Journal of Entrepreneurship & Project Management

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ISSN: 2616-8464

Stratford Peer Reviewed Journals and Book Publishing
Journal of Entrepreneurship & Project Management
Volume 8||Issue 2||Page 58-65 ||February||2024|
Email: info@stratfordjournals.org ISSN: 2616-8464

Project Management Process and Performance of Feeder Roads Construction Projects in Rwanda

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How to cite this article: **Harerimana, C. & Wabala, S. (2024). Project Management Process and Performance of Feeder Roads Construction Projects in Rwanda.** ***Journal of Entrepreneurship & Project Management,*** **8(2), 58-65. https://doi.org/10.53819/81018102t4248**

Abstract

This research examined the influence of project management process on performance of feeder roads construction projects in Rwanda. Feeder roads construction projects experience challenges that hamper them from being effectively completed within the allocated budget, timelines and to the desired quality. This study specifically investigated how project initiation, project planning, project implementation and project monitoring and control influence the performance of feeder roads construction projects. The study was conducted in all the 10 Districts feeder roads construction projects in Rwanda. These feeder roads projects are at various stages of completion. The number of selected respondents was 84 respondents from all 84 employees and cencus was used from which 77 responses were received. The study used descriptive research designs and applying questionnaire in collection of data. Through quantitative analysis, the study found out that project initiation, project planning, project execution and project monitoring and control have a significant relationship with feeder roads projects performance. Moreover, it was established out at which extent those project management process phases are being arranged in the feeder road projects under study. The study employed multiple linear regression model for data analysis and it concluded that project management process phases influenced the performance of feeder roads construction projects. The R-squared (R2) equals to 0.880 (or 88.8%) and adjusted R-squared equals to 0.873 (or 87.3%); the results show the goodness of fit of the estimated model. Up to 88.8% of long-run appreciation in performance is influenced by changes in project initiation process; project planning process; project implementation process and project monitoring & control process as implemented by FRCP. The other remaining 11.2% can be explained by other factors not examined in this study. The results of ANOVA as p-value is less than 5%, this specifies that the performance of FRCP was significantly driven by at least one independent variable under this study. Therefore, the calculated F-value equals to 131.960 and this is greater than critical F-Value which is 2.499. Consequently, the general regression model is significant. Overall conclusions and recommendations were shaped in order to help project managers, organizations, and future researchers.

Keywords: *Project Management Process, Construction Project, Project Performance, Feeder Roads Construction Projects Rwanda.*

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1.0 Introduction

Project performance is mostly based on three main basics which would be, cost, time, and scope (Hutton & Bartram, 2014). This is because through those foundations project management can be established thoroughly; however there is a lack of realization of this by organizations when a project is being proposed (Kwak, 2012): this, in turn, leads to delays, imperfection, incoordination, over budgeting, poor stakeholder expectations, an extension of time as well as poor project identification (Dvir *et al.*, 2013). That is why for any successful project performance there must be great project management that has been carefully vetted by the project manager, investors as well other stakeholders.

This is why project management is important to follow through all the five phases when creating a project which is: the initiation phase, planning phase, implementation phase, monitoring and control phase, and lastly closing phase. As all these phases make up project management and if done correctly they are key instruments to good project performances.

While in some cases where these phases are not well focused on or prepared for which can lead to complications. This can be seen in the case of the Feeder Roads Construction project that was launched in March 2014 and expected to be complete by December 2022, however to unfortunate events and out of the 720 km of road that were to be completed, only 307.3 km is completely making it 42.68% rate of completion, which will force an extension for the time completion to another considerable time. While we look at the budget that was proposed, in the beginning, the project was invested with grants from the World Bank of $45,000,000 and MDTF of $ 68,000,000 and an additional $20,000,000 from GoR as counterpart at a total of $133,000,000, however, at the current time, the project used only around $51,039,337 from the loan and grant of $113,000,000 making the disbursement rate of 24.94% while from GoR counterpart out of the $20,000,000 the remaining is $16,042,863 with a disbursement rate of 19.79% which may force the extension of current financing agreement closure date of 31st December 2022 (RFRDP OAG Audit report 2021).

This has made the Feeder Roads Construction Project management suspect that funds may be withdrawn as well as roads that are still not complete to be abounded or rushed which would lead to stakeholders' dissatisfaction leading to poor project performances. This can be for several reasons but the research will look to prove if the project management process used on this project is correlated to project performances and provide a reasonable conclusion and recommendation for feeder road projects' success with other future road construction projects.

1.1 Research Objective

i. To investigate the effect of project initiation on the performance of Feeder Roads Construction Projects in Rwanda.
ii. To assess the contribution of project planning on the performance of Feeder Roads Construction Projects in Rwanda.
iii. To measure the influence of project implementation on the performance of Feeder Roads Construction Projects in Rwanda.
iv. To evaluate the effect of project monitoring and control on the performance of Feeder Roads Construction Projects in Rwanda.

https://doi.org/10.53819/81018102t4248

1.2 Research Hypotheses

$H_0$1: Project initiation does not have a significant relationship with the performance of Feeder Roads Construction Projects.

$H_0$2: Project planning does not have a significant relationship with the performance of Feeder Roads Construction Projects.

$H_0$3: Project implementation does not have a significant relationship with the performance of Feeder Roads Construction Projects.

$H_0$4: Project Monitoring and Control does not have a significant relationship with the performance of Feeder Roads Construction Projects.

2.1 Literature Review

2.1.1 Effect of project initiation on roads construction projects performance

In a research by Kerzner, (2009) shows that there is a coloration between project performances and project initiation, stating that for a project to be successful that identification of the stakeholder and scope of the project all has to go into account so that the project manager has the ability to come up with a project objective that will satisfy the identity of the project. While other studies such as Müller and Turner (2007) points out that during project initiation phase many project managers do not take into account aspects such as stakeholders interaction or communication aspects so when they are creating the project there are clashes of ideology as well as breakdown in execution. Although many top it off as failure in project planning it can actually be traced back to the project initiation phase (Cooke-Davies and Teague, 2007). This goes out to show that in a research about a project it is key to recognize the crucial aspects of project initiation as it allows project managers to come up with a realistic approach of the project as Feeder Road Construction project in Rwanda shows.

2.1.2 Effect of project planning on roads construction project performance

Patanakul *et al*., (2016) points out that any government sanction as well as work on project need a lot of coordination, and planning in order to satisfy the projects objective as well as increase stakeholders' satisfaction. This can also be seen as that the project planning stages is crucial to a project success rate. While in Sevilay and Ozorhon (2013) research that they conducted on Turkish construction industry they saw that there was coloration between project planning and project performances as they pointed out that in the data they collected they saw that project planning process was integral to the success of project performances as they argued that it helped set up the stage for executing the project and bringing the investors vision into a stakeholders reality (Patanakul *et al*., 2016). This research shows that there is a strong connection between project planning and project performances as it will show in the case of Feeder Road Construction projects outline in reasons of the project delays.

2.1.3 Effect of project implementation on roads construction project performance

According to a study done by Silva et al., (2017) shows that during a project implementation phase of a project especially a government-based project tends to create a bulk in the original timeframe as well as budget. They pointed out that due to many factors being inserted during this phase such as human work power, technology, contracts and environmental aspects this can all lead to delays. With Thomas (2012), going a step further and pointing out that this step is important and in the stage that has to be carefully supervised by the project manager in order to provide successful project performances.

This comes to show that in this research that there is a strong bond between project implementation and project performances as in this stage that is when the actually work to manually work on begins as well as it is the stage where a lot of the problems, challenges and difficulties occur.

2.1.4 Effect of project monitoring and control on roads construction project performance

In Phiri (2015), study on the monitoring and control phase of project management he shows that there is a slight link between project management and project performances as the study shows that during this phase a project manager is able to effectively correct and adapt the project to accommodate risks as long as the project manager has enough information partaking the project development. This goes out to show that no matter the steps that the project manager takes there will always be risks and that in the project manager is able to work around it then there is a good chance that the project being successful. Ngatia (2016) agrees with the findings as he point out further in his research that constructions of projects governmental taken on usually has a lot of moving parts and are at a large scale, so it requires for project managers to always be well informed about the progression of the project so that the project manager can make asserted interjections to help fight any challenge that the project may come across (Nasser *et al*., (2017).

With Feeder Road Construction project being a governmental base project, it was expected to come across different challenges but however due to the rate of competition of the project as well as the need for time extension and increase in invest it can be assumed that in the monitoring and control phase there must be a problem.

According to the different World Bank and RTDA reports and other books (papers & journals) written by other scholars (and or authors), those were read by current researcher; he found that there are only few studies done on project management process and their factors, and they presented mixed results. Their research findings show that the project management process contents towards the project performance of FRCP are often described in too many details. The criteria for project management process and exercises are essential for ensuring that the needed inputs will meet the requirements and needs for insuring effective project performance. Considering that most of ongoing feeder roads projects employed Design, Build and Maintenance (DBM) approach through Output-and Performance-Based Road Contracts (OPRC), it is from that biased gap where current researcher was motivated to do research on: "The effects of project management process and performance of feeder roads construction projects in Rwanda; during the period from 2014 up to 2022". Therefore, researcher fulfilled this gap by assessing the influence of project initiation process; project planning process; project implementation process and project monitoring & control process, towards performance of roads construction projects in Rwanda, specifically by taking reference of Feeder Roads.

3.0 Research methodology

This research design of this study is primarily descriptive, focusing on assessing the impact of project management processes on the performance of Feeder Roads Construction Projects in Rwanda. While the main focus is quantitative, qualitative approaches were also utilized to gain deeper insights into the results. The target population comprises individuals involved in completed and ongoing feeder roads projects across ten districts in Rwanda, including staff from district project management teams, Rwanda Transport Development Agency, contractors, and supervising companies. The total population consists of 84 individuals across various roles.

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Sampling techniques employed in this research are non-probability purposive sampling due to the limited number of individuals possessing the desired traits for the study. Given the population size of less than 100, a census approach was deemed suitable, resulting in a sample size equal to the population. Data collection methods include questionnaires and document analysis.

Primary data were collected through questionnaires, while secondary data were obtained from academic journals, magazines, and electronic databases. Data processing involved editing, ensuring the accuracy and completeness of collected data, and coding responses for analysis.

Data analysis was conducted using descriptive analysis and regression analysis with the help of Statistical Packages for Social Sciences (SPSS). Descriptive analysis included percentages, frequencies, means, and standard deviations, while regression analysis examined the relationship between independent variables (project management processes) and the dependent variable (Feeder Roads Construction Performance).

4.0 Findings and Discussion

This section presents the analysis of findings related to research objectives by assessing the factors of that influence project initiation; project planning; project implementation and project monitoring & control towards performance of Feeder Roads Construction Projects in Rwanda; the questions deal with the perceptions of the surveyed respondents on the designed questions; hence the results (findings) are documented in the following tables:

Table 1: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.938[a]	.880	.873	.13844

a. Predictors: (Constant), Project initiation process, Project Planning Process, Project Implementation Process, Project Monitoring and Control Process.

R-squared (R^2) equals to 0.880 (or 88.8%) and adjusted R-squared equals to 0.873 (or 87.3%); the results show the goodness of fit of the estimated model. Up to 88.8% of long-run appreciation in performance is influenced by changes in project initiation process; project planning process; project implementation process and project monitoring & control process as implemented by FRCP. The other remaining 11.2% can be explained by other factors not examined in this study.

Table 2: ANOVA table results

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.117	4	2.529	131.960	.000[a]
	Residual	1.380	72	.019		
	Total	11.497	76			

a. Predictors: (Constant), Project Monitoring and Control Process, Project Initiation Process, Project Implementation Process, Project Planning Process

b. Dependent Variable: Project Performance
Critical F-Value= 2.499

Source: Researcher; Primary Data, SPSS, October 2022

https://doi.org/10.53819/81018102t4248

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The analysis reveals that the regression model, as a whole, is statistically significant (F = 131.960 which is greater than critical F-Value which is 2.499, $p < 0.05$), indicating that at least one of the predictor variables has a significant impact on the dependent variable, which is the performance of roads construction projects in Rwanda. The model explains a significant proportion of the variance in project performance, as indicated by the regression sum of squares (10.117) relative to the residual sum of squares (1.380). In essence, the combination of these predictor variables, taken together, has a statistically significant influence on the performance of roads construction projects in Rwanda.

Table 3: Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	-.016	.150		-.107	.915
	Project initiation process	.209	.033	.315	6.281	.000
	Project Planning process	.240	.029	.405	8.155	.000
	Project Implementation process	.263	.032	.352	8.129	.000
	Project Monitoring and Control process	.279	.038	.315	7.446	.000

a. Dependent Variable: Project Performance

Source: Researcher; Primary Data, SPSS, October 2022

Based on the model coefficient result the model becomes:

$PFRCP = -0.016+0.209PIP+0.240PPP+0.263PIP+0.279PMCP+\varepsilon_t$;

Project initiation process, Project Planning process, Project Implementation process and Project Monitoring and Control process are identified as having the most substantial positive influence on project performance, supported by their positive unstandardized coefficients (B = 0.209, B=0.240, B=0.263 and B=0.279, respectively).

Considering other variables stay constant, the independents variables have following influences on dependent variable, as well as:

The change of one unit of project initiation process leads to 20.9% change in performance of FRCP. Which indicate the effect of project initiation on the performance of the Feeder Road Construction Project in Rwanda is measured to 20.9%. The change of one unit of project planning process leads to 24% change in performance of FRCP.

Which demonstrate the contribution of project planning to the performance of the Feeder Roads Construction Project in Rwanda is reaching 24%. The change of one unit of project implementation process leads to 26.3% change in performance of FRCP. This highlights that the influence of project implementation on the performance of the Feeder Roads Construction Project in Rwanda is 26.3%.

The change of one unit of project monitoring and control process leads to 27.9% change in performance of FRCP. This prove that the effect of project monitoring and control on the performance of the Feeder Roads Construction Project in Rwanda is 27.9%.

From the findings, while holding other factors constant, an increase in project initiation process; project planning process; project implementation process and project monitoring &

control process causes an improvement in performance of FRCP and considering that the p-values are less than 0.05, thus there is significant determinant of performance of which means that the study findings conclude that good performance of FRCP score is directly related to effective independent variables.

5.0 Conclusion

The study determines that feeder roads construction projects performance is impressively directed by project initiation. This means that if project initiation step is well passed, the chance of achieving an effective project performance upgrade. Throughout the initiation phase, project feasibility study, stakeholders' identification, scope definition, project deliverables should be in place in order to have a project strong and self-explanatory charter which would be a basis of project approval by the funders and other stakeholders involved in order to have their expectations and feedback well put into the project design.

The study concluded that feeder roads project performance was influenced by project planning which is the second step after project initiation, the project planning dealt with plans related to human resource, financial/cost, risks, quality/standards, communication and procurement through development of related tools such as work plans and Gantt charts that facilitate proper planning that are used in projects and those lead to project long short and long term objectives or goals by reducing any uncertain that may hinder all their achievement.

The study resulted that project implementation has significant impact on feeder roads construction projects. For better and proper achievement of feeder roads construction project performance, suitable work breakdown structure has to be in place and resources are to be used appropriately with scope, change documentation and performance management.

On the other hand, for project monitoring and control, the study revealed that the performance of feeder roads construction projects is influenced considerably by project monitoring and control. Therefore, enhanced performance, is explained by the proper use of progress and performance indicators by measuring project activities against plan and baselines and determine variance deviation threshold. After that, corrective actions and necessary improvement are to be done timely.

6.0 Recommendations

The implementation of a durable project management process leading to project performance in FRCP can be enhanced by fostering continuous collaboration among employees and partners. This includes facilitating knowledge sharing, improving feasibility studies, ensuring comprehensive risk mitigation measures, fostering a culture of learning from mistakes, assessing financial implications, and conducting targeted awareness programs to enhance partners' understanding of project management processes. Such efforts can optimize project outcomes and contribute to sustained success.

Acknowledgement

I extend heartfelt gratitude to Almighty God for His unwavering guidance and support throughout this dissertation journey. Special thanks to Dr. WABALA Samuel and my teachers for their invaluable mentorship, and to my classmates for their encouragement. I'm indebted to Rwanda Transport Development Agency (RTDA) for providing necessary data. Deep appreciation to my family, especially my children and wife, for their understanding and support, as well as to friends and relatives who contributed to this achievement.

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