EVALUATION OF FACTORS AFFECTING EFFECTIVENESS OF RISK MANAGEMENT IN PUBLIC HOUSING CONSTRUCTION PROJECTS IN RWANDA. CASE OF BATSINDA HOUSING PROJECT.

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ABSTRACT

Rwanda has seen a significant rise in infrastructure developments in the recent past, especially in the fields of real estate development and many house construction projects have failed to achieve project success due to increase in risk and uncertainty. The objective of this study was to evaluate the factors affecting effectiveness of risk management in housing construction projects in Rwanda, a case of Bastinda II project. To achieve study objective, descriptive survey design was adopted. This research design involved gathering data that describe events and then organizing, tabulating and describing the data. The population of the study for this study was three institutions that are involved in Bastinda II project that included Rwanda Social Security Board (RSSB), the Rwandan Ministries of Infrastructure and City of Kigali (CoK). Yamane's formula was used to determine the study sample size of 116 from a target population of 164. The primary data for this study was collected using both closed and open ended structured questionnaires. The study established that low level of top management support where project management failed to develop project procedures from initiation stage, install training programs, affected the effectiveness of risk management in Batsinda Housing project by a factor of 0.633 and p value of 0.03. Incompetent project team members who did not understand project risk management process affected effective risk management by a factor of 0.497and p value of 0.04. The study recommends that top management should be committed to inclusive and transparent risk management, project team should be trained in risk management and administrative skills, project funding should be linked to the Gantt chart and proper project risk planning should be done to enable structured and systematic risk management in construction projects.

Key words: Top Management Support, Employee's Training and effectiveness of risk management

1. Introduction

Risk management is the processes to manage the potential risks by identifying, analyzing and addressing them to reduce the probability or impact of unfavorable negative events and maximize realization of emerging opportunities. The outcome may help to mitigate the likelihood of risk occurring and the negative impact when it happens (Partnerships, 2005). Risk management has become an important part of the management process for any project. In fact, Actually, Akintoye, (2003) believes that the circumstances within the construction industry had led to adopting risk management and analysis into practice.

Project risk management has a prominent position in the framework of project management theory and methodology (Project Management Institute, 2008). The reason is that unexpected events will usually occur during a project (Pinto, 2007). Given the importance of project risk management in project management functioning, the efficiency of risk management is expected to significantly influence project performance (Harker and Satvros, 1998). Strutt (1993) carried a study on impact of risk management on project performance in US and found that risk management strategies lead to project success

Risk often varies in the likelihood of its occurrence and its impacts from one project another and risk changes its nature during the project life cycle (Smith, Merna and Jobling, 2006). A lack of project information, particularly in the early stage of a construction project, always leads to a higher degree of risk associated with cost, time and quality. The level of risk, however, may decrease with the project. When risks are being realized as the project progresses, the increased level of certainty reduces the level of risk in the project. Project risks often tend to be interrelated, but they can sometimes be considered in isolation. Risks can not only affect the achievement of project objectives but also influence the occurrence of one another. According to Loosemore. (2006), the perception of risk varies at both individual and organizational levels because different people hold different views and have different understandings of a particular risk's components, sources, probabilities, consequences and preferred actions. People's beliefs, attitudes, judgments and feelings are believed to influence risk perception to a certain extent (Akintoye & Macleod, 1997).

The rapid development of housing schemes has effectively facilitated increase in house construction risks (Lientz & Larssen 2004). In the case of the UK, the top three risks in the housing construction business are commercial risk, contractual risk and operational risk (Amos and Dents, 1997). Santoso, Ogunlana and Minato (2003) found managerial and design factor to be the major and most significant problems in a high-rise construction project in Jakarta, in terms of frequency and risk impacts. In China, the most significant risk events are found to be financial risks, including capital return difficulty, owners' delaying payment and owner's unreasonable upfront capital demand (Fang. 2004).

In order to minimize and control these risks successfully, project risk management policies and strategies have been developed and implemented in organizations. The effectiveness of risk management in construction project management has been questioned in the past 10 years (Coles & Moulton 2003).Although there is a well- developed, designed and implemented processes of project RM such as risk management planning, risk identification, risk assessment, risk analysis and risk response planning, 51% of construction project experience failure attributed to occurrence of risks Lee & Chun 2009.A government report in America demonstrates that over 80 percent of house development projects have failed in whole or in part due to ineffective poor risk management ((Lientz & Larssen 2004).

An effective risk management system not only brings a higher level of awareness of the consequences of risk but also focuses on a more structured approach, more effective centralized control and better transfer of risk information between parties influence reduced long-term loss expenses and project time overruns (Edwards, 1995). Successful risk management should convert uncertainty to risk and convert risk to opportunity. The project and organization would hence achieve more gains by maximizing opportunity, minimizing risk and reducing uncertainty. Sundararajan (2004) stated that if risk events are not handled and managed properly, consequences like increasing the financing cost, changing the capital structure, delay the building or facility operation, overrun budget, lost the cash inflow, lead to liquidated damages claim, produce poor quality end product, involve rework after completion might occur.

Wood (2005) states the enhancement of the transparent practical linkage of the risk mitigation plan and risk register to the corporate plan objectives as a key measure of project success. According to Hampton (2006) success in risk management is based upon knowledge, relationships and sharing best practices. Lenckus (2005) mentions securing management support, committing ample time to the effort, planning wisely, proving the plan's worth early and pacing risk manager among the CSFs for enterprise risk management (ERM). Coccia (2005) believes that communication and the promotion of behavioural changes throughout an organization are the key success factors for ERM.

Based on a survey results by McDonald (2004), clearly defined risk appetite articulated through limits and monitoring procedures, involvement of managerial board, centralized ERM organizations, proper communication and instilling risk into the culture of business are among the most important success factors in ERM. Some other experts such as Lemos *et al.* (2001) and Roth and Espersen (2004) limit the success of risk management to the successful performance of its formal processes of risk management planning, risk identification, risk analysis, risk response planning and risk monitoring and control. Despite the necessity, benefits and effectiveness of implementing risk management systems (RMS), various researchers state that the organizations which have been successful in practical implementation of RMS are still in a small minority which does not exceed 25% according to the most optimistic reports (Kutsch & Hall, 2010).

Risk and uncertainty constantly plagued construction industry compared with other business activities due to its characteristics of complexity, dynamic and time consuming. As risk management is predicting the unpredictable, it is one of the most vital management tools to cope with project risks and uncertainties. Risk management strategies are important to create values to a project and improve house construction project performance in term of cost, time and quality. However, risk management strategies are not implemented in most of the existing construction companies in Rwanda resulting to house construction project failure through increase cost overrun, schedule slip and poor quality performance. Risk management is essentially influencing the successful project performance (Jin & Yean, 2005).

In regard to this study Batsinda housing project was used for the study launched on February 2015 by the Minister for Infrastructure, Rwanda. The project is located in Batsinda, a suburb of Kigali from which the project gets its name. Rwanda Social Security Board (RSSB) aim at constructing 609 houses at a cost of cost Rwf 30 million each as the government and its partners seek to provide affordable homes for city dwellers. Batsinda II, as the project has been named, is one of five affordable housing projects in the City of Kigali. The process of availing more areas for development is well underway and Kigali city as well as the other districts have considered this as a top priority. Hence by carrying the study on factors affecting effectiveness of risk management in housing construction projects in Rwanda was necessary to fill the existing gaps.

2. Statement of the problem

In order to manage projects effectively and increase the chances for a project's success, it is important to employ effective risk management strategies for completing the project. The project risk management positively influences project performance by instrumental effects through creation of a contingency plan or by influencing project time, budget or design plan. However, construction projects in developing countries such as Rwanda continue to experience failure due ineffective management, cost controls, inappropriate building regulations and codes as well as a lack of basic project planning and provisions (Zwikael & Ahn, 2011).

Rwanda has seen a significant rise in infrastructure developments in the recent past, especially in the fields of real estate development. However, many house construction projects have failed to achieve project success due to increase risk and uncertainty. This despite there being talk of project risk management integrated into the projects. The research is intended to look at the gap that even with the said risk management incorporated in these projects we still find a lot of projects failing to meet the expected outcomes. Poor workmanship has led even to some projects like houses being declared unsafe for habitation. Cost overruns are also common not to mention the issue of scope creeps and projects running far beyond the planned time. This brings to focus the effectiveness of the said risk management.

3. Research objectives
3.1 General Objective

The purpose of the study was to determine factors affecting effectiveness of risk management in housing construction projects in Rwanda.

3.2 Specific Objectives

i.   To determine how level of project top management support affect effectiveness of risk management in public housing construction projects.
ii.   To establish the extent to which competence of project team affect effectiveness of risk management in public housing construction projects

4. Research Questions
i.   How does level of project top management support affect effectiveness of risk management in public house construction projects?
ii.   How does competence of project team affects effectiveness of risk management in public house construction projects?

5. Research Design

This study adopted descriptive research design. A descriptive study is a study concerned with describing the characteristics of a particular individual or of a group (Kothari, 2004). The study sought to establish the factors affecting effectiveness of risk management in public housing construction projects in Rwanda. It adopted a case study survey. A case study involves careful and complete observation and analysis of a unit in its relationship to any other unit in the group (Kothari, 2004). A survey design is associated with a guided and quick collection, analysis and interpretation of observation (Mugenda & Mugenda, 1999).

6. Target population
The population for this study was staff working in five institutions that are behind the implementation of the project. The population constituted of a total of 164 respondents comprising of staff members from Rwanda Social Security Board (RSSB), the Rwandan Ministries of Infrastructure and from City of Kigali (CoK) who are directly involved in the project.

7. *Sample size and sampling procedure*

A sample size of 86 respondents was determined from a total population of 110 individuals using the formula by Yamane (1967). Stratified random sampling technique was used to select the respondents Stratified random sampling technique ensure that different groups of a population are adequately represented in the sample. Stratified sampling divides the population into homogeneous groups such that the elements within each group are more alike than the elements in the population as a whole (Nachimas and Nachimas 2008).

$$n = \frac{N}{1 + N\,(e)^2}$$

Where n = the desired sample size

e= probability of error (i.e., the desired precision, e.g., 0.05 for 95% confidence level)

N=the estimate of the population size.

$$n = \frac{164}{1 + 164(0.05)^2} = 116$$

Therefore, 116 was the study sample size, which represented 116/164=0.7 of the target population. According to Kothari (2000), a stratified random sampling is used where the population embraces a number of distinct categories, the frame can be organized by these categories into separate "strata." Each stratum was then sampled as an independent sub-population, out of which individual elements can be randomly selected. Mugenda & Mugenda (2003), indicated that sample size 10% to 20% is sufficient for a study. Since the study population was small, 70% of the population was considered to select a sample size of 116 respondents.

8. *Data collection*

8.1 Data collection instrument

The primary data for this study was collected using the questionnaires. Questionnaires were used in collecting data and consisted of a mixture of open ended and close ended questions. According to Babbie, (1998) this allows for intensity and richness of individual perceptions in respondent responses. The study used questionnaires because it is flexible and facilitates the capture of in-depth knowledge of the respondents, promotes respondent cooperation and allows probing further for clarification of issues. As a method of data collection questionnaires are appropriate because they are easy to analyze, and are cost effective (Andersen, 2003).

8.2 Pilot testing of the instrument

According to Mugenda & Mugenda (2008) pilot testing involves conducting a preliminary test of data collection tools and procedures to identify and eliminate problems, allowing programs to make corrective revisions to instruments and data collection procedures to ensure that the data that will be collected is reliable and valid. The reliability and validity of research instruments determines the quality of data collected and hence that of the whole research (Babbie, 1998). Key informants in the three categories of

respondents were used in the pilot test to establish the reliability and validity of the instrument, the questionnaires were administered to the key informants and the information was analyzed to establish its validity and reliability. Any questions within the instrument found to be resulting in unreliable or invalid information was altered in order to result in more reliable and valid information

8.4 Data analysis technique

The collected data was well examined and checked for completeness and comprehensibility. The data was then summarized, coded and tabulated. Descriptive statistics such as means, standard deviation and frequency distribution were used to analyze the data. Data presentation was done by the use of frequency tables for ease of understanding and interpretations. Inferential statistics such as regression and correlation analysis was used to describe the relationship between effectiveness of risk management and factors that affects risk management effectiveness in project management in housing sector. A multiple regression model was developed to establish the relationship between the dependent and independent variables (Sekaran, 2003). The relationship equation was represented by the linear equation below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu$$

Y= Dependent variable- Effectiveness of risk management

α = Constant

μ = Error

β = Coefficient of the Disbursement

X_1 = Level of project top management Support

X_2 = Competence of project team

X_3 = Project funding

X_4 = Project Risk planning

Factor analysis of the individual factors (Level of project top management Support, Competence of project team, Project funding and Project Risk planning). Independent t-tests and/or simple analysis of variance (ANOVA) were used to look for significant differences. SPSS (Statistical Package for Social Sciences) software program was used for in-depth data analyses. Analyzed data was then presented using tables, pie charts, percentages and text for ease of understanding and interpretations of the role of strategic human resource management practices on the performance of financial institutions in Rwanda.

9. RESEARCH FINDINGS AND DISCUSSION

9.1 Demographic Information

Demographic information of the respondents was based on gender, Age of respondent's education level and the department where they work.

Table 1: Demographic characteristics

	N	%
Gender		
Male	67	62
Female	41	38
Total	108	100
Age		
<30	12	11
31-40	66	61
41-50	24	22
Above 50	6	6
Total	108	100
Education Level		
Diploma	22	20
University	76	70
Postgraduate	10	10
Total	108	100
Functional Areas		
Finance & Administration	18	16
Marketing	24	22
Project Management	21	19
Quality Assurance	30	28
Training & Welfare	15	15
Total	108	100

From Table 1, male participants constituted 62% while female were the minority 38%. This shows that majority of the project beneficiaries were male as compared to female showing the problem of gender bias in project selection in the area. From the findings, 12 of the respondents (11%) were aged less than 30 years, 66 of the respondents, (61%) between 31 to 40 years, 24 of the respondents, (22%) between 41 to 50 years and the rest 6 respondents (6%) were above 50 years. This shows that majority of the project beneficiaries were youths. 22 respondents (20%), had a diploma, 76 respondents (70%) had university education while 10 respondents (10%) had postgraduate degree. This implies that the direct beneficiaries of the projects were very educated hence low level of dependence. The percentages of respondents from finance and administration, marketing, projects managements, Quality assurance and training and welfare were 16%, 22%, 19%, 28% and 15% respectively.

9.2 *Effect of top Management Support*

The study sought to establish the extent to which level of top management support affected effectiveness of risk management in Batsinda Housing project and various dimensions of top management support were examined and the following are the results:-

Respondents were supposed to use Key: NE- No Extent, LE- Less extent, ME-Moderate, GE- Great Extent, and VE-Very Great Extent.

Table 1: Effect of top management support

Statements	NE	LE	ME	GE	VE
Commitment level to risk management		7 (7%)	35 (33%)	66 (60%)	
Support in risk identification		8 (7%)	20 (19%)	80 (74%)	20 (19%)
Developing project procedure			7 (7%)	66 (60%)	35 (33%)
Identification of Project scoping		40 (37%)		68 (63%)	
Assist in establishing a project management office		20 (19%)	8 (7%)	80 (74%)	
Commissioning the right officers to the project		15 (14%)	35 (33%)	58 (54%)	15 (14%)
Identifying uncertainty			28 (26%)	80 (74%)	
Ineffective communication		23 (22%)	27 (34%)	58 (54%)	

The respondents were requested to indicate the extent to which the given statement concerning top management role in Batsinda Housing project affect effectiveness of risk management in the scheme. Majority of the respondents indicated that top management commitment level to risk management was done, ensuring of safety in construction site; assisting in establishing a project management office and supporting in risk identification affects effectiveness of risk management in the scheme to a very great extent as indicated by mean of 4.62, 4.59, 4.42 and 4.39 and standard deviation of 1.09, 1.06, 1.03 and 1.13.

Coordination of scheme activities, ineffective communication and effective conflict management affects effectiveness of risk management in the scheme to a great extent as indicated by mean of 4.49, 4.46 and 4.44 with standard deviation of 0.41, 0.35 and 0.31. Most of the respondents indicated that commissioning the right officers to the project, supporting quality management of the scheme, identification of project scoping, commitment level to risk management and developing project procedure affects effectiveness of risk management in the scheme to a great extent as indicated by a mean of 4.40, 4.33, 3.93 and 3.84 with standard deviation of 1.15, 1.14, 0.39 and 0.37. The study further found that most of the respondents were neutral on whether identifying uncertainty affects effectiveness of risk management in the scheme as indicated by a mean of 3.35 with standard deviation of 0.66. This implies that risk management requires top-level management support, acknowledgment that risks are realities, and a commitment to identify and manage them.

Regression analysis was done to determine the effect of top management commitment on effectiveness of risk management and the following results were obtained. The results of the analysis are shown in table

Table 2: Model summary showing top management commitment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.442[a]	.301	.318	.65724

   a.   Predictors: (Constant), Top management commitment

Further analysis of the top management commitment obtained an adjusted R 31.8%. This implies that the simple linear model with recruitment and selection strategies as the independent variable explains 31.8 % of the variations effectiveness of risk management. This means that when the top management was committed to risk management the effectiveness of risk management changed by 31.8 %.

Table 3: ANOVA results showing the effect of top management commitment $ANOVA^b$

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	42.431	1	40.431	11.388	.000[a]
1	Residual	142.688	52	.617		
	Total	1.953	53			

b. Dependent Variable: Effectiveness of risk management
c. Predictors: (Constant), Top management commitment

A regression analysis was done to determine the effect of top management commitment on effectiveness of risk management in Rwanda. From the analysis a p-value less than 0.05 (p-value = 0.0000) was obtained. This implies that the simple linear model with recruitment and selection strategies as the only independent variable is significant.

Table 4: Coefficient results showing the relationship between top management commitment and effectiveness of risk management *Coefficients (a)*

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.773	.231		5.973	.000
	Top management commitment	.539	.062	.444	8.815	.000

   a.   Dependent variable: effectiveness of risk management

Correlation coefficients show that top management commitment (X1) is significant (p-value = 0.0000) in influencing effectiveness of risk management (Y). The results of the analysis are shown in Table 9. The fitted model from this analysis is shown below:

Y= 0.773+0.539X1

9.3 Effect of Competence of project team

The study sought to establish the extent to which competence of project team affected effectiveness of risk management in Batsinda Housing project and various dimensions of competence of project team were examined and the following are the results:-

Table.5: Effect of Competence of project team

Statements	SA	A	UN	D	SD
Level of administrative skill of project team members	20 (19%)	8 (7%)	80 (74%)		20 (19%)
Delay in provision of drawings to contractors		35 (33%)	66 (60%)	7 (7%)	
Failure to adopt appropriate risk strategies effect risk management of the success of the schemes		40 (37%)		68 (63%)	
Low level of skills in risk evaluation affects information haring on risk management leading to incompletion Batsinda II project in time		20 (19%)	8 (7%)	80 (74%)	
Low creativity in assessing risks facing the schemes lead to unsuccessful project	15 (14%)	35 (33%)	58 (54%)		15 (14%)
Level of flexibility influence house construction			28 (36%)	80 (74%)	

The level of communication skills of the project team in risk management was sought and 65% of the respondents said that the project team had a low level of communication skills in risk management, 24% of the respondents indicated that they had high level of communication skills while 11% of the respondents said that level of communication skills among the project team in risk management was medium. This implies that there were some problems for risk communicators which involved how to reach the intended audience and to make the risk comprehensible and relatable to other risks. The study sought to know the extent to which respondents agreed with the given statement concerning competency of project officers and effectiveness of risk management in Batsinda housing project. From the findings, majority of the respondents strongly agreed that delay in provision of drawings to contractors, low level of creativity in assessing risks facing the scheme lead to unsuccessful project and that low level of skills in risk evaluation affects information sharing on risk management leading to delay in completion of Batsinda Housing project in time as indicated by a mean of 4.88, 4.86 and 4.77 with standard deviation of 0.76, 0.64 and 0.58.

Most of the respondents agreed that failure to adopt appropriate risk strategies, level of administrative skill of project team members, incompetency in risk control lead to ineffective risk management in the scheme, level of flexibility that influence house construction and incompetent staff of government regulatory agencies affects effectiveness of risk management as indicated by a mean of 4.71, 4.69, 4.66, 4.55 and 4.52 with standard deviation of 0.62, 0.59, 0.53, 0.46 and 0.48. Most of the respondents agreed that level of competency of contractors in risk management, team work determine success of risk, desire by contractors to make easy money through contractual claims affect success of risk management and style of leadership by the project manager determine level of success of the scheme as indicated by a mean of 4.39, 4.30, 4.20 and 4.16 with standard deviation of 0.31, 0.33, 0.29 and 0.27. This implies that competence of all persons involved in the project not only in their areas of contribution but also an appreciation of the importance of risk management during the entire project life cycle would promote a concerted effort to deal with project risks in order to achieve project success.

10. Conclusions And Recommendations

10.1 Conclusions

The purpose of the study was to determine factors affecting effectiveness of risk management in housing construction projects in Rwanda.this was achieved by the two objectives

The first objective was to determine how level of project top management support affect effectiveness of risk management in public housing construction projects. The study concluded that low level of top management support in risk commitment led to insufficient allocation of resources for risk management. Lack of effective decision making and stake holder involvement by top management affected effective risk management in Batsinda Housing Project. Effective risk management should be transparent and inclusive.

The second objective was to establish the extent to which competence of project team affect effectiveness of risk management in public housing construction projects. The study established that poor project management skills in project team affected effective risk management of the scheme despite there being risk mitigation measures in place. Low level of administrative skill and low level of communication skill in risk management amongst project team also affected effective risk management.

10.2 Recommendations

From the study, it was evident that the study found out that there is lack of risk management commitment and low level of risk knowledge to both top management and project team. The study therefore recommends that top management and project team should be continuously trained on project risk management; this will enable them to appreciate the benefits of risk management in construction projects and this will in turn uplift their commitment to risk management in terms of project risk planning and resource allocation.

The study also found out that whereas the project team had high technical qualifications, they had low administrative skills and low risk management skills. This is due to absence of units on soft skills and risk management in their training programs in colleges and therefore the study recommends integration of these skills in their core technical units.

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