

Role of Risk Management Strategies on Performance of Construction Projects in Rwanda; A Case Study of Kigali - Gatuna Road Rehabilitation Project

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Abstract: *As open systems, these projects are subject to the impacts of a wider socio-political environment and climatic changes stemming from both internal and external parties such as community groups, local residents, landowners, environmentalists, regulatory agencies, local and national governments. In Rwanda, the report of Ministry of Infrastructure reported that in construction industry most projects fail because their owners assume that all the projects would succeed and they therefore do not identify, analyze, and provide mitigation or contingencies strategies for the risk elements involved in the project. This shows that risks may hinder key project milestones and actions hence affecting project delivery as the project may lag behind the schedule, delivered outside the initial project architectural plan and budget line. It is in this regard that the researcher is prompted to assess the role of risk management strategies on success of road rehabilitation projects in Rwanda. The aim of this study was to assess the role of risk management strategies on performance of construction projects in Rwanda. Based on the information drawn from findings the researcher concluded that the effect of strategies on performance of project is significant. It was found out that the project could not perform without effective risk avoidance strategies. The positive coefficient of determination of .862 indicates that there is positive correlation between risk avoidance and performance of Kigali-Gatuna road rehabilitation project and that the increase of one unit in risk avoidance increases the project performance by .262 units if other variables remain constant. The study demonstrated that there is a strong relationship between the risk transfer strategies and performance of project. The study found that risk transfer strategies have a great effect on success of project. It showed that an increase of 1% on the performance of project in risk transfer will increase the project performance given by 0.443 % at the high t-statistic value (2.550) indicates the effect is statistically significant at 95% confidence level. Finally; study demonstrated that there is a significant relationship between risk control measures and project performance. Statistically the increase of 1% in the performance of project in term of risk of control is attributed to 0.332 % improvement in performance of Kigali-Gatuna road rehabilitation project and the high t-statistic value (3.370) indicates the confidence level of 95% the effect is statistically significant. The study recommends that the project owners and managers should adopt the effective risk avoidance strategies by listing the possible risks that are likely to occur during the project implementation process and think in advance the strategies to eliminate their occurrence in order to ensure the timely, cost and quality compliance of the projects. The project owners and managers should transfer the dangerous risks to the institutions that have experience in handling the risks in order to mitigate their negative effects during the course of project implementation. This leads to the timely, cost and quality compliance of the projects' activities and in turns ensures project performance and finally; the project managers and team should be aware of using the standardized materials, usage of personal protective equipment and they should adopt a culture of regularly checking the machines before using them in order to control the job related accidents.*

Keywords: Risk Management, Performance of Construction Projects

1. Introduction

Managing risks in construction project should be recognized as very important in order to achieve project objectives in terms of time, cost and quality. Due to the nature of the construction sector, risk management is a very important process. It is most widely used in those projects which include high level of uncertainty. These types of risk investments are characterized by more formal planning, monitor and control processes. The easiest way to identify risk is to analyze and draw a conclusion from projects which failed in the past. To make sure that the project objectives are met, the portfolio of risks associated with all actors across the project life cycle should be considered (Banaitis, 2012). In the early stages of the project where planning and contracting of work, together with the preliminary capital budget are being drawn, risk management procedures should be initiated. In later stages, risk management applied systemically, helps to control those critical elements which can negatively impact project performance. In other words,

to keep track of previously identified threats, will result in early warnings to the project manager if any of the objectives, time, cost or quality, are not being met (Michaela, 2011).

2. Statement of the Problem

There is always the possibility that something known or unknown could impact the achievement of a construction project's goals. Nowadays, the number and complexity of construction projects is growing rapidly and executed by partnering institutions (Miller, 2014). As open systems, these projects are subject to the impacts of a wider socio-political environment and climatic changes stemming from both internal and external parties such as community groups, local residents, landowners, environmentalists, regulatory agencies, local and national governments (Pejman, 2012). Nerija (2012) also argues that all projects are inherently risky because they are unique, constrained, complex, based on assumptions, and performed by people. As a result,

project risk management must be built into the management of projects and should be used throughout the project lifecycle. In Rwanda, the report of Ministry of Infrastructure of (2016), reported that in construction industry most projects fail because their owners assume that all the projects would succeed and they therefore do not identify, analyze and provide mitigation or contingencies strategies for the risk elements involved in the project. This shows that risks may hinder key project milestones and actions hence affecting project delivery as the project may lag behind the schedule, delivered outside the initial project architectural plan and budget line. It is in this regard that the researcher is prompted to assess the role of risk management strategies on success of road rehabilitation projects in Rwanda.

3. Objectives of the Study

The general objective of this study was to assess the role of risk management strategies on performance of construction projects in Rwanda.

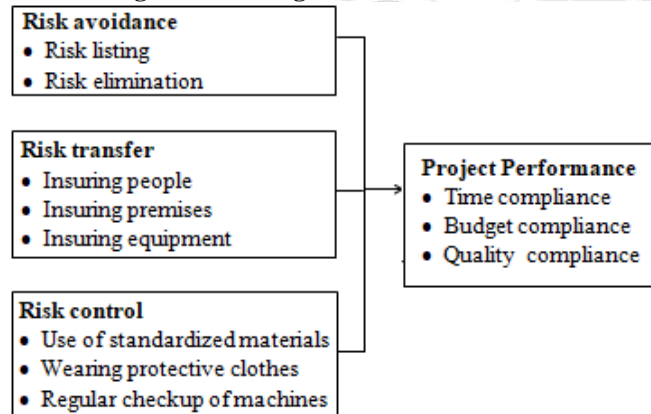
3.1 Specific objectives

The specific objectives of this study were:

- 1) To analyze the role of risk avoidance strategies on performance of Kigali-Gatuna Road Rehabilitation Project
- 2) To assess the role of risk transfer on performance of Kigali-Gatuna Road Rehabilitation Project
- 3) To assess the role of risk control on performance of Kigali-Gatuna Road Rehabilitation Project

4. framework

Risk Management Strategies



5. Research Methodology

- **Research Design:** The researcher used descriptive research design. The major aim of a descriptive study according to Kumar (2005) is to describe and provide information on what is prevalent regarding a group of people, a community, a phenomenon or a situation.
- **Target Population:** The target population of the study was drawn from 143 project members including different stakeholder representatives.

- **Sample Size:** During this study, the researcher will use the sample size of 105 respondents due to the fact that it cannot be easy to collect data from all population under the study. This sample size will be determined by using Slovin's formula which states that $n = \frac{N}{1+N(e)^2}$, where: n= sample size, N= target population, e= margin error. Using this Yamane formula:

$$n = \frac{N}{1 + N(e)^2} = \frac{143}{1 + 143 (0.05)^2} = \frac{143}{1.3575} = 105 \text{ Respondents}$$

- **Data Collection Instruments:** Data are facts or things certainly known and from which conclusions may be made. The main sources of data collection referred to when conducting this study were primary sources of data. The survey questionnaires were used as the main data collection instruments. Mugenda (2008) said that a questionnaire is justifiable in data collection mainly because; it enables the researcher to collect large amount of data within a short time period, it also provides opportunity for respondents to give frank, anonymous answers. The researcher personally administered structured questionnaires to the target group in order to collect the primary data. The questionnaires contained by both closed and open ended questions related to intended information about the effect of stakeholder management on performance of Kigali- Gatuna Road Rehabilitation Project.

6. Research findings

6.1 General respondents' information

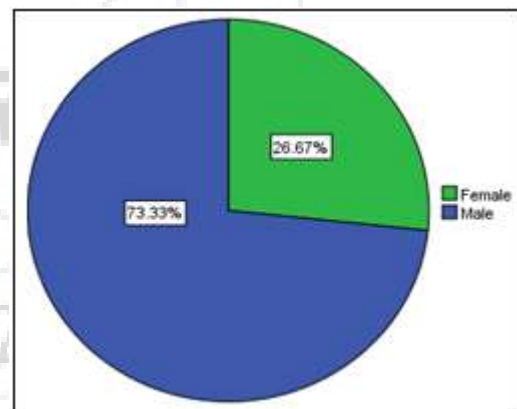


Figure1: Respondents Sex

Source: Field Data (2018)

The findings in figure1 showed that in 105 respondents; 73.3% of them were male while 26.7% were female. Therefore; it is clear that the majority of respondents involved in this study were male.

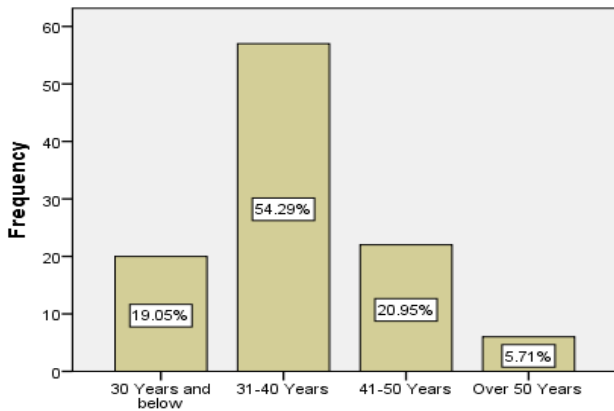


Figure 2: Respondents' Age Category
 Source: Field Data (2018)

According to the results shown in Figure 2, the ages of the respondents were grouped in four categories. Majority of the respondents 54.29% were aged 31 to 40 years. It was followed by 20.95% of the respondents being between 41 to 50 years. There were 19.05% of the respondents between the ages of 30 and below, while only 5.71% was over 50 years.

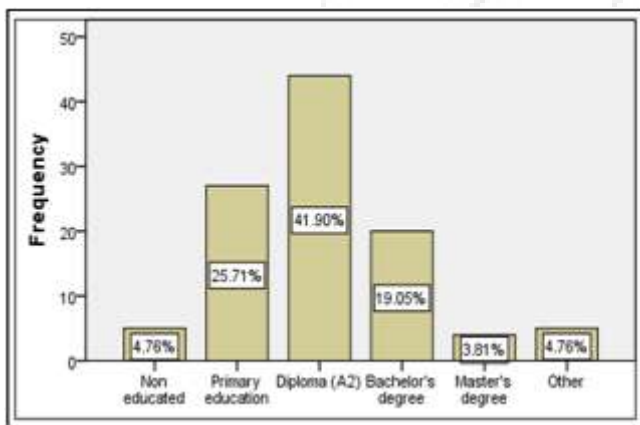


Figure 3: Respondents' Education Qualification
 Source: Field Data (2018)

These findings in Figure 3 above illustrate that 41.90% of respondents had a diploma A2, 25.71% respondents acquired a primary education, and 19.05% of respondents acquired bachelor's degree, 3.81% of respondents acquired a masters' degree while only 4.76% of respondents were non-educated and other. This demonstrates that the majority of respondents are got a diploma A2. This also means that the respondents involved in this study had the capacity of understanding the purpose of the study and respond the questions related to the study.

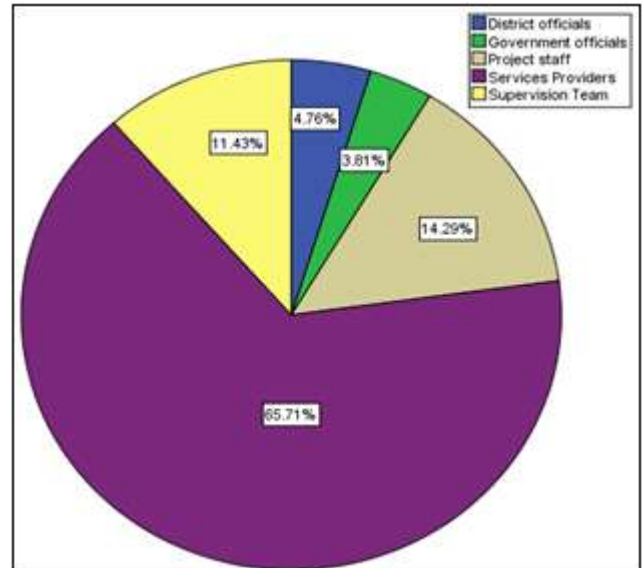


Figure 4: Positions Occupied by Respondents during the Rehabilitation of Kigali-Gatuna Road
 Source: Field Data (2018)

As revealed by the findings in the Figure 4; most of the respondents 65.71% were Services providers, followed by 14.29% of respondents who were project staff, 11.43% of respondent were from supervision team while 3.81% of respondents were government officials and only 4.76% respondents were district officials.

6.2 Analysis of the role of risk avoidance strategies on performance of project

Table 1: Correlation between Risk avoidance and Performance of Kigali-Gatuna road

		Risk avoidance	Project performance
Risk avoidance	Pearson Correlation	1	.839**
	Sig. (2-tailed)		.000
	N	105	105
Project performance	Pearson Correlation	.839**	1
	Sig. (2-tailed)	.000	
	N	105	105

Source: Field Data (2018)

The findings in Table 1 revealed that, the results of correlation between risk avoidance and performance of Kigali-Gatuna road rehabilitation project was at 0.839 meaning that risks avoidance were at the level of 83.9% which proves a significant relationship between risk avoidance and performance project at 0.05 of level of significance because their p-value (0.000) is statistically significant at 5% level of significance.

6.3 Assessment of the role of risk transfer on performance of Kigali-Gatuna Road Rehabilitation Project

Table 2: Correlation between risk transfer and project performance

		Risk Transfer	Project Performance
Risk transfer	Pearson Correlation	1	.827**
	Sig. (2-tailed)		.000
	N	105	105
Project performance	Pearson Correlation	.827**	1
	Sig. (2-tailed)	.000	
	N	105	105

Source: Field Data (2018)

The findings in Table 2 revealed that, the results of correlation between risk transfer and performance of Kigali-Gatuna road rehabilitation project was at 0.827 mean that risk transfer was at the level of 82.7% which prove a significant relationship between risk transfer and project performance. If the researcher considers the level of significance which is 0.05, there is therefore a significant relationship between risk transfer and performance of Kigali-Gatuna rehabilitation project because their p-value (0.000) is statistically significant at 5% level of significance.

6.4 Assessment of the role of risk control measures on performance of Kigali-Gatuna Road Rehabilitation Project

Table 3: Correlation between risk control and performance project

		Risk control Measures	Project Performance
Risk control measures	Pearson Correlation	1	.669**
	Sig. (1-tailed)		.000
	N	105	105
Project performance	Pearson Correlation	.669**	1
	Sig. (1-tailed)	.000	
	N	105	105

Source: Field Data (2018)

The results of correlation between risk control measures and performance of Kigali-Gatuna road rehabilitation project is at the level of 66.9%. Therefore there is a significant relationship between risk control measures and project performance. On the other hand, by considering the level of significance which is 0.05, hence risk control has a significant effect on project performance because their p-value (0.000) is statistically significant at 5% level of significance hence a positive correlation between risk control measures and performance of Kigali-Gatuna Rehabilitation Project.

6.5 Estimate parameters between risk avoidance, risk transfer, risk control and performance of Kigali-Gatuna road rehabilitation project

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.862 ^a	.742	.735	.544

Source: Field Data (2018)

- Predictors: (Constant), Independent variables
- Dependent variable: Performance of Kigali-Gatuna road rehabilitation Project

Table 5: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	86.066	3	28.689	96.919	.000 ^b
	Residual	29.896	101	.296		
	Total	115.962	104			

Source: Field Data (2018)

- Predictors: (Constant), Independent variables
- Dependent variable: Performance of Kigali-Gatuna road rehabilitation Project

Table 4.6: Coefficients^a

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	.322	.153	2.102	.038
	Independent variables	.262	.164	1.595	.114
		.443	.174	2.550	.012
		.332	.098	3.370	.001

Source: Field Data (2018)

Dependent variable: Performance of Kigali-Gatuna road rehabilitation Project

4.5 Discussion of results

The study sought to establish the Performance of Kigali-Gatuna road rehabilitation Project. The Performance of Kigali-Gatuna road rehabilitation Project includes met the expected quality, met the planned cost and met the expected time. An $R^2 = .742$, indicates that 74.2% of variation in risk avoidance, risk transfer and risk control can be explained by the performance of Kigali-Gatuna road rehabilitation project leaving only 25.8% of the variation in the dependent variable being explained by the error-term or other variables other than project performance. The results indicate that project performance has statistically significant effect on risk avoidance, risk transfer and risk control measures. The positive coefficient of determination of .862 indicates that there is positive correlation between performance of Kigali-Gatuna road rehabilitation project and risk avoidance, risk transfer and risk control strategies. The $\beta_1, \beta_2, \beta_3$ of performance project are 0.262; 0.443 and 0.332 with a statistically significant ($p = 0.000$). Therefore, the model equation derived was:

$$y = 0.322 + 0.262x_1 + 0.443x_2 + 0.332x_3 + e.$$
 The positive coefficient further demonstrates that a 1% increase in the performance of project in risk avoidance is attributed to 0.262% improvement in project performance and the high t-statistic value (1.595) indicates the effect is statistically significant at 95% confidence level. An increase of 1% on the performance of project in risk transfer will increase the project performance given by 0.443 % at the high t-statistic value (2.550) indicates the effect is statistically significant at 95% confidence level while a positive coefficient demonstrates a 1% increase in the performance of project in term of risk of control is attributed to 0.332 % improvement in performance of Kigali-Gatuna road rehabilitation project and the high t-statistic value (3.370) indicates the confidence level of 95% the effect is statistically significant. This demonstrates that performance of Kigali-Gatuna road rehabilitation project exhibited in terms of risk avoidance, risk transfer and risk control are exhibited and executed excellently.

7. Conclusions and Recommendations

7.1 Conclusions

Based on the information drawn from findings the researcher concluded that the effect of strategies on performance of project is significant. It was found out that the project could not perform without effective risk avoidance strategies. The positive coefficient of determination of .862 indicates that there is positive correlation between risk avoidance and performance of Kigali-Gatuna road rehabilitation project and that the increase of one unit in risk avoidance increases the project performance by .262 units if other variables remain constant. The study demonstrated that there is a strong relationship between the risk transfer strategies and performance of project. The study found that risk transfer strategies have a great effect on success of project. It showed that an increase of 1% on the performance of project in risk transfer will increase the project performance given by 0.443 % at the high t-statistic value (2.550) indicates the effect is statistically significant at 95% confidence level. Finally; study demonstrated that there is a significant relationship between risk control measures and project performance. Statistically the increase of 1% in the performance of project in term of risk of control is attributed to 0.332 % improvement in performance of Kigali-Gatuna road rehabilitation project and the high t-statistic value (3.370) indicates the confidence level of 95% the effect is statistically significant.

7.2 Recommendations

After analysis and interpretation of data, the researcher came up with the following recommendations To Whom It May Concern especially to project owners, managers and other key stakeholders:

- 1) The project owners and managers should adopt the effective risk avoidance strategies by listing the possible risks that are likely to occur during the project implementation process and think in advance the strategies to eliminate their occurrence in order to ensure the timely, cost and quality compliance of the projects.
- 2) The project owners and managers should transfers the dangerous risks to the institutions that have experience in handling the risks in order to mitigate their negative effects during the course of project implementation. This leads to the timely, cost and quality compliance of the projects' activities and in turns ensures project performance.
- 3) The project managers and team should be aware of using the standardized materials, usage of personal protective equipment and they should adopt a culture of regularly checking the machines before using them in order to control the job related accidents.

7.3 Suggestions for further research

Since the study has been limited only on Kigali-Gatuna road rehabilitation project in Rwanda; other similar studies may be done in other projects and locations to confirm or contradict the findings of this study. Since the study also focused on the construction industry as the one that is likely

to face more risks during its implementation, the researcher also recommends future studies to be carried out in the projects implemented in agricultural sector so as to bring new knowledge on the different risk management strategies used in agricultural sector and their effect on agricultural project performance.

References

- [1] Abu Mousa, J. (2008). *Risk Management in Construction Projects from Contractors And Owners' Perspectives*, Master Thesis, Islamic University Of Gaza
- [2] Akintoye, A. (2007). *Risk Analysis and Management in construction*. International Journal of Project Management, 4-32.
- [3] Clark, R. (2010). *Risk Analysis in the Evaluation of Non-Aerospace projects*. International Journal of Risk Management, 18-25.
- [4] De Cieri, H. (2008). *Human resource management in Australia: Strategy people performance (3rd ed.)*. Sydney: McGrawHill Australia Pty Limited.
- [5] Mulcahy, R. (2003). *Risk Management - Tricks of the Trade for Project Managers*. USA: RMC Publications.
- [6] Nerija, (2012). *Risk Management in construction Projects*. Department of Construction and Property management. Gediminas Technical University.
- [7] Taylor, H. (2006). *Risk management and problem resolution strategies for IT projects: Prescription and Practice*. Project Management Journal, 49-63.
- [8] Tinnirello. (2005). *Best Practices in Risk Management*. USA:Auerbach: Project Management Seminar.
- [9] Wang et al,(2011). *Factors Affecting Contractors' Risk Attitudes in Construction Projects: Case Study From China*, International Journal Of Project Management 29(2): 209–219
- [10] Oztas, (2005). *Judgmental Risk Analysis Process Development in Construction Projects*, Building and Environment, 40 (9): 1244–125
- [11] Nieto-Moroteet al(2011). *A Fuzzy Approach to Construction Project Risk Assessment*. International Journal of Project Management, 29 (2): 220–231
- [12] Flanagan, R et al, (2003) *Risk management and construction*. Oxford: Blackwell Scientific Publications
- [13] Simu, K., (2006). *Risk management in small construction projects*.Department of Civil and Environmental Engineering.
- [14] Zhen Chen, (2009). *Risks assessment in Real Estate Development: an application of Analytic Network process*. School of Built environment. Liverpool, United Kingdom
- [15] Zouet al (2007). *Understanding the Key Risks in Construction Projects in China*, International Journal of Project Management, 25 (6): 601–614.