ASSESSMENT OF RISK MANAGEMENT AND PERFORMANCE OF CONSTRUCTION PROJECTS IN RWANDA: CASE OF AFRIPRECAST

BY:

MUNYANGANGO ALEXIS SALEM[1]

Reg No: MSCPM/20/01/6211

Tel.: +250 783 466 199

(AWARD OF DEGREE OF MASTERS OF SCIENCE IN PROJECT MANAGEMENT, UNIVERSITY OF KIGALI "UoK")

Co-Supervisor: Dr. Ronald Kwena[2]

Lecturer of UoK,

Tel.: +250 780 796 020

E-mail: rkwena@uok.ac.rw

Co-Author: Dr. HATEGEKIMANA Jean Paul[3]

A Director of Administration and Academic Services of BRAINAE UNIVERSITY (BU), Delaware, USA

Assistant Registrar of BRAINAE UNIVERSITY, Delaware, USA

Lecturer of Research Methodology at BU,

Private Writer,

Tel.: (+250) 783 590 293 -RW; +1 (251) 237-9112 -USA

E-mail: hategejp6@gmail.com

ABSTRACT:

The study was conducted in Rwanda, and the general objective was to examine the relationship between Risk management and performance of construction projects in Rwanda, case of AFRIPRECAST. The specific objectives were to assess the relationship between Risk identification and performance of construction projects in Rwanda, to evaluate the relationship between Risk assessment and performance of construction projects in Rwanda, to examine the relationship between Risk response and performance of construction projects in Rwanda. By sampling 97 respondents out of a population of 130 people were used, this research used descriptive research design employing both qualitative and quantitative approach. The research objective one, two, three and four were analyzed using descriptive statistics and were interpreted using the mean range of Likert Scale. The research question 3 was responded and analyzed using the Pearson and multiple Correlation Analysis to ascertain any significant relationship between risk management and performance of construction projects. The findings revealed that there is a positive and significant relationship between risk identification, risk assessment, risk response, risk monitoring and performances of construction projects in AFRIPRECAST. Results revealed also that the level of risk management was moderate. Furthermore, the level of performance in construction projects was moderate Results revealed that there is significant positive relationship between risk response, risk monitoring and performance of construction projects, there is a significant negative relationship between risk assessment and performance of construction projects as well as non-significant relationship between risk identification and performance of construction projects AFRIPRECAST. The hypothesis which stated that "there was no significant relationship between risk management and performance of construction projects in AFRIPRECAST, Rwanda" was rejected.

Key words: *Risk management, performance, construction projects, AFRIPRECAST*

INTRODUCTION

The project financing policy applicable in Rwanda, mixed with the poorly designed tasks particularly in scope definition and cost estimation generates many troubles in initiatives management for the duration of their execution because of the terrible initiatives' research especially the construction projects, the buying entities face the trouble of explaining to the Ministry of Finance and economic planning the reasons of their request for additional contracts with a purpose to pay the contractors for the unplanned additional works because the price range requested for the ones tasks has been underestimated throughout the practice of the procuring entities' procurement plans.

A creation work on a new 10,000-seat indoor area within the Rwandan capital of Kigali has been completed within a six-month length; SUMMA has a song report of delivering rapid production projects in Rwanda. King Faisal sanatorium has initiated the mission involved the development of a brand-new outpatient facility, installation of a top rate offerings health facility, renovation and growth of the older facility, set up of a ramp connecting the brand-new constructing and the older one in addition to procurement of equipment.

A creation works has already started at King Faisal clinic as it undergoes an infrastructure improve that is anticipated to cost an estimated $20 million; due to the pandemic period the entirety of the project was rescheduled in 2021, in line with King Faisal health facility appearing chief executive, Dr Edgar Kalimba, works see the ability establish a corporate/VIP sanatorium responding to a number of the market's needs and production is expected to be complete in 2021. (New times, 2020).

Gitau, (2015) each construction project surely has dangers, and this is authentic of the Rwandan's creation enterprise, as most people of the tasks fail to fulfill closing dates, cost and great objectives because of insufficient risk control. This failure is often due to chance elements that are not anticipated as a consequence, evaluating risk management practice make the venture managers recognize danger incidence, hazard have an effect on and the extent in their impacts in coping with and controlling the maximum dominant dangers as recommended in the file performed by REMA, (2008).

STATEMENT OF THE PROBLEM

The problematic case is that in Rwanda construction projects undertaken by various companies including AFRIPRECAST show signals of non-performance in terms of quality, scope and timely completion exemplified by a remarkable delay in completion for example construction of a new Nzove WTP, extending the capacity of Nzove 2 WTP and construction of forwarding infrastructures: on 15 June 2017, WASAC Ltd signed with CULLIGAN International EACA an agreement worth USD 1,625,400 for increasing the length of forwarding infrastructure by 8.6 Kms ductile iron pipeline of ND400 NP25 from Mont Kigali-Kimisange main pipeline from Kimisange to Kicukiro. However, OAG field visit conducted on 26th November 2019 (18 months after the completion of expected period) noted that works from Nyanza (Rwandatel up to Kicukiro centre) were not completed.

Delayed construction works of Rebero-Mageragere prison water supply system in

Kicukiro and Nyarugenge districts worth of Frw1,036,004,830; delayed construction of water supply system in Gasabo district: On 10th March 2016, WASAC Ltd signed contracts worth Frw 421,111,137 with GASABO District to construct Karuruma water supply in Gatsata and Jali sectors. However, OAG audit field visit conducted in November 2019 (3 years after completion expected date) noted that works were not complete.

Uncompleted works include: construction of 23 chambers (gate valves, washout and air valves) and five water taps at Gatsata, 2 chambers (gate valves, washout and air valves) and 4 water taps at Jali water supply system. Delayed construction works of Rebero-Mageragere prison water supply system in Kicukiro and Nyarugenge Districts, Delayed construction of water supply system in Gasabo district, Forfeited funds due to failure to implement project activities within reasonable Time: the audit of RTDA revealed that the Government of Rwanda lost funds amounting to

Frw 263,682,784 from BADEA meant for financing feasibility study for by pass roads in five (5) districts and construction of asphalting Rubengera–Gisiza Road Projects. This loss resulted from the failure to implement projects' activities within reasonable time.

As such, to complete project activities, the Government of Rwanda have to mobilize own resources which could have been utilized for other activities, continuous failure to complete project activities within the scope of initial set contract cost and period, cases of contracts significant cost and/or time variations are continuing.

The audit noted that on 41 contracts, RDTA extended period of completing work in the range of 50% and 250% from the initial planned period. Further, on 32 contracts, amount of Frw 42,995,285,540 was added to initial contract amount to finalize the work. Management attributed these variations to various reasons including: delays in payment of contractors' invoices, delayed road design studies, delays in payments for expropriation, unforeseen adverse climatic conditions with heavy rainy seasons leading to obstacles such as landslides on some sections of the roads and unforeseen additional works required.

Specifically, on AFRIPRECAST its projects such as Kanombe Transit Hostel, Ntare School of Excellence, Batsinda Middle Cost Apartments projects failed as shown by delays, cost overruns and sometimes clients were unsatisfied on quality delivered. Risk is an essential element and exist in all projects regardless of size or complexity (Ali et al., 2014; Khan et al., 2014).

Risks in a project management should be properly managed, otherwise the project is likely to fail. Thus, as project managers, they should do a proper and effective analysis and strategies to deal with those risks. Therefore, the aim of this study is to find out if the low performance of construction projects in Rwanda is related to Risk management or other factors.

OBJECTIVE OF THE STUDY

The general objective of this research is to examine the relationship between Risk management and performance of construction projects in Rwanda. while the specific objectives were:

1. To assess the relationship between Risk identification and performance of construction projects in Rwanda.
2. To evaluate the relationship between Risk assessment and performance of construction projects in Rwanda.
3. To assess the relationship between Risk response and performance of construction projects in Rwanda.
4. To assess the relationship between Risk monitoring and performance of construction projects in Rwanda.

HYPOTHESIS OF THE STUDY

The research was guided by the hypothesis that "There is no significant relationship between Risk management and performance of construction projects in AFRIPRECAST, Rwanda''.

CONCEPTUAL REVIEW

RISK MANAGEMENT

Hamzah et al., (2015) outline risk management as a procedure of figuring out, assessing, evaluating and dealing with risks. in addition, they described risk management as a hard and fast of techniques developed to control the influences introduced on by risks and uncertainties and assists in facilitating the choice-making process.

Risk Identification

Risk identification technique tries to identify the supply and type of dangers. Risk identification involves the popularity of capacity chance occasion situations in the construction venture and the explanation of risk obligations (Wang, & Aguria, 2004).

Risk Assessment

According to Wang, Dulaimi, & Aguria, (2004) a standard risk management method consists of threat identity; threat evaluation; threat

mitigation; and chance monitoring. Risk identity manner attempts to pick out the supply and form of risks.

Risk Response
According to Ali *et al.,* (2014) dangers in an undertaking control need to be well controlled, in any other case the challenge is possibly to fail. Consequently, as mission managers, they need to do a proper and powerful analysis and strategies to deal with those dangers. Many literatures have mentioned danger management techniques or steps to be accompanied on the way to manipulate any types of risks.

Risk Monitoring
According to the project management Institute (PMI), 2013), threat monitoring that's amongst one of the vital steps within the chance control method requires a non-stop supervision over the threat management technique for you to discover new dangers, to maintain song the recognized risks and remove past dangers from the assessment and manufactured from initiatives.

PERFORMANCE OF CONSTRUCTION PROJECTS
The assignment management success specializes in three extra extended standards involving (1) assembly time, value and first-rate objectives; (2) fine of the mission control technique and (3) fulfilling stakeholder (number one sponsor and venture group) during mission control method. Success of the project is characterized by way of ambiguity (Ika *et al.,* 2012).

Time Performance
According to Neely *et al.,* (2012) from the perspective of patron, quit users, stakeholders, or the general public, the primary standards to measure success of the mission will be the of completion time.

Cost Performance
In line with PMBOK (2008), venture time control consists of the processes required to manipulate well timed completion of the challenge and the levels encompass defining sports, sequencing sports, estimating hobby resources in addition to intervals, agenda development and manage. Value performance is the diploma to which the general conditions promote the crowning glory of assignment in the anticipated budget (Martineze *et al.,* 2008).

Quality Performance
Satisfactory is defined as the totality of capabilities required by means of a product or a carrier to meet a given want; fitness for reason (Ahoniemi & Nissinen, 2009).

Stakeholders' Satisfaction
A stakeholder is any character or business enterprise this is actively concerned in an undertaking, or whose interests can be affected undoubtedly or negatively by means of execution of an assignment. Stakeholders can be internal to the company or outside (Luyet *at al.,* 2012).

THEORETICAL FRAMEWORK
Trade theory
This study was based at the theory of trade advanced by using Kurt (1890), consistent with clark & Taplin, (2012); theory of alternate explains the technique of change by means of outlining causal linkages in an initiative, i.e., its shorter-term, intermediate, and longer-time period outcomes. The identified modifications are mapped because the "consequences pathway" displaying every final result in logical relationship to all of the others, as well as chronological flow.

The hyperlinks between effects are explained via "rationales" or statements of why one final result is thought to be a prerequisite for every other. Principle of change defines long-time period dreams and then maps backward to discover important preconditions. Production assignment as development projects have been supposed to change the lifestyles of the network in terms of development (Ofori, 2015).

Contingency theory
Accordingly, the contingency theory is appeared to be an appropriate theoretical framework for such instances as the main concept of this idea is in step with the goals of this study thru conditions as defined by way of Ghahramanzadeh (2013)

wherein i) the life of time-honoured concepts for management and companies, and ii) the individuality of each employer for that reason requiring analysing every state of affairs. In different phrases, the contingency theory is perceived as adapting a new way for precise activities primarily based on the contemporary requirement or circumstance wherein the all-reason theories or one size in shape all is now not suitable in such a state of affairs (Ritchie and Marshall, 1993). The aim of the contingency principle is to improve construction overall performance by way of efficaciously responding to uncertainties wherein a contingency is created to put off or reduce the terrible consequences of unexpected events by means of a) determining the probability of dating among sports and surroundings, and b) identifying the responses to these elements.

EMPIRICAL REVIEW

Gajewska and Ropel (2011) outlined risk control as a scientific software of management policies, strategies and approaches of figuring out, analysing, assessing, treating, monitoring and speaking dangers. different researchers inclusive of Liu and coffee (2009), Siang and Ali (2012), Mahendra *et al.,* (2013) and Hamzah *et al.,* (2015) define risk management as a method of figuring out, assessing, evaluating and dealing with risks. They defined risk management as a fixed of strategies advanced to govern the impacts introduced on by way of dangers and uncertainties and assists in facilitating the selection making manner. The goal of risk management is to pick out sources of risk and uncertainty, determining their effect, and developing appropriate control responses.

The fundamental to surely have a successful risk management is the middle undertaking for groups (Ali et al., 2018). In respect of risk control technique, preceding studies along with Aven (2016) have described that risk identity, risk evaluation and risk reaction as well as danger tracking as the principal stage of chance control technique. to accomplish this manner, the important thing players of any projects should have the ability to discover, examine and be able to control risks and make sure that risk records is successfully been disseminated (Ali and Taylor, 2014).

Previous studies which included by Zou et al., (2006), Liu and coffee (2009), Mahendra et al., (2013) and Hamzah et al. (2015) additionally defined that the risk control approach carries a sequence of steps, namely, risk identification, risk analysis and prioritization, danger reaction and hazard manipulate and hazard tracking. The practices or implementation of risk management in handling a creation assignment is widely identified as an effective way in coping with hazard related to production tasks.

Risk management is perceived as a way to inspect dangers in a systematic way. On pinnacle of that, risk control is located to pick out assets of dangers and uncertainties, to decide the effect, to expand suitable response and intentionally determine how each chance should be treated (Ehsan et al., 2010). It is also perceived to be a manner that creates values to a task and improves project overall performance in terms of cost, time and quality (Kang et al., 2015). For this reason, it is not arguable that risk control is the liveliest process to cope with undertaking hazard and uncertainties in a creation assignment (Kang *et al.,* 2015).

CONCEPTUAL FRAMEWORK

The independent variable in this study is risk management. Risk management process constituted by project Risk identification, risk assessment, risk response and risk monitoring. The dependent variable comprises of quality, time, budget and stakeholder satisfaction
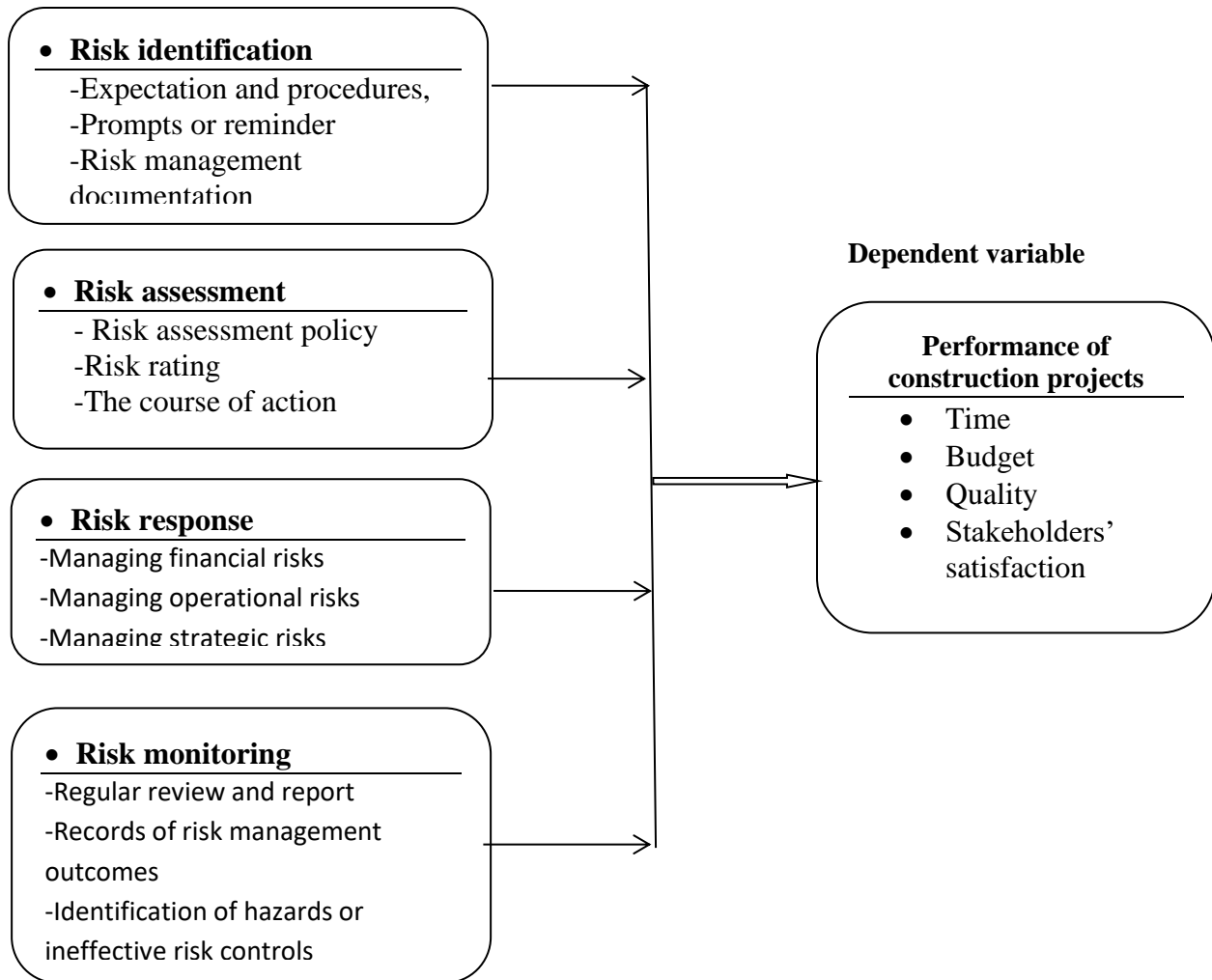
Independent Variable

Risk Management

```
• Risk identification
  -Expectation and procedures,
  -Prompts or reminder
  -Risk management
  documentation
```

```
• Risk assessment
  - Risk assessment policy
  -Risk rating
  -The course of action
```

```
• Risk response
  -Managing financial risks
  -Managing operational risks
  -Managing strategic risks
```

```
• Risk monitoring
  -Regular review and report
  -Records of risk management
  outcomes
  -Identification of hazards or
  ineffective risk controls
```

Dependent variable

```
Performance of
construction projects
  • Time
  • Budget
  • Quality
  • Stakeholders'
    satisfaction
```

Source*: (Ali and Taylor, 2014, ILO, 2010; Baccarini & Collins, 2014 and Stephanie, 2014)*

Figure 1: Conceptual framework

METHODOLOGY

The research used a descriptive research design using employing both Qualitative and Quantitative approaches. The study applied the correlation design to examine the relationship between risk management and performance of construction projects, the study applied this design, because it provides a systematic description that is as factual and accurate as possible.

The population of the study constituted with all stakeholders involved in project designing and execution of construction projects. This study was mainly be focused on 130 employees of AFRIPRECAST in charge of projects planning, procurement and contract management whose function are related to projects, technical staff involved in the day-to-day implementation, project management team committees responsible for monitoring and evaluation in different construction projects. The total sample size was 97 people. This sample is taken as illustrated above according to their experiences in undertaking construction projects.

Purposive sampling was used to select key stakeholder in the project management sector. The study also applied simple random to select members from project management sector. The questionnaire was used and divided in into two parts. The first part gives the demographics

characteristics of the respondents, the second part contains the questions related to the variable of the study.

Data analysis was handled with a view of establishing the relationship between the dependent and independent variables. Qualitative data was analyzed by obtaining information about the phenomenon and then establishing patterns, trends and relationships from information gathered. Quantitative data was analyzed using descriptive statistics to meaningfully describe the distribution of scores or measurements. The finding of the P-value of 0.000 which was less than the significance (α) level 0.01 implies that there is a significant relationship between risk management and performances of construction projects in AFRIPRECAST.

RESULTS AND DISCUSSIONS

Out of 130 population, the sample size of 97 was determined and all 97 questionnaires were distributed and responded. The demographic characteristics of the respondents in terms of age, years of service, qualification, number of dependents and the main occupation were analyzed using descriptive statistics, frequencies and percentages.

Table 1: Demographic characteristics of respondents

Characteristic	Description	Frequency	Percentage
Gender	Male	74	76.3
	Female	23	23.7
Age	26-35	43	44.3
	36-45	37	38.1
	above 45	17	17.5
Education level	secondary level	9	9.3
	bachelor's degree	74	76.3
	masters	14	14.4
Years of service	1 year	64	66.0
	4-7 years	33	34.0
Heard on Risk management and Performance		**97**	**100**

N=97

Results in Table 1 regards gender of respondents whereby, 74(76.3%) were males and23 (23.7%) females. This means that that males' respondents dominated the study in AFRIPRECAST and implies that men are still dominant in construction industry. According to Table 1 which analyzed the age of respondents, a majority of the respondents 44 (44.3%) aged between 26-35, 37(38.1%) aged between 36-45 and those above 45 years are 17(17.5%). This means that most respondents are at productive age and contributed to this research in responding timely and these categories understand the instrument easily. On matters of Education level of respective respondents, the findings found out that 74(76.3%) were bachelor holders as compared to 14(14.4%) who were master holders and moreover only 9(9.3%) had a secondary level. This means that most respondents have a good education background at least a university level and implies that they understand the research variables. According to Table 1 which analyzed the service years of respondents, a majority of the respondents 64(66%) had worked at least one year, and 33(34%) respondents had worked between 4 and 7 years in AFRIPRECAST. This means that most respondents understand the work environment of AFRIPRECAST and implies that they may give accurate information to this research. Findings in Table 1 shows that all respondents 97(100%) had heard about risk management and performance of construction projects. This means that all respondents understand the research variables and implies that the information given were sure.

DESCRIPTIVE STATISTICS

Risk Management

The level of risk management at AFRIPRECAST was first determined by measuring the risk identification, risk assessment, risk response, and risk monitoring was analyzed using the mean and standard deviation

Table 2: Risk identification

Item	Mean	Std. Deviation	Interpretation
1.AFRIPRECAST publish specific expectations and procedures of risk identification	2.49	1.27	Low
2.AFRIPRECAST has prompts or reminders in place that require application of risk management tools or processes	2.85	0.97	Moderate
3.AFRIPRECAST' s risk management processes different by department	3.26	1.49	Moderate
4.AFRIPRECAST promote non-punitive reporting system that allow employees to; report hazards and risks, issues, concerns, occurrences, and incidences and propose solutions and improvement	3.09	1.39	Moderate
5.AFRIPRECAST 's risk management documentation clearly identifies the levels of management with the authority to make decision regarding risk acceptance of the company	3.29	1.46	Moderate
Aggregate mean and S. D	**3**	**1.11**	**Moderate**

N=97, *Legend:*1.00 – 1.80 Very low, 1.81 – 2.61 Low, 2.62 - 3.42 Moderate, 3.43 – 4.23 High, 4.24 – 5.00 Very High

The results revealed that the risk identification at AFRIPRECAST is at moderate level with (Mean=3; SD=1.11). The high standard deviation of (SD= 1.11) shows disproportion in the opinion of the respondents regarding the subject matter.

The moderate risk identification at AFRIPRECAST is attributed to moderate presence of risk management tools, the risk management processes, promotion of non-punitive reporting system and risk management documentation (Mean=2.85; Mean=3.26, Mean=3.09, Mean = 3.29) and the low publication of risk specifications and procedures (Mean=2.49).

Risk Assessment

Table 3: Risk assessment

Item	Mean	Std. Deviation	Interpretation
6.AFRIPRECAST 's risk management procedures identify the specific processes to be used to conduct risk assessment	2.63	1.29	Moderate
7.AFRIPRECAST use the organization's risk matrix and definition while rating the likelihood and severity of their risks	2.42	1.14	Low
8. AFRIPRECAST Management fully considers risks in determining the best course of action.	2.46	1.25	Low
9.The existence of risks and management's recognition of this is appropriately communicated to employees	2.81	1.16	Moderate
10.AFRIPRECAST is guided by it management policy while conducting Risk assessment	3.89	1.41	High
Aggregate mean and S.D	**2.84**	**1.08**	**Moderate**

N=97, *Legend:*1.00 – 1.80 Very low, 1.81 – 2.61 Low, 2.62 - 3.42 Moderate, 3.43 – 4.23 High, 4.24 – 5.00 Very High

The results revealed that the risk assessment at AFRIPRECAST is at moderate level with (Mean=2.84; SD=1.08). The high standard deviation of (SD= 1.08) shows disproportion in the opinion of the respondents regarding the subject matter. The moderate risk assessment at AFRIPRECAST is attributed to higher presence of management guiding policy the risk assessment (Mean=3.89), moderate presence of risk management procedures, the risks and management's recognition (Mean=2.63, Mean=2.81), lower level regarding the Organization's risk matrix, management full risks consideration (Mean=2.42; Mean=2.46)

Risk Response

Table 4: Risk response

Item	Mean	Std. Deviation	Interpretation
11.AFRIPRECAST have a structured processes for managing financial risks	2.89	1.73	Moderate
12.AFRIPRECAST have a structured processes for managing operational risks	3.29	1.44	Moderate
13.AFRIPRECAST have a structured processes for managing safety and security risks	3.69	1.26	High
14.AFRIPRECAST have a structured processes for managing strategic risks	3.56	0.89	High
15.AFRIPRECAST have a structured processes for managing environmental and social-political risks	2.80	0.90	Moderate
16.AFRIPRECAST have a structured processes for managing Legal/Reputation risks	2.21	1.16	Low
Aggregate mean and S. D	**3.07**	**0.96**	**Moderate**

N=97, ***Legend:***1.00 – 1.80 Very low, 1.81 – 2.61 Low, 2.62 - 3.42 Moderate, 3.43 – 4.23 High, 4.24 – 5.00 Very High

The results revealed that the risk response at AFRIPRECAST is at moderate level with (Mean=3.07; SD=0.96). The high standard deviation of (SD= 0.96) shows disproportion in the opinion of the respondents regarding the subject matter. The moderate risk response at AFRIPRECAST is attributed to higher presence structured processes for managing safety and security as well as those for managing strategic risks (Mean=3.69, Mean=3.56), moderate presence of structured processes for managing for managing financial risks and operational risks as well as those managing environmental and social-political risks (Mean=2.89, Mean=3.29, Mean=2.80), lower level regarding the presence of structured processes for managing for managing legal or reputation risks (Mean=2.21)

Risk monitoring

Table 5: Risk monitoring

Item	Mean	Std. Deviation	Interpretation
17.AFRIPRECAST require an evaluation of residual risk, prior to risk control implementation	2.92	1.48	Moderate
18.AFRIPRECAST use a prioritization strategy when mitigating multiple risks	2.79	1.44	Moderate
19.AFRIPRECAST require the regular review and report on the system's safety performance to AFRIPRECAST management	2.96	0.92	Moderate

20.AFRIPRECAST require a process that include records of its risk management outcomes for as long as the control(s) remain relevant to the operation	2.66	0.84	Moderate
21.AFRIPRECAST require a process to develop and maintain a means for communicating risk information to relevant stakeholders	2.94	1.58	Moderate
22.when AFRIPRECAST has identified hazards or ineffective risk controls, the risk management process is documented and traceable	2.76	1.09	Moderate
Aggregate mean and S. D	**2.84**	**0.92**	**Moderate**

N=97, *Legend:1.00 – 1.80 Very low, 1.81 – 2.61 Low, 2.62 - 3.42 Moderate, 3.43 – 4.23 High, 4.24 – 5.00 Very High*

The results revealed that the risk monitoring at AFRIPRECAST is at moderate level with (Mean=2.84; SD=0.92). The high standard deviation of (SD= 0.92) shows disproportion in the opinion of the respondents regarding the subject matter. The moderate risk monitoring at AFRIPRECAST is attributed to moderate presence of an evolution of residual risk prior to risk control implementation, the use of prioritization strategy, the regular review and report on system's safety performance, recording risk management outcomes, communicating risk information to relevant stakeholders and the identification of ineffective risk controls (Mean=2.92; Mean=2.97, Mean=2.96, Mean = 2.66, Mean=2.94, Mean = 2.76)

PERFORMANCE OF CONSTRUCTION PROJECTS

The Level of performance of construction project in AFRIPRECAST was also determined. The specific variables investigated under this included; meeting time, meeting budgets and meeting technical specifications, also stakeholders 'satisfaction. The detail of the findings is as shown in the table below;

Table 5: Level of construction projects performance in AFRIPRECAST

Item	Mean	Standard Deviation	Interpretation
Meets time	2.80	0.75	Moderate
Meets budgets	2.98	1.01	Moderate
Quality	3.22	1.05	Moderate
Stakeholders' satisfaction	3.02	0.87	Moderate
Aggregate Mean &SD Deviation	**3.01**	**0.92**	**Moderate**

N=97, *Legend:1.00 – 1.80 Very low, 1.81 – 2.61 Low, 2.62 - 3.42 Moderate, 3.43 – 4.23 High, 4.24 – 5.00 Very High*

The findings revealed that Performance of construction projects in AFRIPRECAST is at moderate level with a Grand mean of 3.01 and Standard Deviation of 0.92 attributed by moderate project meets time; moderate project meets budgets, moderate project quality and moderate stakeholders 'satisfaction. Meets time had a Mean of 2.80 and the Standard Deviation of 0.75, implying that most respondents agreed that the projects are moderately meets time, Meets budgets had a Mean of 2.98 and the Standard Deviation of 1.01, implying that most respondents agreed that projects are moderately meet budget, Quality had a Mean of 3.22 and the Standard Deviation of 1.05, implying that most respondents agreed the projects quality was moderately achieved, Stakeholders 'satisfaction had a mean 3.02 of and standard deviation of 0.87, implying that the level of satisfaction of stakeholders is moderate. The high standard deviation of (SD = 0.92) shows disproportion or non-coherent in the opinion of the respondents regarding to the subject matter. In the interview of various key informants, it was concluded that the stakeholder's satisfaction was moderate which were in line with the findings found in the questionnaire instrument where mean 3.02 of and Standard deviation of 0.87 which was low as well.

CORRELATION

The general objective of the study was to establish the relationship between risk management and performance of construction projects in AFRIPRECAST and this was determined by showing the risk management dimensions (Risk identification, risk assessment, risk response and risk monitoring) relationship with performance of construction projects in AFRIPRECAST as show in table below:

Table 6: Multiple Correlation Coefficients

		Risk Identification	Risk Assessment	Risk Response	Risk Monitoring	Performance of construction projects
Risk Identification	Pearson Correlation	1	0.747	0.857	0.934	0.909
	Sig. (2-tailed)		0	0	0	0
	N	97	97	97	97	97
Risk Assessment	Pearson Correlation	0.747	1	0.72	0.813	0.721
	Sig. (2-tailed)	0		0	0	0
	N	97	97	97	97	97
Risk Response	Pearson Correlation	0.857	0.72	1	0.831	0.872
	Sig. (2-tailed)	0	0		0	0
	N	97	97	97	97	97
Risk Monitoring	Pearson Correlation	0.934	0.813	0.831	1	0.93
	Sig. (2-tailed)	0	0	0		0
	N	97	97	97	97	97
Performance of construction projects	Pearson Correlation	0.909	0.721	0.872	0.93	1
	Sig. (2-tailed)	0	0	0	0	
	N	97	97	97	97	97

**. Correlation is significant at the 0.01 level (2-tailed).

Results reveal that there is a positive relationship between risk identification and performance of construction projects in AFRIPRECAST (r = 0.909**, P= .000). The Pearson correlation coefficient (r) was found to be 0.909 which reveals that there is a strong and positive relationship between project risk identification and performance of construction projects in AFRIPRECAST. Results reveal that there is a positive relationship between risk assessment and performance of construction projects in AFRIPRECAST (r = 0.721**, P= .000). The Pearson correlation coefficient (r) was found to be 0.721 which reveals that there is a moderate and positive relationship between project risk assessment and performance of construction projects in AFRIPRECAST. Results reveal that there is a positive relationship between risk response and performance of construction projects in AFRIPRECAST (r = 0.872**, P= .000). The Pearson correlation coefficient (r) was found to be 0.872. The fourth objective was to establish the relationship between risk monitoring and performance of construction projects in AFRIPRECAST. Results reveal that there is a positive relationship between risk monitoring and performance of construction projects in AFRIPRECAST (r = 0.930**, P= .000). The Pearson correlation coefficient (r) was found to be 0.930.

INFERENTIAL STATISTICS

Table 7: Model summary

Model	R	R square	Adjusted R Square	Std. Error of the estimate
1	.951[a]	0.904	0.900	0.26095

a. Predictors: (Constant), Risk Monitoring, Risk Assessment, Risk Response, Risk Identification

The Adjusted R^2 from Table 7 revealed that Risk management variables with reference to risk identification, risk assessment, risk response and risk monitoring explained about 90.4% of variance in performance of construction projects in AFRIPRECAST, While the remaining 19.6% of changes in construction projects in AFRIPRECAST is as result of some other factors that have not been captured in the model.

ANOVA
Table 8: ANOVA

Model	Sum of Square	df	Mean Square	F	Sig.
1 Regression	59.194	4	14.799	217.324	0.000 a
Residual	6.265	92	0.068		
Total	65.459	96			

a. Predictors: (Constant), Risk Monitoring, Risk Assessment, Risk Response, Risk Identification
b. Dependent Variable: Performance of construction projects

The value of the calculated F is 217.324 while p-value was 0.000, which is < 0.05 for the variance generated by the regression. The critical value of F, at the significance level of 0.05 with 4 degrees of freedom at numerator and 92 at denominator is 2.47. The obtained value of F (217.324) is larger than the critical F-value (2.47), then result is significant at this level of probability means that the obtained F-ratio is likely to occur by chance with a p<.05. These results indicated that the model is statistically significant hence; Risk management has a significant effect on performance of construction projects in AFRIPRECAST. Multiple regression analysis was conducted at significance level of 0.05.

REGRESSION COEFFICIENTS
Table 9: Regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.481	0.096		5.010	0.00
Risk Identification	0.079	0.074	0.106	1.058	0.293
1 Risk Assessment	-0.106	0.043	-0.139	-2.462	0.016
Risk Response	0.271	0.056	0.314	4.873	0.00
Risk Monitoring	0.614	0.093	0.683	6.587	0.00

a. Dependent Variable: Performance of construction projects

The results in Table 9 present the relationship of each risk management independently towards performance of construction projects in AFRIPRECAST. The results showed that there is no significant relationship between Risk identification and performance of construction projects in AFRIPRECAST (b=0.106; p<.05). Results shows that there is a significant relationship between Risk assessment and performance of construction projects in AFRIPRECAST (b=-0.139; p<.05), the negative correlation means that there is an inverse relationship between that Risk identification and performance of construction projects in AFRIPRECAST, this implies that each increase of one unit in risk assessment decreases

performance of construction projects in AFRIPRECAST by 13.9%. Results shows that there is a significant relationship between Risk response, risk monitoring and performance of construction projects in AFRIPRECAST

$(b=0.314; p<.05, b=0.638; p<.05)$. This implies that each increase of one unit in risk response and risk monitoring increases performance of construction projects in AFRIPRECAST by 31.4% and 63.8% respectively.

CONCLUSION

The conclusions below were drawn on the foundation of the findings of this study and that: there was a moderate level risk management in AFRIPRECAST. It was also concluded that there was a moderate level performances of construction projects in AFRIPRECAST, meaning that the level of performance needs to be improved through. It is concluded that there is

significant positive relationship between risk response, risk monitoring and performance of construction projects, there is a significant negative relationship between risk assessment and performance of construction projects as well as non-significant relationship between risk identification and performance of construction projects AFRIPRECAST.

RECOMMENDATIONS

The following recommendations have been made:

- AFRIPRECAST should adopt the risk management policy and make it fully implemented
- AFRIPRECAST should develop projects timelines stipulating a clear design of activities and their execution as well sticking on their framework,
- AFRIPRECAST should put in place the required personnel to perform risk assessment,
- Since there is moderate level of risk management in AFRIPRECAST, AFRIPRECAST should improve this by ensuring their risk identification is full undertaken to achieve the expected

outcomes, AFRIPRECAST should take care of their risk management,
- AFRIPRECAST before starting implementing their projects should identify well the existing problem affecting a certain group, a project must be a participatory exercise from the beginning to the end,
- Each project in AFRIPRECAST needs to be unique i.e., every project needs to have a definite beginning and an established end. Over time, problems change, just as people, dynamics, politics and opportunities do.
- With the existence of a positive relationship between risk management and performance of construction projects, AFRIPRECAST should focus on their risk management interventions as one of the ways of fostering projects performance.

REFERENCES

[1] Agomoh, U. (2012). Project conceptualization. Irct ssa regional workshop. New york: asley.45-52.
[2] Ahoniemi, H., & Nissinen., V. (2009). Performance through measuring leader's profiles: An empirical study. *International journal of economics*, 385-394.
[3] Ali and Taylor, D. (2014). Corporate risk disclosure in Malaysia: The influence of pre-dispositions of chief executive officers and chairs of audit committee. *Research Journal of Finance and Accounting,* 5(2): 92- 106.
[4] Amin, M. (2005). *Social science research, conception, methodology and analysis.* Kampala: Makerere University Printery.78-84.

[5] Auditor (2019), Report of the auditor general of state finances for the year ended 30 June 2019, Rwanda
[6] Auditor, G. (2014). *Report of the Auditor General of State Finances.* Kigaki-Rwanda.45-62.
[7] Baccarini, D., & Collins, A. (2014). *The Concept of Project Success-What 150 Australian project managers think.* Path, Western Australia: Curtin University of Technology.
[8] Bailey, K., & pride, T. (2007). Community design of a light rail transit-oriented development using case wise visual evaluation. *socio-economic planning sciences*, 235,254.

[9]   Barlow, G., & Wolley, P. (2013). *Project management survey report.* New York: project management institute.32-36.

[10]   Bourne, L., & Walker, D. (2007). *Project relationship and the stakeholder cicle*. Retrieved 10 10, 2015, from www.mosaicprojects.com.au.

[11]   Business Sweden (2017), "opportunities in the construction industry in Rwanda business Sweden in eastern Africa," *fact pack*

[12]   CARE (international). (2011). CARE International Design, Monitoring and Evaluation. washintonpresss.89-96.

[13]   Chan, S. & Park, M.(2005). *Project Cost Estimation using principal component Regression.* Construction Management and Economics.295-304.

[14]   Chen & Wanting. (2012). *'A Review on the Project Appraisal Processes for Major Public Investments in China.' Working Paper.* Norway: Norwegian University of Science and Technology.

[15]   Chou, J.S. &Yang, J.G, (2012). *Project management knowledge and effects on construction project outcomes*: an empirical study. Proj. Manag. J. 43, 47–67.

[16]   Clark, & Taplin. (2012). *Theory of change.* Retrieved 0ctober 21, 2015, from Wikipedia: https://en.wikipedia.org/wiki/Theory_of_chang e.

[17]   Cough R.H, & Sears G.A. (2008). C*onstruction project management: Practical guide.* Texas: John Wiley.

[18]   Dabla-Norris, Era, Brumby, J., Kyobe, A., Mills, Z., & Papageorgiou, C. (2011). 'Investing in Public Investment: An Index of Public Investment Efficiency.'. *IMF Working Paper* .43-46.

[19]   Dvir, D., & Lechler, T. (2004). Plans are nothing, change plans is everything: The impact of changes on project success. pp. 1-15.

[20]   Dvir, D., & Peerasit, P. (2005). Standardized project management may increase development projects success. *International journal of project management*, 181-192.

[21]   Ehsan, N., Mirza, E., Alam, M. and Ishaque, A., 2010. "Risk management in construction industry. Computer science and information technology (ICCSIT)." In *3rd IEEE International Conference.* pp. 16–21.

[22]   Enon, J. (1998). *Education research.* Kampala: Makerere University PRESS.37-41.

[23]   Eugene, kazige .(2013). Strategic plan 2013-2018.KIGALI: Rura.22-24.

[24]   FDOT. (2009). *Project workplan-Florida department of transportation.* Frolida.16-20.

[25]   Fortune, & White. (2006). Framing of project critical success factors by systems model. *International journal of project management*, 53-65.

[26]   Gibson, & Hamilton. (2005). Building project scope definition. *jt O'Connor* .38-43.

[27]   Gitau L. Mwangi, (2015) "the Effects of Risk Management at Project Planning Phase on Performance of Construction Project in Rwanda," Jomo Kenyatta Univ. Agric. Technol., pp. 1–76.

[28]   Haithaman, H., Basem, M., & Mohammad, A. (2013). The impact of risk management on construction projects success from employees' perspectives. *Interdisciplinary journal of contemporary research in business*, voll3,4.

[29]   Hamilton, A. (2004). *Handbook of project management procedures* TTL Publishing Ltd Hartem.

[30]   Hamzah, A. R., Wang, C. and Farhanim, S. M. (2015). Implementation of risk management in the Malaysian construction industry: Case studies. *Journal of Construction Engineering,* 2015: 1-6. Available: http://dx.doi.org/10.1155/2015/192742

[31]   Hoffman, T. (2013, october 27). Computerworld. *corporate execs try new ways to align IT with business units* .13-18.

[32]   Huber, p. (2004). Robust statistics. *Wiley* .22-27.

[33]   Ika, L., Thuillier, Khang, & Moe. (2012). Critical success factors of world bank project: empirical research. *International journal of project management*, 115-116.

[34]   ILO. (2010). Principles, rationale, planning and managing for evaluations. In *ILO guidelines to results-based evaluation.* Geneva: ILO(EVAL).47-52.

[35]   Jensen, G. (2010). P*roject planning using a logical framework approach.* USA: Bond.32-28.

[36]   Jha, K.N.& Iyer, K.C., (2006). Critical determinants of project coordination. Int. J. Proj. Manag. 24, 314–322.

[37] Karamouz, J., Ahmadi, & Nazif, S. (2009). Development of management schemes in irrigation planning: economic and crop pattern consideration. *scienta iranica, transactions A: Civil engineering*, 457-466.

[38] Kerzner, H., (2006). P*roject Management — A Systems Approach to Planning, Scheduling, and Controlling,* 9th edition. John Wiley & Sons.

[39] Khan, R. A., Liew, M. S. and Ghazali, Z., 2014. "Malaysian construction sector and Malaysia vision 2020: Developed nation status." In *Procedia - Social and Behavioral Sciences.* pp. 507–13.

[40] kfh.rw https://kfh.rw/about-us/. Retrieved 25 September 2021. King Faisal Hospital construction.

[41] Kishk, M., & Ukaga, C. (2008). The impact of effective risk management on project success. *The Scott Sutherland school of architecture and the built environment; The Robert Gordon University*.

[42] KPMG. (2013). *Project management survey report.* New York: Project management institute.22-28.

[43] Krejcie, R., & Morgan, D. (1970). Determining simple size for research activity. *An electronic journal for 21st century*, http:/www.emoderators.com.

[44] Laursen, T., & Myers, B. (2009). Public Investment Management in the New EU Member States: Strengthening Planning and Implementation of Transport Infrastructure Investments. *World Bank Working Paper No. 161.*

[45] Lenkunze, R. (2001). *Assessing stakeholder participation in integrated resource management.* Sweden: Lund University.16-28.

[46] Liu, J. Y. and Low, S. P. (2009). Developing an organizational learning-based model for risk management in Chinese construction firms. Disaster prevention and management. *An International Journal,* 18(2): 170–86.

[47] Lopez, R. (2010). *A methodology to identify sustainability indicators in construction project management -Application to infrastructure projects in Spain*: Ecological Indicators, 10(6): 1193-1201.

[48] Mahendra, P. A., Pitroda, J. R. and Bhavsar, J. J. (2013). A study of risk management techniques for construction projects in developing countries. *International Journal of Innovative Technology and Exploring Engineering,* (5): 139–42.

[49] Martinez, M., Martinez-Lorette, A., & Choi, T. (2008). Simultaneous consideration of TQM and ISO performance and motivation: An empirical study of Spanish companies. *international journal of production economics*, 23-39.

[50] Martyn R, H. (2012, winter). Journal of supply chain management. *Procurement reform and MIS projects success*, pp. 1,2.

[51] Maurice M, & Steve. (2008). A Statistical Analysis of Determinants of project success: Examples from African development Bank. *economic research paper*.

[52] Meredith, & Mantel. (2000). *Project management: A managerial approach.* New York: John Wiley.87-95

[53] Michael, L. (2011, December 11). University of Missouri ST. Louse e-publication. *Managing user expectations* .76-87.

[54] Miller, D., & Oliver, M. (2015). *Engaging stakeholders for project success.* Retrieved from http://www.pmi.org/~/media/PDF/learning/engaging-stakeholders-project-success.ashx.

[55] MINECOFIN, (2017). "Rwanda's economy grew by 5.9% in 2016," www.minecofin.gov.rw

[56] Mugenda. (1999). *Research Methods: Quantitative and Qualitative approaches.* Nairobi: African center for technology studies (ACTs).114-126.

[57] Neely, A., Gregory, M., & Platts, M. (2012). Performance measurement system design-a literature review and Reserach agenda. *International journal of operations and production management*, 15(4).pp80-116.

[58] Numean, w. (2006). Qualitative and Quantitate Approaches-United states of American. *Social Research*.