey Data: Reliability and Validity? Are they Interchangeable?* Retrieved from Explorance :
<https://explorance.com/blog/survey-data-reliability-and-validity-are-they-interchangeable/>
- Jens, E. M. (2013, March 12). *The Right Tools For The Job: Front-End-Loading*. Retrieved from <https://www.manufacturing.net/article/2013/12/right-tools-job-front-end-loading>
- Jens, M. (2013, March 12). The Right Tools For The Job.: *Front-End-Loading*. Retrieved, from <http://www.chem.info/article/2013/12/right-tools-job-front-end-loading>
- Kam, P. S. (2012). *Construction Project Management Handbook*. Washington DC: Federal Transit Administration (FTA), Gannett Fleming Inc.
- Lowe, J. (2003). *Construction Economics*. Retrieved from www.callnetuk.com/home/johnlowe70/
- Luigi, S., Rob, H., & Alvaro, A. (2008). Front End Loading Provides Foundation For Smarter Project Execution. *Oils & Gas financial Journal*. Retrieved from

<http://www.ogfj.com/articles/print/volume-5/issue-7/special-report/front-end-loading-provides-foundation-for-smarter-project-execution.html>

Maarouf, R. (2011). *Quantity Surveying in Construction industry, a comparison roles in Sweden and UK*. Byggdesign: Anders Peterson.

Mac-Barango, D. (2017). World Journal of Innovation and Modern Technology . *Construction Project Abandonment: An Appraisal of Causes,, No.1*, p. 7.

Masrom, M. A. (2012). *Developping a predictive contractor satisfaction model (CosM) for construction projects*. Queensland University of Technology, School of Civil Engineering and Built Environment , Faculty of Science and Engineering. Retrieved from http://eprints.qut.edu.au/54737/1/Masrom_Md_Thesis.pdf

McMillan, J. H., & Schumacher, S. (1993). *Research in education a conceptual introduction* (3 ed.). New York: NY HarperCollins College Publishers.

Mehdi Mozuni, W. J. (2017, June 13). An Introduction to the Morphological Delphi Method for Design: A Tool for Future-Oriented Design. (T. U. Pres, Ed.) *She Ji The Journal of Design, Economics and Innovation, Volume3*, 308.

Middleton., F. (2020, June 29). *Reliability vs validity: what's the difference?* Retrieved June 15, 2021, from scribbr: <https://www.scribbr.com/methodology/reliability-vs-validity/>

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

- Mogbo, T. (2001). The Construction Sector and the Economic Growth of Nigeria. *Journal of the Nigerian Institute of Quantity Surveyors*, 35(2), 8-13.
- Morgan, B. V. (1987). *Benefits of project management at the front end* (Vol. 5). International Journal of Project Management-Elsevier.
- Morris, T., & Wood, S. (1991). *Testing the Survey Method: Continuity and Change in British Industrial Relations*”.
- Morse, J. M. (1991). *Approaches to qualitative-quantitative methodological triangulation-Nursing Research*.
- Mouton, J. (1996). *Understanding social research*. Pretoria: JL van Schaik Publishers .
- Mugenda, M., & Mugenda, G. A. (2003). *Research Methods: Quantitative and Qualitative Approaches* (4 ed.). Nairobi: African Centre for Technology Studies.
- Mugenda, O. M., & Mugenda, A. G. (1999). *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: African Centre for Technology Studies.
- Mugisha, I. R. (2017, October 29). Rwanda procurement authority blacklists 181 contractors. Kigali, Rwanda. Retrieved from <https://www.theeastafrican.co.ke/rwanda/Business/Rwanda-procurement-authority-blacklists-companies/1433224-4159226-ljj3mfz/index.html>
- Munano, A. N. (2012). *Pre-construction Planning: Exploring the factors that influence timeliness of project completion for public sector buildings in Kenya*. Nairobi: Jomo Kenyatta University of Agriculture and Technology .

- Ngotho, P. (2013, September 19). *Introduction to Adjudication: A Mode of Resolution of Disputes in*. Retrieved from <http://www.ngotho.co.ke>:
<http://www.ngotho.co.ke/assets/kiac.ngotho.adjudication.19.9.13.pdf>
- Niyonzima, A. (2015, September). *Legal Assistance for Economic Reform (LASER)*, 2. Retrieved from http://laserdev.org/media/1111/laser-rwanda-y1-report_stories-of-change.pdf
- O, F., & PED Love, J. (2002). *Effective Front-End Project Management – A Key Element in Achieving Project Success in Developing Countries*. irbnet. doi:<https://www.semanticscholar.org/paper/Effective-Front-End-Project-Management-%E2%80%93-A-Key-in-Faniran/cefbb70ab294a6d0817a8633812575ddda9c282a>
- OAG. (2002-2017). *Annual report - the office of the Auditor General of States Finances*. Kigali-Rwanda: OAG.
- OAG. (2002-2018). *Report of the Auditor General of State Finances -Submitted to the parliament*. Kigali: OAG.
- OAG. (2010). *Office of Auditor General of State Finances-Submitted to the parliament*. Kigali: OAG.
- OAG. (2011). *Office of Auditor General of State Finances-Submitted to the parliament*. Kigali: OAG.
- Ogunlana, S. O. (1996). construction delays in a fast-growing economy Comparing Thailand with other economies. *international journal of project management*, 14(1), 37-45.

- PMI. (2004). *Project Management Institute- User guide*. Project Management Body of Knowledge (PMBOK® Guide).
- Prakash, S. (2018). *Project Management-Principles and Practices*. Project Management Concave. Retrieved from <http://pinnacleresults.com>:
https://www.pmi.org.in/conclave/presentation/suneet_prakash.pdf
- Ralph L.& Kliem, I. S. (1998). *Project Management Practitioner's Handbook*. New York: AMACOM.
- RDB. (2012). Rwanda skill Survey 2012. Retrieved from <http://www.lmis.gov.rw>:
<http://www.lmis.gov.rw/scripts/publication/reports/Construction.pdf>
- RDB. (2018). *Investment Opportunities-Infrastructures*. Retrieved February 15, 2018, from www.rdb.rw: <https://rdb.rw/investment-opportunities/infrastructure/>
- RHA. (2010, October 25). *WHO WE ARE*. Retrieved from Rwanda Housing Authority: <http://www.rha.gov.rw/index.php?id=176>
- RHA. (2019, January 17). *List of RHA permanent staff*. Retrieved January 20, 2019, from Rwanda Housing Authority:
http://www.rha.gov.rw/fileadmin/user_upload/RHA_Staff_Jan_17__2019.pdf
- RIA. (2018). *contact list of registered members 2018*. Retrieved from <http://www.architectsofrwanda.com>:
http://www.kcps.gov.rw/asset_uplds/files/List%20of%20Registered%20Architect.pdf

- RIBA. (2013). *RIBA plan of Works Overview*. London: Royal Institute Of British Architects .
- RICS. (2014, March 18). *Project management*. Retrieved from <http://www.rics.org/rw/knowledge/glossary/project-management/>
- Ritchie, J., & Lewis, J. (2003). *Qualitative Research Practice:A Guide for Social Science Students and Researchers*. London: Sage Publications.
- Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2014). *Qualitative research practice : a guide for social science students and researchers* (2 ed.). Los Angeles: SAGE.
- Rubin, H. J., & Rubin, I. (1995). *Qualitative Interviewing: The Art of Hearing Data*., Thousand Oaks,,: C.A.: SAGE Publications.
- Rutagwenda, E. K. (2004). *Office of Auditor general of State Finance-Annual report*. Kigali: OAG.
- Rwanda Public Procurement Authority, R. (2017, 05 15). *Blacklisted Companies*. Retrieved from www.rppa.gov.rw: <http://rppa.gov.rw/index.php?id=605>
- Rwanda Public Procurement Authority, R. (2017). *RPPA annual activity report 2016-2017*. Kigali: RPPA.
- Safari, E. (2012). *Analysing the causes and Impacts of disputes in the Rwanda Road Construction Sector and determining ways of Reducing or addressing such disputes*. Retrieved from <http://dr.ur.ac.rw>:
<http://dr.ur.ac.rw/bitstream/handle/123456789/167/SAFARI%20Elly.pdf?sequence=1&isAllowed=y>

- Saunders, Lewis, M., & Thornhill, P. &. (2003). *Research methods for business students* (3 ed.). Harlow: FT Prentice Hall.
- Sekaran, U. (2003). *Research Methods for Business: A skill building approach* (4 ed.). USA: John Wiley & Sons, Incorporated.
- Sertyesilisik, B. (2007). *An Investigation On The Application Of Standard Contracts in the Turkish Construction Industry, Ph.D Thesis*. Ankara, Turkey: Middle East Technical University.
- Smith, G. R. (2003). *Contract and Claims*. CRC Press LLC.
- Somba, K. (2015). *Assessment of the ministry of public works supervision capacity in the construction of public buildings in Kenya*. Retrieved from [http://ir.jkuat.ac.ke: http://ir.jkuat.ac.ke/bitstream/handle/123456789/3524/M.Sc%20Construction%20Project%20management%20thesis.pdf?sequence=1&isAllowed=y](http://ir.jkuat.ac.ke/bitstream/handle/123456789/3524/M.Sc%20Construction%20Project%20management%20thesis.pdf?sequence=1&isAllowed=y)
- Sommer, H. (2010). *Project Management for Building Construction*. German: Springer.
- Stake, R. (1996). *Case studies. Handbook of qualitative research* (2 ed.). Thousand Oaks: CA: Sage Publications.
- Summer. (2008). *analysis on the role of standardized project*. Project Management Institute.
- Szymczyk, K. (2017). *The impact of restructuring strategies on the functioning of the organization* . Czestochowa University of Technology.

- Tim, M. (2011, 11 30). Retrieved from [http://www.controleng/search/search-single-display/system integration-tutorial-measure-twice-cut-once/081010](http://www.controleng/search/search-single-display/system%20integration-tutorial-measure-twice-cut-once/081010)
- Tolson, S. (2013, July). Disputes in the Construction Industry UK. *Legal Forcus*, 66. Retrieved from https://www.fenwickelliott.com/sites/default/files/simon_tolson_-_qanda_for_lawyer_monthly.pdf
- Tripp, C. (2011, 10 19). Cover pricing in construction tenders: a risky business. Australia, New Zeland.
- Usta, E. (2005). *Comparison of International Federation of Consulting Engineers and General Specification for Public Works Contracts from Risk Management Perspective*. . Ankara, Turkey : Middle East Technical University.
- Vasconcelos, M. S., Arantes, V. A., Souza, L. L. D., Trevisol, M. T. C., & Belloto, M. E. (2010). Juízos e valores morais: a perspectiva de investigação dos modelos organizadores do pensamento. *Paidéia (Ribeirão Preto)*, 20, 207-217.
- Wade, R. (2020, August 27). Suicide Bidding – A warning for Construction Firms. Retrieved May 13, 2021, from <https://www.blakemorgan.co.uk/suicide-bidding-a-warning-for-construction-firms/>
- Westney Consulting Group. (2008). Stages and Gates Destroying? The Unintended Consequences of Front-End. *Westney & Advisor*, 3.
- Winter, G. (2000, March 4). A Comparative Discussion of the Notion of 'Validity' in Qualitative and Quantitative Research. *The Qualitative Report*, 4(3). Retrieved 8 15, 2018, from <https://nsuworks.nova.edu/tqr/vol4/iss3/4/>

World Economic Forum, T. B. (2016, May). *Shaping the future of Construction -A breakthrough in mindset and Technology*. Retrieved April 27, 2017, from <http://www3.weforum.org>:
http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report__.pdf

Yamane, T. (1967). *Statistics* (2nd Ed ed.). New York: Harper and Row.

Yates, D. J. (1998). *conflict and disputes in the development process :a transaction cost economics perspective*. Retrieved from www.prres.net:
<http://www.prres.net/proceedings/proceedings1998/Papers/Yates3Ai.PDF>

Yin, R. (2003). *Case Study Research: Design and Methods*. (4, Ed.) USA : SAGE .

APPENDICES

Appendix I: The Researcher's Introduction Letter To Respondents



JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

Date: 22/01/2019

Dear Respondent:

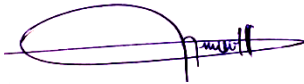
My name is Frederic Nyaminani and I am currently undertaking a Masters of Constructing Project Management at the Jomo Kenyatta University of Agriculture and Technology (JKUAT). For my final research project, I am developing a front – end construction project management framework in Rwanda. Through your participation, I eventually hope to understand how best to develop construction management framework at early stages of the project in Rwanda. I am inviting you to participate in this research study by completing the attached surveys.

The following questionnaire will require few minutes of your time to complete. There is no compensation for responding nor is there any known risk. In the same line, in order to ensure that all information will remain confidential, please *do not* include your name. The

copies of the research project will be provided to my JKUAT supervisors and to the JKUAT masters coordinator. If you choose to participate in this research project, please answer all questions as honestly as possible and return the completed questionnaires promptly. Participation is strictly voluntary and you may refuse to participate at any time. The questionnaire should be sent back to me within 2 weeks.

Thank you for taking your time to assist me in my educational endeavors. The data collected will provide useful information regarding project management in Rwanda. Completion and return of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at fredericnyaminani@gmail.com or +250783772116 / + 250788953188

Sincerely,

A handwritten signature in purple ink, appearing to read 'Frederic Nyaminani', with a large, stylized loop at the beginning.

Frederic NYAMINANI
Quantity Surveyor
MSc Candidate in CPM/JKUAT.

Appendix II: Research Questionnaire

QUESTIONNAIRE ON THE DEVELOPMENT OF FRONT-END CONSTRUCTION MANAGEMENT FRAMEWORK IN RWANDA

This is a research work aiming at developing a framework for Front-End Construction Project Management in Rwanda. The study will look at the available project management resources, competencies, tools and equipment in RHA. The study is also to identify and prioritize the factors with potential in the delivery construction projects especially public building projects.

You have therefore been selected as one of the respondents; I am kindly requesting you to spare few minutes of your precious time for the Questionnaire or oral interview at your office or at any other place of your convenience. I assure you that the information given shall be strictly treated with full confidentiality.

This research work is conducted with the authorization of Construction management department at Jomo Kenyatta University of Agriculture and Technology.

SECTION I. INFORMATION ABOUT RESPONDENT

(Use the tick symbol \surd in the bracket [] below to indicate where you belong)

I.01. What is your professional background?

a) A professional Architect []

b) A professional Engineer

- A Civil /Structural Engineer []
 - An Electrical Engineer []
 - A Mechanical Engineer []
 - A Geotechnical Engineer []
 - A Geomatic Engineer []
- c) A professional Quantity Surveyor []
- d) Other [] Specify

I.02. Are you currently working as:

- a) Projects Architect? []
- b) Projects Manager ? []
- c) Projects Engineer? []
- d) Projects Quantity Surveyor? []
- e) Other? [] Specify

I.03 What is your age?

- i. Under 25 years []
- ii. 26-35 years []
- iii. 36-45 years []
- iv. 46-55 years []
- iv. Over 55 years []

I.04. How many years of experience?

i. 1-5 years []

ii. 6-10 years []

iii. 11-15 years []

iv. 16-20 years []

v. Over 20 years []

I.05. What is your level of education?

i. Certificate A2 []

ii. Diploma A₁ []

iii. First Degree A₀ []

iv. Second Degree (Masters) []

v. PhD []

SECTION II. QUESTIONS RELATED TO THE OBJECTIVE1

Objective1: To examine the organizational effectiveness in assuring front end construction management on building construction projects in Rwanda Housing Authority. Unless otherwise stated, answer all the Questions by using the tick symbol \surd in appropriate column to express your opinion by tick one of your conviction among five points scale : *1=Strongly disagree, 2=Disagree, 3=Neither agree nor Disagree, 4= Agree , 5 =strongly Agree,*

II.01	1	2	3	4	5
Based on the provisions of the current organizational structure of RHA, there are some vacant posts that are affecting the functions of your office / position.					

II.02. The items bellow are considered as challenges or problems of the current organizational structure of RHA	1	2	3	4	5
There is <i>inflexibility</i> of the structure (there are too many levels leading to slow decision making)					
There is <i>Centralization</i> of authority (the decision-making powers are retained in the top management)					
There is <i>Rigidity</i> (Team leaders are not flexible) to handle problems and people					
There are <i>Rules and regulations</i> reflecting the existence of inefficiency of the work (process of getting approvals for example)					
There is <i>staff stagnation</i> (Employees stay the same as they were, thus there is no staff growth and development resulting to the frustration of technical staff, lack of staff					

	1	2	3	4	5
II.03 The following are the proposed changes in a new structure of RHA that would increase efficiency and effectiveness in assuring front-end construction project management on government construction projects.					
Fill in vacant posts or positions					
Reduce technical staff stagnation					
Increase the number of staff on existing posts					
Decentralize the authority to reduce decision making process					
Create new posts for new staff					
Create departments based on professions involved in construction projects such as Architecture, town planning, land surveying, Quantity surveying, Civil/Structural Engineering, Building service Engineering, Project					

II.04. Factors affecting front-end construction project management in RHA.	1	2	3	4	5
Project Budget					
Project stakeholders					
Project market demand					

II.05. RHA have adequate organizational capacity to manage all Government construction projects with budget over 500 million RWF in terms of below subjects:	1	2	3	4	5
Construction Project Planning and coordination					
Construction Project Monitoring					
Construction Project Staffing					
Construction Project Budgetary allocation					
Construction Project Plant and equipment,					
Construction Project Staff facilitation					
Construction Project Reporting					
Construction Project Evaluation					

II.06. The current organizational structure of RHA intensify staff relationship through below indicators:	1	2	3	4	5
Professional Development					
Allocation of responsibilities					
Delegation					
Team work promotion					
Reporting relationship					

	1	2	3	4	5
II.07 Based on the provisions of the current RHA organizational structure, the structure intensifies the indicators of efficiency and effectiveness listed below: (Respond using 1 = Poor, 2 = Fair, 3 = Good, 4 = very good, 5= Excellent)					
Meeting construction Project Timeliness					
Procurement of Plant, tools and equipment for the construction project.					
Level of accountability of technical staff on a construction project					
Administering construction Projects including contract administration					
The management of Human resource assigned to the construction project					

SECTION III. QUESTIONS RELATED TO THE OBJECTIVE No. 2:

Objective2: Identify Front-End construction Management factors affecting project performance and evaluate its tools, techniques applicable in RHA.

	1	2	3	4	5
III.01. The following are the Critical factors in early stages of a construction project that RHA considers to have effects on project performance: <i>1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5 =strongly Agree,</i>					
Clarity of project goals / objectives					
Adequacy of Project Terms of reference					
Adequacy of project brief and scope determination					

Availability of adequate project funds					
Realistic /adequate timelines for assignment delivery					
Clear communication channels					
Adequate professional Consultation					
Adequate experience of project team					
Timely Decision making/Approvals from top					
Thorough project documentation & decisions					
Facilitation and payment of project team					

III.02. Below are some of the construction Project management techniques and tools that RHA is currently using to fulfill its mandate. <i>(Use frequency of occurrence: 1= Never, 2=occasionally, 3= sometimes, 4=often, 5=Always)</i>					
	1	2	3	4	5
Construction Project management softwares					
In-house construction Project Management Handbook					
The techniques of making informed Decisions					
The techniques of using Cost benefit analysis					
The technique of analyzing Decisions					
Sensitivity analysis techniques and risk assessment					

SECTION IV. QUESTIONS RELATED TO THE OBJECTIVE 3:

Objective 3: To explore the extent to which construction project management during early stages of a construction project is currently applied in RHA.

The questions in this section entail to determine the extent at which the front-end construction project management is actually applied in RHA and evaluate if its application is efficient.

IV.01 The following are the people in charge of the training policy for RHA technical staff. (1= <i>Strongly disagree</i> , 2= <i>Disagree</i> , 3= <i>Neither agree nor disagree</i> , 4= <i>Agree</i> , 5 = <i>strongly Agree</i>)	1	2	3	4	5
It is responsibility of RHA Human resource manager to put in action the training policy for RHA technical staff					
It is responsibility of RHA Heads of Departments to implement the training policy for RHA technical staff.					
It is responsibility of Rwanda Development Board (RDB) to training policy for RHA technical staff and other public officials.					
It is the responsibility of National Capacity Building secretariat (NCBS) to implement the training policy of RHA technical staff					
None of the above entities or persons is responsible implement the training policy for RHA technical staff.					

IV.02 The following are the main RHA challenges and staff issues (1= <i>Strongly disagree</i> , 2= <i>Disagree</i> , 3= <i>Neither agree nor disagree</i> , 4= <i>Agree</i> , 5 = <i>strongly</i>	1	2	3	4	5
Inadequate technical staff compared to the existing					

Inefficient budgetary allocation for staff welfare					
Lack of funds for technical training of staff					
Dilapidated equipment (in ruin state) and obsolete equipment (no longer produced)					
Poor hierarchy in planning and management of					
Staff with limited technical capacity					
Poor time management					
Lack of tangible collaboration among the project					
Extended Bureaucracy in the procurement of goods					
Others (Please specify)					

<p>IV.03. Staff had training opportunities related to the following subjects for the last two years. (<i>Very irrelevant =1, irrelevant =2, Neither Relevant nor irrelevant=3, Relevant =4, Very relevant =5</i>)</p>					
Degree of relevancy:	1	2	3	4	5
Construction Project Management courses					
Technical courses related to construction					
Seminars related to construction project					
Workshops related to construction project management					

Others (Please Specify)					
-------------------------	--	--	--	--	--

IV.04 In the current in-house skills, the RHA does not have required construction project management skills, the following are recommendation for improvement:

(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5 =strongly Agree)

<i>Degree of relevancy:</i>	1	2	3	4	5
Train current technical staff to acquire construction management skills.					
Hiring external construction project managers					
No need of staff training or hiring external construction project managers.					

IV.05 RHA lacks construction project management manual, as a result, construction Project management is now guided based on the following: *(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4= Agree, 5 = strongly Agree)*

<i>Degree of relevancy:</i>	1	2	3	4	5
Terms of reference drafted by the hired consultants					
Circulars or Government orders					
Architects / Quantity Surveyors or Engineers personal judgments					
Construction Project management experience					

Instructions issued by superior authorities					
Other criteria					

IV.06 How often have you encountered the following cases resulting from defective terms of Reference drafted for a construction project? . *(Use frequency of occurrence: 1= Never, 2=occasionally, 3= sometimes, 4=often, 5=Always)*

<i>Frequency of occurrence:</i>	1	2	3	4	5
Project Re-design resulting from ambiguities in					
Delays in obtaining required clarification from					
Delays in getting approval of alternative design					
Changes in Initially Estimated Cost due to					
Rejection of the proposed design due to different					
Additional professional fees claim due to client					

IV.07 Referring to the actual practice of construction Project management in RHA, how would you rate RHA in managing the following project performance indicators? (Please tick suitable box to indicate relative frequency from Lowest to Highest *1-Poor 2-Below average 3-Average 4-Above average 5 =*

<i>Frequency of level:</i>	1	2	3	4	5
Construction Project cost management					
Construction Project time management					
Construction Project scope management					
Construction Project quality management					

IV.8 The following items indicate that RHA is indeed overwhelmed in fulfilling his mandate to oversee all Government housing construction projects:

(Please tick suitable box to indicate relative frequency from Lowest to Highest
1=Poor, 2=Below average, 3=Average, 4=Above average, 5 = Excellent)

	1	2	3	4	5
There are many construction projects and few technical staff to handle them					
Huge technical staff movement/ turnover in and out due to retrenchment, un-satisfaction of working environment, early retirement, transfer or staff death.					
A number of construction project under RHA docket are being contracted to private consultants and contractors					
There are many failed construction projects or construction projects with prolonged delays in completion					
Any other (specify)					

IV.09 How many construction projects are you currently handling?

1-5 projects	[]
6- 10projects	[]
11- 15 projects	[]
16- 20 projects	[]
Over 20 projects	[]

IV.10 (use <i>1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5 =strongly Agree</i>)					
Degree of relevancy:	1	2	3	4	5
Based on available resources in in RHA (technical staff, transport facilitation for employees, required equipment and tools, printers, computers, photocopiers, office spaces, consumables ..., do you think that the actual workload is achievable without having more technical staff?					

SECTION V. QUESTION RELATED TO OBJECTIVE NO.4

Objective 4: Formulating a framework for front-end construction project management

V.01. A review of the Auditor General’s reports for the period 2002 – 2017 shows a trail of underestimation, variations, over payment and abandonment of on many states financed projects in Rwanda. The same situation applies to private projects as well

a) In your opinion, what are the major causes of this failure in Rwandan Construction industry?

.....

.....

.....

.....

b) In your opinion, what are your recommendations to overcome / minimize such problem above in Rwandan Construction industry?

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

Thank you, a lot, for filling this Questionnaire!

Appendix III: Jkuat Recommendation Letter For Data Collection



JOMO KENYATTA UNIVERSITY
OF AGRICULTURE AND TECHNOLOGY

Office of the Director

KIGALI CAMPUS

P.O Box 3373, Kigali-Rwanda Email: director_kigalicampus@jkuat.ac.rw

FROM: DIRECTOR

DATE: 2ND FEBRUARY 2019

TO: TO WHOM IT MAY CONCERN.

REF: JKU/13/05/753



SUBJECT: FREDERIC NYAMINANI- AB343-C010-2669/2015.

The above named is a bona fide student of Jomo Kenyatta University of Agriculture and Technology (JKUAT) pursuing a Masters Degree course in Construction Project Management.

On behalf of JKUAT, I am writing to request your institution to allow him to access data and information that shall assist him in his research. We assure you that any data and information collected shall only be used for research purposes.

Any assistance accorded to him shall be highly appreciated.

Yours Faithfully,



PROF. CHERUIYOT WILSON (PhD),
DIRECTOR.



JKUAT is ISO 9001:2008 Certified



Setting trends in higher education, research and innovation