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Operational Risk Management and Project Success in Rwanda: A Case Study of Lake Victoria Water and Sanitation Project (LVWATSAN) in Nyagatare District, Rwanda

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Abstract

Lake Victoria Water and Sanitation Project (LVWATSAN) operations in Nyagatare District were particularly aimed at constructing a faecal sludge treatment plant with the ability to treat dirt water not only in Nyagatare District but also other two secondary cities namely, Nyanza, Kayonza (MINIFRA, 2015). The general objective of this study was to assess the impact of operational risk management on project success of LVWATSAN in the Nyagatare District; Specifically, the objectives of the study were to examine the impact of operational risk identification on the success of LVWATSAN project; To assess the impact of operational risk monitoring on the success of LVWATSAN project; To determine the impact of operational risk mitigation on the success of LVWATSAN project. The target population of the study was 42 respondents sourced from all the staff members undertaking project activities including project manager, engineers and operators; a census method was used where all 42-target population were considered as a sample size. The study used primary and secondary data collection methods. Primary data was collected using a survey questionnaire while secondary data was sourced from published and unpublished sources from library and peer- reviewed articles from journals of project management databases. Data was processed using statistical package for social sciences (SPSS) software. Data was analysed using descriptive statistics in frequencies, percentages, standard deviations and means. Correlation and regression analysis were used to evaluate the relationship between the independent and dependent variables. After analysing the data, findings concluded that the project lacked effective risk planning procedures due to the weaknesses in the approval and reviews of the risk management framework, had an outlined risk mitigation plan, however, the project team appeared unaware of the mitigation measures to adopt should risks present themselves. The study concluded that there is a significant relationship between operational risk management - identification, monitoring as well as mitigation and project success in terms of timely completion, cost performance and stakeholder' satisfaction. The study recommended that; the senior leadership in Lake Victoria

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Water and Sanitation project should adopt operational risk management as a methodology and knowledge field when they start implementing new project.

Keywords: *Operational risk management, project success, LVWATSAN, Rwanda*

1.0 Introduction

Lake Victoria Water and Sanitation Project (LVWATSAN) project in Nyagatare District was particularly aimed at constructing a faecal sludge treatment plant and a modern landfill with the ability to treat dirt water not only in Nyagatare District but also in neighbouring areas (MININFRA, 2015). An annual report by the Office of the Auditor General in June 2018 implied that the project had not achieved its scope and budgetary expectations. LVWATSAN had acquired trucks to be used for solid waste collection in Nyagatare, however, 32 months after the trucks were handed over to the District, and they had never been used to carry out the intended activities due to lack of proper coordination between WASAC and the districts (Office of the Auditor General, 2018).

The idle assets implied that no value for money was being derived from invested funds. Although the project was in line with the government's National Strategy for Transformation (NST1) for the construction of modern landfills in all districts and scale up the sanitation and hygiene conditions, this could not be exercised before investing in the infrastructures (MINECOFIN, 2018). A proper risk needs assessment ought to have been carried out, coupled with existence of infrastructure operation plans to limit instances of idle assets and ensuring that value for money was derived from invested funds. It is against this background that the current study investigated the impact of operational risk management on project success in Rwanda taking Lake Victoria Water and Sanitation Project (LVWATSAN) in Nyagatare District as the case study.

1.1 Objectives of the Study

The general objective was to assess the impact of operational risk management on project success in Rwanda taking Lake Victoria Water and Sanitation Project (LVWATSAN) in Nyagatare District as the case study.

The specific objectives guiding the study were:

i. To examine the impact of operational risk identification on Lake Victoria Water and Sanitation (LVWATSAN) project success.
ii. To assess the impact of operational risk monitoring on Lake Victoria Water and Sanitation (LVWATSAN) project success.
iii. To evaluate the impact of operational risk mitigation on Lake Victoria Water and Sanitation (LVWATSAN) project success.

1.2 Research Questions

The research questions guiding the study were:

i. Is there any contribution of operational risk identification on Lake Victoria Water and Sanitation (LVWATSAN) project success?
ii. Is there any contribution of operational risk monitoring on Lake Victoria Water and Sanitation (LVWATSAN) project success?
iii. Does operational risk mitigation have influence on Lake Victoria Water and Sanitation (LVWATSAN) project success?

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2.0 Literature review

The researcher demonstrated in this chapter what other researchers have said regarding the research's dependent and independent variables, project success and operational risk management, respectively. By using a conceptual framework and the gap that needs to be filled, the researcher will also determine the relationship between these factors.

2.1 Theoretical Literature

Risk Management and Operational Risk Management

Project Management Institute (PMI) (2008) defines risk as "an uncertain event or condition that, if it occurs, has a positive or negative effect on project objectives. The Association of Project Management Body of Knowledge defined the concept as "an uncertain event or condition, that, if it occurs, has a positive or negative effect on project objectives," while the Institute of Risk Management defined the concept as "The combination of a probability of an event and its consequences (Rose, 2013).

Project Success

A project can be defined as a unique set of co-ordinated activities, with definite starting and finishing points, undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters. The project is considered an overall success if the project meets the technical performance specifications and/or mission to be performed, and if there is satisfaction of stakeholders (Sina, 2020).

2.2 Empirical Literature

A study carried out by Roque and de Carvalho (2013) sought to understand the impact of project risk management and risk assessment on project success in Brazilian vendor businesses. The results demonstrated that risk assessment and planning were implemented, and that this had a considerable positive impact on project success because project staff were better able to identify hazards and act to lessen their likelihood of occurring. The study also discovered that using risk management strategies, understanding the business environment in depth, and monitoring uncertainties throughout the project had a substantial impact on project success ($P<0.05$, $r=0.002$, $b=0.413$). The results demonstrated that the impact of project risk assessment on project success were positive.

Al Mhirat and Irtemeh (2017) examined the impact of risk management on project success in the Jordanian ministry of environment projects. The study established significant positive relationships between risk management components (risk planning and definition, risk analysis, response to danger, evaluation and review of risk) in achieving project success in the dimensions of time, cost, quality, and satisfaction. Roque & Carvalho (2013) did an empirical study on understanding the impact of project risk management on project success. The findings showed that using risk management procedures significantly improved project success. They also demonstrated a beneficial effect of a risk manager's presence on project success. Practically speaking, project managers and risk managers must pay close attention to project uncertainties, employ risk management strategies, and have a thorough understanding of the business environment in order to achieve success. The outcomes showed how risk management techniques affected the success of the project. Additionally, they demonstrated how having a risk manager on board had a favorable effect on project success. Wabomba (2015) carried out a study on influence of risk management strategies on project success in Kenya. From the study's results, it was clear that risk management and project success were positively statistically correlated. Otniel (2013) carried out a study on the role and the effects of risk management in it projects success. The paper emphasized the role of risk management

and its contribution to projects success in the existing literature. The methodology applied was based on documentary study review and analysis of the concepts used by the literature. The results were that risk management was a very important component of the project management process and it is assumed implicitly to work in favor of project success. Uwajeneza and Mulyungi (2018) analysed the effect of operation risk management process on project success in Rwanda. Based on the information drawn from findings the researcher concluded that the effect of risk management process on success of project is significant. It was found out that the project could not perform without effective risk efficiency and effective risk identification process. The study further demonstrated that there is a strong relationship between the operation risk assessment and success of Ridge Foothills Integrated Environmental Management Project. The study found operation risk treatment to have a great effect on success of Ridge Foothills Integrated Environmental Management Project.

2.3 Critical Review and Gap Identification

The study by Roque and de Carvalho (2013) on the impact of project risk management, assessment of risks on project success, did not look at the components of operational risks that faced IT projects in Brazil. Wabomba (2015) study in Kenya on risk management strategies on project success the study did not address operational risk in projects. The Rwandan study of Uwajeneza and Mulyungi (2018) analyzed the effect of operation risk management process on project success in Rwanda. While the study may have linked operational risk management with project success, the analysis was based on an environmental case study, and hence would differ significantly with the current project in terms of design, goals, and scope. As a result, study was required to create a better knowledge of what effective operational risk management is in sanitation sector. Delays and cost overruns continue to be common occurrences in most projects, despite the fact that numerous volumes of literature have been written on risk management generally in other fields. With a focus on sanitation sector in Rwanda, this project intends to further knowledge in this area.

2.4 Theoretical Framework

Prospect Theory

Prospect theory is a theory has been established as a model of behavioural decision making under uncertainty (UPPARI, 2019). Decisions involve internal conflict over value trade-offs. This theory is designed to better describe, explain, and predict the choices that typical person makes in a world of uncertainty. The theory addresses how these choices are framed and evaluated in the decision-making process. Prospect theory advances the notion that utility curves differ in domains of gain from those in domains of loss. Prospect theory is designed to explain a common pattern of choice. It is descriptive and empirical in nature.

Expected Value Model

Expected Value was one of the first theories of decision-making under risk. The expected value model did not consider the fact that the value that a particular payoff held for one person was not directly related to its precise monetary worth. Expected value analysis is a special way of determining severity in risks. To do this, we must measure the probability of the risk in numbers between 0.0 and 1.0. Of course the numbers 0.0 and 1.0 themselves are not used since these would mean that the risk was either an impossibility or a certainty. If the risk is a certainty, it should be put into the project plan as a required task; if it is an impossibility, it should be ignored. The expected value is extremely useful because it gives us a value that could be spent on the risk to avoid it. If the cost of avoiding a risk is less than its expected value, we should probably spend the money to avoid it. If the cost of the corrective action to avoid a risk is greater than the expected value, the action should not be taken. The same is true with the other

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risk strategies. If the difference between the expected value of the unmitigated risk and the mitigated risk is less than the cost of the mitigation, then the mitigation should not be done (Browning, 2014).

2.5 Conceptual Framework

The study's independent variable was operational risk management whose predictors included risk identification, monitoring and mitigation, while the dependent variable was project success whose predictors included timely completion, cost performance, and stakeholder's satisfaction.

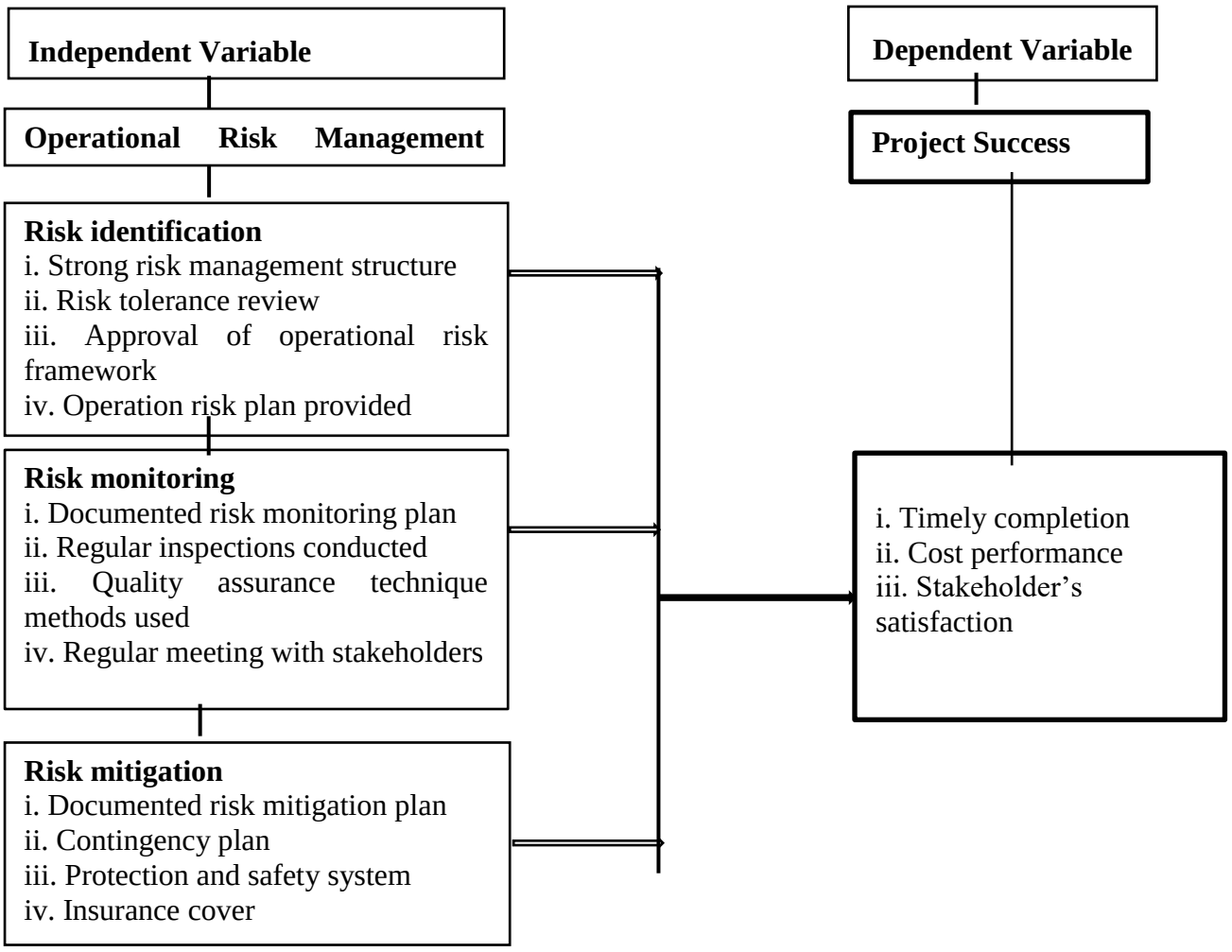

Figure 1: Conceptual Framework
Source: Researcher (2023)

3.0 Research methodology

Research Design

The research design used in the study was both descriptive and correlational. A descriptive research design involves observing and describing study subjects' behaviour without changing their behaviour or outcomes. It is intended to provide an accurate picture of the participants (Yin, 2017). The current study employed a case study-like descriptive research design to analyze the project and pertinent respondents. A correlation study design is employed to

evaluate the similarities between two occurrences under investigation (Suter, 2011). In the context of this investigation, a correlation study approach was used to assess the connection between operational risk management and project success.

Target Population

Kumar and Phrommathed (2015) defined target population as the available population made up of subjects or study components that the researcher theoretically hoped to include in the study. According to statistics provided by the project manager, LVWATSAN had 42 members of staff including management and technical personnel. Therefore, the target population of the study was 42 respondents sourced from all the staff members undertaking project activities using a census method.

Sample Size and sampling

Due to the varied nature of the target population, a survey was carried out to include every member of the population in the sample using a census method, 42 people were therefore included in the study's sample size.

The respondents were chosen through the use of purposeful sampling. In selecting the respondents, purposive sampling procedure was used as the researcher expects to gather first-hand information for the study. The strength of purposive sampling is in choosing individuals who will offer the most detailed data for in-depth analysis of the main topic under study (Mariana, 2015).

Data Collection Instruments

Survey Questionnaire

Information from the respondents was gathered via a self-administered survey questionnaire. The survey comprised two sections. The first section listed the respondents' demographics, while the second section listed responses to the objectives in a predetermined order. A survey questionnaire was chosen as the primary data gathering method since it can quickly gather data. Additionally, administering and analysing it are simple.

Procedures of Data Collection

The researcher first requested approval from Mount Kenya University to carry out the study through the provision of the data collecting authorisation letter. After that, the researcher contacted the LVWATSAN project management to enquire about getting approval to carry out the research. After obtaining consent, the researcher contacted the respondents and used the study tools.

Data Analysis Methodology

The final set of questionnaires to be analysed was reviewed for mistakes, and those detected were removed. The Statistical Packages for Social Sciences (SPSS) Version -23 Analysis program was used to code and enter the data from correctly completed questionnaires. The data were analysed using descriptive statistics, which include frequencies, percentages, standard deviations, and averages. To assess the connections between resource coordination, project execution, and their corresponding predictors, regression analysis and correlation were performed. The data were presented in tables.

4.0 Research findings

This chapter includes study findings that have been analysed from the unprocessed field data. To analyse data, descriptive statistics like frequencies, means, percentages and standard deviations and inferential statistics such as correlation and regression analysis were used.

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Table 1: Operational Risk identification and success of LVWATSAN Project

		Strong risk management structure	Risk tolerance review	Approval of operation risk framework	Public disclosure of Operation risk plan
N	Valid	42	42	42	42
	Missing	0	0	0	0
	SD	1.2%	1.1%	1.2%	1.1%
	D	2.2%	1.1%	1.2%	2.1%
	N	8.8%	7.8%	8.1%	8.6%
	A	12.2%	14.2%	14.2%	13.1%
	SA	78.4%	74.8%	75.2%	75.1%
	Mean	4.9048	4.5429	4.7857	4.6667
	Std. deviation	1.22593	.89909	.89812	1.18938

Source: Primary data (2023)

As seen in Table 1, a big number of respondents strongly agreed that operational risk identification influences the success of LVWATSAN project. 78.4% strongly agree that strong risk management structure affects the success of the project and 12.2% are agree. 8.8%are neutral, 2,2% are disagree and 1.2% are strongly disagree. For Risk tolerance review, 74.8% are strongly agree 14.2% are agree, 7.8% are neutral, 1,1% are both disagree and strongly disagree, while for approval of operational risk framework, 75.2% are for strongly agree, 14.2% are agree, 8.1% are neutral, 1.2% are both disagree and strongly disagree; finally, respondents strongly agreed that provided operation risk plan is a factor for project success at 75.1%, agreed at 13.1%, a percentage of 8.6 are neutral, 2.1% are disagree while 1.1% are strongly disagree. Based on these findings it is obvious that operational risk identification influences the project success.

Table 2: Operational Risk Monitoring and success of LVWATSAN Project

		Documented risk monitoring plan	Conduct regular inspection	Use of quality assurance techniques	Regular meeting with stakeholders
N	Valid	42	42	42	42
	Missing	0	0	0	0
	SD	-	-	-	1.1%
	D	2.2%	1.1%	1.1%	-
	N	-	2.2%	1.1%	6.3%
	A	15.1%	8.6%	16.1%	17.2%
	SA	82.8%	88.2%	81.7%	75.3%
	Mean	4.4619	4.5476	4.3095	4.2524
	Std. deviation	.70051	1.43480	.99971	1.65577

Source: Primary data (2023)

Table 2 shows the level of agreement of respondents on the impact of operational risk monitoring on project success. At 82.8% they strongly agree that Documented risk monitoring plan is a factor of operational risk monitoring on project success, agreed at 15.1%, disagree are 2.2%; for Conduct regular inspection 88.2% strongly agreed, agreed at 8.6%, neutral at 2.2%, disagree at 1.1%; respondents strongly agreed at a percentage of 81.7% that Use of quality assurance techniques is a factor of the success of LVWATSAN project, agreed at 16.1%, neutral at 1.1% and disagreed at 1.1%; the same respondents indicated their level of strong

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agreement at 75.3%, that Regular meeting with stakeholders influences the success of the project and agreed at 17.2%, neutral at 6.3% and strongly disagree on 1.1%. Based on the findings it's shown that operational risk monitoring influences the success of LVWATSAN project.

Table 3: Operational Risk Mitigation and success of LVWATSAN Project

		Documented risk mitigation plan	Use of contingency plan	Put in place protection and safety system	Insurance cover
N	Valid	42	42	42	42
	Missing	0	0	0	0
	SD	1.1%	-	1.1%	1.1%
	D	2.2%	1.1%	1.1%	-
	N	4.2%	1.1%	-	2.1%
	A	18.1%	15.6%	18.1%	17.2%
	SA	75.2%	82.2%	79.7%	80.3%
	Mean	4.1190	4.9521	4.6667	4.7381
	Std. deviation	.96783	.84995	1.26234	1.12747

Source: Primary Data (2023)

According to Table 3, respondents strongly agree that documented risk mitigation plan is a factor for the success of LVWATSAN project at a percentage of 75.2%, agreed at 18.1%, neutral at 4.2%, disagree at and strongly disagree at1.1%. For Use of contingency plan 82.2% are strongly agree, 15.6% are agree, 1.1% are neutral and 1.1% strongly disagree. While Put in place protection and safety system, respondents strongly agreed on a percentage of 79.7%, agreed on 18.1%, disagreed on 1.1% and strongly disagreed on 1.1%; finally, for Insurance cover, 80.3% strongly agreed, 17.2% agreed, 2.1% neutral, 1.1% strongly disagreed. The findings show that operational risk mitigation have an influence on the success of LVWATSAN project.

Table 4: Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.872	.640		3.725	.001
	Identifying	.150	.138	.270	1.087	.028
	Monitoring	.288	.139	.318	2.077	.045
	Mitigation	.347	.101	.218	1.117	.021

a. Dependent Variable: Scope

Source: primary data (2023)

The following was the regression model that was created using Table 4:

$Y= .872+ 0.270X_1 + 0.318X_2 + 0.218X_3 + e$, where Y is project success; X_1 is operational project risk identification; X_2 is operational risk monitoring; X_3 is operational risk mitigation. This means that operational risk identification contributes 15% to the success of the project, while operational risk monitoring contributes 28.8%, while operational risk mitigation contributes 34.7%.

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Table 5: Correlation Analysis

		Identification	Monitoring	Mitigation	Timely completion	Cost Performance	Stakeholder Satisfaction
Identification	Pearson Correlation	1	.214	.231	.242*	.987**	.152*
	Sig. (2-tailed)		.173	.142	.012	.003	.033
	N	42	42	42	42	42	42
Monitoring	Pearson Correlation	.214	1	.133	.357*	.458**	.477*
	Sig. (2-tailed)	.173		.402	.020	.002	.026
	N	42	42	42	42	42	42
Mitigation	Pearson Correlation	.231	.133	1	.531**	.429**	.287*
	Sig. (2-tailed)	.142	.402		.001	.000	.016
	N	42	42	42	42	42	42
Timely completion	Pearson Correlation	.242*	.357*	.531**	1	.309*	.184
	Sig. (2-tailed)	.012	.020	.001		.047	.243
	N	42	42	42	42	42	42
Cost performance	Pearson Correlation	.987**	.458**	.429**	.309*	1	.208*
	Sig. (2-tailed)	.000	.002	.000	.047		.017
	N	42	42	42	42	42	42
Stakeholder Satisfaction	Pearson Correlation	.152*	.477**	.287*	.184	.208*	1
	Sig. (2-tailed)	.033*	.026	.016	.243	.017	
	N	42	42	42	42	42	42

* correlation is significant at the 0.05 level (2-tailed),
** correlation is significant at the 0.01 level (2-tailed)

Source: Primary Data (2023)

There were positive correlations between operational risk management and all the predictors of project success – timely completion (*r* .531**, p .001), cost performance (*r.* 429**, p .000), and stakeholder satisfaction (*r.* 287*, p .016). All the correlations were statistically significant given that the p value was < 0.05 and < 0.01. The implication was that effective operational risk identification, monitoring and mitigation would lead to the achievement of project objectives.

The above findings were consistent with those of Roque and de Carvalho (2013) in Brazil who found out that making use of the risk management strategies and deeply understanding the business environment were critical success factors had a significant impact on project success (P<0.05, r=0.002, b=0.413) and Al Mhirat and Irtemeh (2017) who established significant

positive relationships between risk management components (risk planning and definition, risk analysis, response to danger, evaluation and review of risk) in achieving project success in the dimensions of time, cost, quality, and satisfaction in Jordanian ministry of environment projects. The findings were also in agreement Wabomba (2015) who statistically significant positive relationship between risk management and success of projects in Kenya, and Roque and Carvalho (2013) who indicated that adopting risk management practices had a significant positive impact on project success.

5.0 Conclusion

As indicated by the findings of the study, operational risk identification, operational risk monitoring as well as operational risk mitigation can influence the success of Lake Victoria Water and Sanitation project in terms of the project's timely completion, cost effectiveness, and stakeholder satisfaction. It was found by the researcher that operational risk identification contributes significantly to the success of Lake Victoria Water and Sanitation project, however it was found that it is not given high importance, the project lacked efficient risk planning practices because of flaws in the approval process and reviews of the risk management framework, which possibly hindered activities and decisions taken during risk identification process.

The researcher discovered that operational risk monitoring is key factor to the success of Lake Victoria Water and Sanitation project, nevertheless the findings realised significant deficiencies challenges by mild monitoring mechanisms, not enough regular inspections, as well as no regular communication with both internal and external stakeholders. In regards to operational risk mitigation the findings found out that it has a great influence to the success of Lake Victoria Water and Sanitation project, although the project has an outlined risk mitigation plan, the project team appeared unaware of the mitigation measures to adopt when risks present themselves, as well as the insurance cover is still a problem for the project for the Insurance brokers are not familiar with sanitation sector. The study concluded that there was a significant positive relationship between operational risk identification, monitoring as well as mitigation on Lake Victoria Water and Sanitation project success in terms of timely completion, cost performance and stakeholder' satisfaction.

6.0 Recommendations

Based on the findings, recommendations were suggested. The senior leadership in the Lake Victoria Water and Sanitation project should incorporate operational risk management into their project implementation process as a methodology and subject of study. Lake Victoria Water and Sanitation project managers should keep abreast of developments in the field of risk management in general and water and treatment projects in particular, they should furthermore develop a clear and specific guide to addressing the risks to water and sanitation projects that will be a reference for project personnel to address when risk exposure is in accordance with best practices as well as activate communication and engagement channels for all stakeholders especially on activities related to retention policies to ensure exchange of data and information between the Ministry of infrastructures and stakeholders. The Government of Rwanda through the respective ministries needs to set criteria for the success of Lake Victoria Water and Sanitation projects as well as other water and sanitation projects on the standard of commitment to time, cost and satisfaction of stakeholders.

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