

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

Frederic Nyaminani, Abednego Oswald Gwaya, Titus Kivaa Mbiti

**Abstract:** A construction project as any other project must have a definite beginning and end. The interval between the start of a construction project and its end constitutes a long process under which attention should be made. This process is referred to as a construction project life cycle. As far as content and execution are concerned, the basis for success of a construction project is laid at the start of a project and during the planning stage. Anything that is left out or handled wrongly during this stage can only be repaired to a limited extent during building construction (Sommer, 2010). The start and planning stages of a construction project constitute a pre-construction stage whereby management is a paramount and it is referred to as Front-End Construction Project management (Jens, 2013). In other words, it is Construction management at early stages of a construction project. The level at which a care is taken in front-end construction management exercise will determine project performance. A good start is a half the battle. In Rwanda, major state financed projects are complex and significant problems arise later on as the result of weaknesses in project management up front. A review of the Auditor General's annual reports for the period 2002 – 2016 shows a trail of underestimation, variations, delayed and abandonment of many state financed projects. The same situation applies to private projects as well. Rwanda housing Authority as a government institution with a mandate to oversee all public construction project noticed a number of project issues resulting from inadequate designs. Mac-Barango (2017) asserts that poorly developed clients brief and working drawings can result in project abandonment, Unrealistic cost planning and control at the design stage can lead to project abandonment. All these is due to lack of front end construction project management framework. The study therefore developed a Front-end construction project management framework in Rwanda which will contribute to successful construction project.

**Index Terms:** Construction Project Cycle, Project documentation, Project management framework, project procurement.

## I. INTRODUCTION

The construction industry is the largest industry in the world and it is more of a service than a manufacturing industry (Elbeltagi, 2009). The construction industry accounts 6% of global GDP and it serves almost other industries (World Economic Forum, 2016, p. 9).

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In UK, construction contributed 8% to the UK's Gross Domestic Product (GDP) (CIOB, 2010). The Government of Rwanda recognizes the importance of construction industry. A number of studies revealed that construction industry accounts for 6% and 10% of GDP. Rwanda is not an exception, almost a 1/10 of Rwanda's annual budget is committed to infrastructures (RDB, INFRASTRUCTURE, 2017). Gahigi (2017) asserts that the Rwandan construction industry contributes more than seven per cent to the national GDP. Despite of much investment in this sector and its contribution to the country's economy, as of now, the Office of Auditor general of State finances indicates a trail of failed /abandoned construction projects (OAG, 2002-2017) whereas the Rwanda Public procurement authority publish a list of blacklisted companies including construction companies. The researcher was of the opinion that that the generating roots of these problems rely on the practice of front-end construction management on construction projects and that Rwanda Housing Authority as a pilot institution for building projects was a case study.

## II. OBJECTIVES OF THE STUDY

- To examine the Rwanda housing organizational effectiveness in assuring front-end construction management on building projects.
- Identify front-end construction Management factors affecting project performance and evaluate its tools, techniques applicable in Rwanda Housing Authority.
- To explore the extent to which front-end construction project management is currently applied in Rwanda Housing Authority.
- Formulate a framework for front-end construction project management for public building construction projects in Rwanda.

## III. RESEARCH METHODOLOGY

This study used a mixed strategy whereby both qualitative and quantitative approaches were used interchangeably. In consideration of the study objectives, a survey design was considered suitable where data was collected through Self-administered questionnaires and semi-structured interviews.

The target population was the technical staff of the Rwanda Housing Authority. Respondents were chosen randomly with a target of 33 technical staff which was arrived on by using the formulae shown below:

$$n = \frac{N}{1 + Ne^2} \quad \text{Yamane (1967)}$$

Where

n: Sample size

N: Population size

e: Margin of error (5%)

The total number of technical staff was obtained from Rwanda Housing Authority website [http://www.rha.gov.rw/fileadmin/user\\_upload/RHA\\_Staff\\_Jan\\_17\\_2019.pdf](http://www.rha.gov.rw/fileadmin/user_upload/RHA_Staff_Jan_17_2019.pdf) with further consultation of Human Resource department.

The total number of required technical permanent staff is 70 less 35 vacant positions, the actual number of technical staff is therefore 35.

$$n = \frac{35}{1 + 35 * 0.05^2}$$

n = 32.18 ≈ 33  
 n= 33 RHA technical staff including Civil Engineers, Architects, town planners , Quantity Surveyors and other allied professionals

A total number of 33 questionnaires were issued both manually and electronically, however a total number of 30 respondents returned the questionnaires which was equivalent to a response rate of 90.6 % compared to the targeted number of respondents.

Both Quantitative and Qualitative data were used. The quantitative data was achieved by the use of a five points likert scale .Also, qualitative data could not be left out as the researcher sought more information from the respondents through open ended questions in the questionnaire whereby respondent were given a chance to express themselves. A pilot study was conducted on questionnaire in order to ensure that there was no ambiguity in questions and that questions were clear enough to get required information from the respondents. Thereafter, several changes were made and the final questionnaire was prepared which serves as instrument to collect data.

#### IV. RESEARCH FINDINGS

##### A. General information of the Respondents

The study sought to establish the general information of the respondents in terms of professional Qualification, work positions, age, experience in the field and level of education as well.

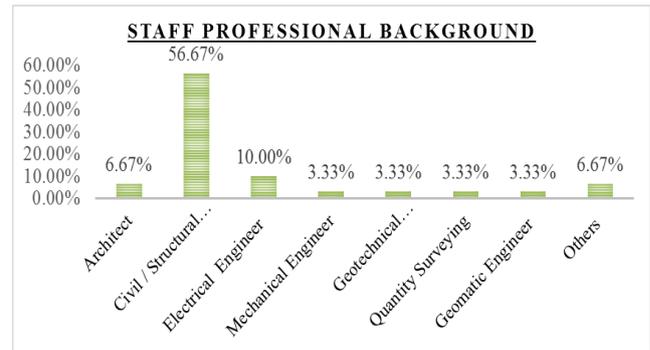


Figure 1: RHA Staff professional qualification Source: Author, 2019

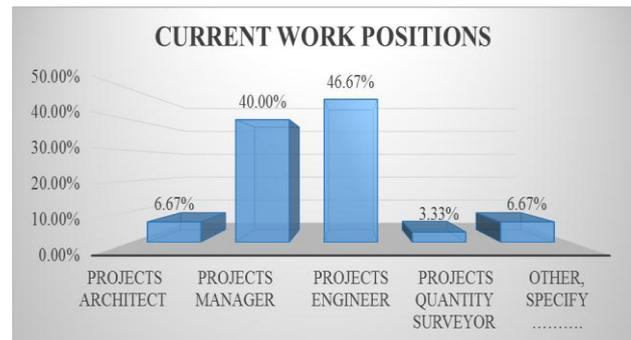


Figure 2: RHA staff work positions Source: Author, 2019

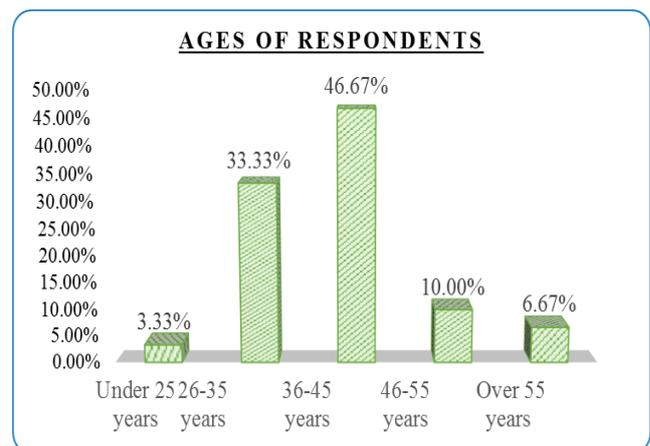


Figure 3: RHA staff ages Source: Author, 2019

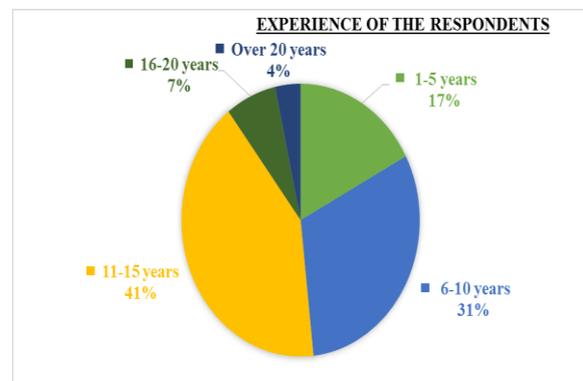
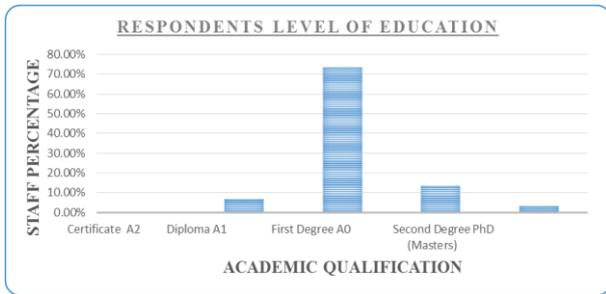


Figure 4: RHA staff experience Source: Author, 2019





**Figure 5: RHA staff level of education**  
Source: Author, 2019

The study found that most of the Rwanda housing Authority technical staff are of civil /Structural engineering background, working s project Engineers, aging between 36 and 45 years old, with working experience between 6-10 years. The study also sought to examine the overall efficiency and effectiveness of the current organizational structure in construction project management. The study sought if there is effect of vacant positions on staff performance, challenges of the organizational structure, proposed changes to the structure, capability of technical staff in Project management and decision making intensification level of Rwanda Housing Authority. The data was analyzed by using Relative Importance Index (RII) formulae below:

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

(Tam & Le, 2006)

Whereby:

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

n1: number of respondents for not important (ie 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 sample for the study

The RII ranges from 0 to 1

The study revealed that the vacant posts affects individual staff performance and that the major challenge of the existing organizational structure is the inflexibility of the structure. The study proposed to fill vacant post and create departments based on professions involved in construction projects such as Architecture, Quantity surveying, Civil/Structural Engineering, Building service Engineering, Project Management.

The study also sought to investigate major factors, tools and techniques applicable in Rwanda Housing Authority.as shown in table 1,2, 3 &4.

Critical factors in early stages of a construction project	Relative Importance Index	RANK
Clarity of project goals / objectives	0.62	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 / adequate timelines for assignment delivery	0.580	11
Clear communication channels	0.607	7
Adequate professional Consultation	0.620	5
Adequate experience of project team	0.593	9
Timely Decision making/Approvals	0.600	8
Thorough project documentation & designs	0.640	1
Facilitation and payment of project team	0.633	2

**Table 1 : Factors of front-end construction Project management in RHA**

Project Management tools and techniques frequently used in RHA	Relative Importance Index	RANK
Project management softwares	0.62	1
In-house Project	0.61	3
Decision making techniques	0.627	2
Cost benefit analysis	0.587	5
Decision analysis	0.58	6
Sensitivity analysis	0.607	4

**Table 2: Project Management tools and techniques in RHA**

Main RHA challenges and staff issues	Relative Importance Index	RANK
Inadequate technical staff comparing to the 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 and obsolete equipment	0.6	6
Poor succession planning and management coupled with ageing workforce	0.8	2
Limited staff capacity	0.81	1
Poor working environment	0.71	4
Disjointed scheme of service	0.5	8
Bureaucracy in procurement of goods and services	0.73	3

**Table 3: Main challenges and staff issues in RHA**

The basis of project management in RHA	Relative Importance Index	RANK
Terms of reference drafted by the hired consultants	0.67	1
specifications, BQs and drawings	0.52	4



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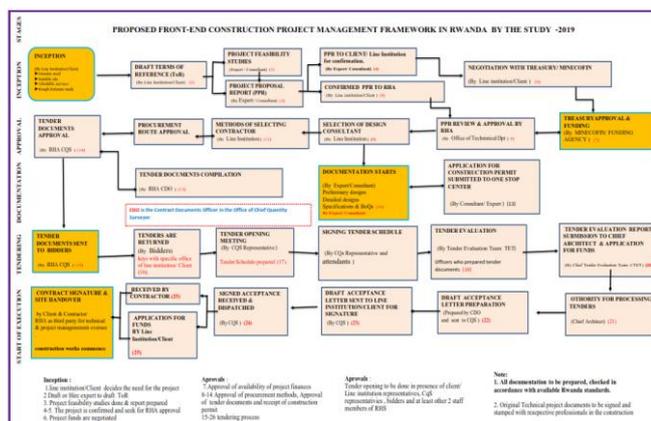
Circulars / Government orders	0.41	6
Architects / Engineers subjective judgments	0.6	2
Project management experience	0.51	5
Directions issued by superior authorities	0.39	7
Other criteria	0.59	3

**Table 4: The basis of project management in RHA**

The study revealed that the major factor affecting front-end construction management is the thoroughness of project documentation and designs, followed by facilitation and payment of the project team. The study also found that RHA uses project management softwares and decision making techniques. The limited capacity of technical staff is the major challenge in managing all public construction projects. It was also found that there is no in-house project management manual and that the project management is done based on Terms of reference drafted by the hired consultants.

The study further sought to highlight major causes of project failure in Rwanda and came up with recommendations for improvement as per the table below:

Furthermore, the study developed a framework for front-end management practice in Rwanda.



**Figure 6: Front-end construction project management framework in Rwanda.**

Source, Author 2019

Rwanda Housing Authority as a Public Institution with a mandate to oversee all technical concerns for all government construction project, thus any government agency with intention to put up a building construction is supposed to liaise with RHA for all technical matters.

The framework developed is indicated at Appendix 2 and it 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

### A. 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 & Client Confirmation.

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

### B. 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.

### C. 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 and particular conditions of the contract.

The contracted expert /consultant will first prepare preliminary designs and preliminary project cost estimates. He 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.

### D. 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 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 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.

### E. 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 hand over the site to the contractor and then the project execution will have to take place.



### V. CONCLUSION

The main aim of this study was to develop front-end construction project management framework that would enhance project performance in Rwanda. This was done in a view identifying and prioritizing factors and practices that have the potential for improving project management effectiveness in achieving project public building project performances in Rwanda.

The specific objectives in developing the said framework were:

- a. To examine the organizational effectiveness in assuring front end construction management on building construction projects in RHA,
- b. To identify front-end construction Management factors affecting project performance and evaluate its tools, techniques applicable in RHA.
- c. To explore the extent to which s front-end construction project management is currently applied in RHA.
- d. Formulate a framework for front-end construction project management

In view of the above, the study findings revealed that RHA organizational structure was only effective in the areas of allocation of responsibilities and reporting relationship. However, it was found that the structure is with inflexibility and centralization of authority issues and comprise vacant posts that are affecting individual current performance. The findings further revealed that RHA applies project management techniques and tools to a lesser extent while undertaking projects management. The study also indicated that no building projects supervision manual and that project management relied heavily on staff own subjective judgments.

The study found that there is a need of skill development and professional development in quality, cost, time and scope management, risk control, project procurement management, and contract administration skills.

The study also found out that most terms of reference used for projects are general and copy-and-paste from one project to another. No specific ToR for most projects and as a result, a lot of re-designs due to ambiguities, delays in obtaining designs approvals and rejection of designs done due to different interpretations.

Finally, the study found that the current workload in RHA was huge as the cumulative number of projects stood at over 52 projects against 35 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% .

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