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CLOUD BASED MANAGEMENT PRACTICES AND PERFORMANCE OF INFORMATION TECHNOLOGY PROJECTS IN RWANDA, A CASE STUDY OF THE RWANDA DIGITAL ACCELERATION PROJECT

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ABSTRACT

The main objective of this study was to assess the cloud base management practices and the performance of IT projects in Rwanda. The study was carried out on the Rwanda Digital acceleration project Phase I (RDAP I) of RISA as case study. The findings were to add to the literature on the cloud based management practices and how the process affects performance within IT projects in Rwanda. This study followed the following objectives: To evaluate the effect of the cloud based project planning (scope plan and resource plan) on the performance of RDAP I, to determine the effect of cloud based project collaboration (communication and coordination) on the performance of RDAP I, and analyze the effect of cloud based project monitoring (Analysis and reporting) on the performance of RDAP I. Descriptive research design was used within this study, and the study population comprised both 57 employees of RDAP I, and 132 contractors involved in the implementation of the project. Using stratified sampling technique and slovin's formula the sample size of 128 respondents was established. The researcher used primary and secondary data in this study. A closed end questionnaire was utilized. Descriptive research design and correlation analysis were utilized to assess the data and results generalized for the entire population, while multiple regression was used to test hypothesesThe regression model 1 revealed that Cloud based Project planning (measured by Scope plan and resource plan) contributed to 78.9% on performance in RDAP I. The calculated F statistic of 6.351 and the calculated p-value of =.030 was less than the Critical p-value of =.05 level of significance, making the entire model significant. Therefore, this implies that the variables: Scope plan and resource plan had significant effect to the variation of performance. The results indicate that scope plan ($\beta 1 = .219$; $t = .750$, p-value=0.035<0.05), and resource plan ($\beta 2 = .682$; $t = 1.732$, p-value=0.014 <0.05) have positive and significant effect on performance of RDAP I. This shows that 1 percent increase in scope plan and resource plan will lead to 0.219% and 0.682% increase in performance of RDAP I. Findings

revealed also that cloud based collaboration has moderate positive correlation (0.572 and P value =0.00) with performance of RADP. Regression model 2 revealed that Cloud based Project collaboration (measured by communication and coordination) contributes to 88.2% on performance in RDAP I. The F statistic of 11.727 and the calculated p-value of =0.034 is lower than the key p-value of =0.05 level of significance implying that the variables: communication and coordination jointly had significant effect to the variation of performance in RDAP I. The results in Table 4.14 indicated that communication (β1= 0.497, t=1.500, p-value=0.031<0.05) has positive and significant effect on performance of RDAP I, while coordination (β2= 1.267, t= 2.798, p-value=0.028<0.05) has positive and significant effect on performance of RDAP I. This shows that 1 per cent increase in communication will lead to 0.497% increase on performance of RDAP I, while 1 per cent increase in coordination will lead to 0.267% increase on performance of RDAP I. Results of correlation analysis showed that cloud based Monitoring has moderate positive correlation (0.568 and P value =0.00) with performance of RDAP I. The findings of the multiple regression analysis showed that cloud based project monitoring (measured Analysis and reporting) contributes to 72.8% on performance. Findings in Table 4.16, indicate that F statistic of 4.831 and the p-value of 0.012 is less than the critical p-value of 0.05. The results in Table 4.17 indicate that Analysis (β1= 0.642, t=1.500, p-value=0.001<0.05) and Reporting (β2= 0.164, t=0.280, p-value=0.029<0.05) have positive and significant effect on performance of RDAP I. This shows that 1 per cent increase in analysis and reporting will lead respectively to 0.642% and 0.164% increase on performance of RDAP I in Rwanda.

Keywords: Cloud base management practices, performance of IT projects.

1.0 Background of the study

In every industry, the use of information and communications technology (ICT) is a crucial topic (Alharbi, 2012). In the sphere of project management, the same is true. ICT is a general phrase that refers to several technologies. ICT comes in many different forms today, including cloud computing. Numerous research and surveys have been conducted on cloud computing. Xie and Zhao (2013) have examined potential risk factors. Furht and Escalante (2010) go over cloud computing fundamentals for every industry. A new approach to provide information technology (IT) services is represented by cloud computing. It provides projects, application platforms, and software as a service over the Internet (cloud) (Furht & Escalante, 2010).

When applications are delivered on the cloud, the project manager's responsibilities remain largely same. It is not necessary for the project manager to be an expert in the specific technologies used for development and test environments because their primary responsibility is to keep the project on track and offer progress updates. However, learning the fundamentals is still advised (Aguilera, Villalobos, & Dávila, 2018). For instance, in this scenario, it is advantageous for the project manager to become familiar with cloud computing jargon. Additionally, it is vital to comprehend how the cloud is used (Bachleda & Ouaaziz, 2017).

Słoniec (2015) outlines applications for cloud computing in testing procedures. The author warns project managers to make sure cloud providers take action to solve these high-vulnerability areas, noting that performance, security, disaster recovery, and management issues can arise. The project manager must be aware of each potential risk area and determine who is in charge of carrying out the necessary performance, security, and disaster recovery testing.

The need to adopt new technologies is driven by the growing pressure on projects to produce quicker and more cost-effectively as a result of increased global competitiveness. These advancements most certainly have an impact on the type of projects as well as how they are designed, managed, and carried out (Sloniec, 2015). To improve efficiency and the likelihood of project success, cloud-based management can be used to handle data needed for project planning and performance monitoring (Timonen & Vuori, 2018).

By improving communication with the aid of project management information systems and enabling decision-making based on visibility of correct project performance data, cloud-based

management solutions, according to Sether (2016), can boost project performance (PMIS). In light of this, Lai and Zainal (2014) stated that software can make project management easier by automating and/or simplification some project tasks. According to Topor (2018), contemporary PMIS software enables project managers (PMs) to spend less time on repetitive rule-based tasks and more time on higher order functions like innovation, creativity, stakeholder relationships, and strategy.

According to a recent study into PM software user trends by the Mc Kinsey cabinet (2019), cloud-based project management (PM) software has grown in popularity recently. It is now the preferred deployment technique, with 60% of businesses utilizing cloud-based PM tools in 2019, up from 46% in 2015.

The popularity of cloud-based solutions is increasing for a variety of reasons, but one of the most significant is that it coincides with the growth of flexible work arrangements (FWAs) (Mandiak, Mesáro, & Kozlovská, 2016). In addition to serving as a centralized workspace for teams, cloud-based project management applications give users access to information and updates in real-time across all platforms (Topor, 2018). Organizations are investing in these solutions as telecommuting becomes the new standard because they foster collaboration between coworkers and remote workers equally and promote transparency for all stakeholders (Sether, 2016).

The ease of integration they provide with other corporate software is a major factor in the growth of cloud-based project management applications (Brinda & Heric, 2017). This is crucial since organizations are spending more money on a number of specialized tools rather than a single all-encompassing system to suit the demands of teams and/or departments. A help desk staff, for instance, might use one tool for task management, another for chat, and a third for ticketing; nonetheless, they require smooth data transfer between all three platforms. Thus, the need of assessing the cloud-based project management technologies and the performance of IT projects in the Rwandan context.

1.1 The Problem Statement

Timely completion of government projects is crucial to saving costs, and to timely avail key services to citizens aimed at improving their living conditions as enshrined in the National Strategy for Transformation (NST1). However, the Office of the Auditor General (OAG, 2022) reported 37 cases of delayed contracts worth Frw 201,017,126,883 in 28 public entities and projects. This comprise of 25 delayed contracts worth Frw 89,940,329,515 identified during the year 2021 under audit, and 12 contracts worth 111,076,797,368 from previous audits. Delays were up to 6 years.

In IT related project, the report of the Auditor General (2022), noted cases of unlawful and wasteful expenditure, noncompliance with public financial management laws and regulations as indicated in unsupported expenditure, partially unsupported expenditure, and funds fraudulently utilized within IT projects in Public Institutions. For example while auditing the Building Permit Management Information System (BPMIS), the audit noted delays ranging from 61 to 1,581 days in issuance of 908 building permits. The audit also noted that 134 invoices which were overbilled by Frw 6,180,000; for example, an applicant paid application fees of Frw 920,000 instead of Frw 60,000. This was due to weak system control that allows invoicing any amount above prescribed thresholds. The audit noted that the system lacks input control for validating building permit validity period. The validity period can be set above five years provided by Ministerial Order. As a result, on a sample basis, 60 building permits were issued with validity period ranging between 6 and 3,336 years.

In Brazil, Correia and Martens (2022) revealed that managing IT projects are challenging due to concerns related to security and privacy of data, 24/7 development model, and coordination complexities because of language, terminology, and cultural differences between geographically distributed teams. In South Africa, Besouw and Bond-Barnard (2020) found that IT project requires organizations to adjust their management processes due to different service and

deployment models in order to attain effective performance. Mwangi (2021) in Kenya, stated that IT projects can cut expenses further by increasing utilization, lowering projects and administration costs, and hastening deployment cycles with the help of the cloud. According to Bizimana, Hitiyaremye, Musoni, Nsabimana, Mupenzi, Mukarugira, and Ishimwe (2020), projects in Rwanda are getting more technical and under more pressure to be finished faster and cheaper because of increased stakeholder expectations and competition. According to the authors, the fact that digital organizations typically manage numerous projects at once makes it harder for them to effectively monitor and manage them, which lowers their performance, thus Cloud management may be the solution to that issue (Bizimana, et al., 2020). However, little empirical insight is available about the cloud based management practices through which IT projects can be successful. A better understanding of the success factors associated with IT project management can be helpful to practitioners for carrying out project management activities in the Rwandan context.

Thus, the problem statement of this study lies in assessing at which extend cloud based project management practices may contribute to the performance of IT projects in Rwanda, by taking evidence of the Rwanda Digital acceleration project Phase I (RDAP I), which is implemented by the Rwanda Information Society Authority (RISA).

1.2 Objectives of Study

1.3.1. General Objective

The main objective of this study is to assess the cloud based project management practices and the performance of information technology (IT) projects in Rwanda, specifically in the Rwanda Digital acceleration project Phase I (RDAP I).

1.2.2. Specific Objectives

i. To evaluate the effect of the project planning (scope plan and resource plan) on the performance of the Rwanda Digital Acceleration Program Phase I.
ii. To determine the effect of project collaboration (communication and coordination) on the performance of the Rwanda Digital Acceleration Program Phase I.
iii. To analyze the effect of project monitoring (Analysis and reporting) on the performance of the Rwanda Digital Acceleration Program Phase I.

2.1 Theoretical Framework

2.1 Theoretical Framework

The main theory underlying this study are the Technology acceptance Model (TAM) and stakeholders' theory. This theory was reviewed within the following section.

2.1.1 The Lean Construction Theory

The basis of the Technology acceptance model (TAM) is the social-psychological model Theory of Reasoned Action (TRA) by Ajzen and Fishbein from 1980. The TAM was developed by Davis in 1989 and represents a central approach to acceptance research. Further, it forms the basis for many subsequent technology acceptance models (Devasena, 2014).

TAM was originally developed and used to model the user acceptance of information technologies (Davis, Bagozzi, & Warshaw, 1989, p. 985). The model assumes that two characteristics are critical to users' technology acceptance: Perceived Ease of Use and Perceived Usefulness. Davis defines the two dimensions as follows (Davis, 1989, p. 320): Perceived Ease of Use (PEOU): „The degree to which a person believes that using a particular system would be free of effort. “

Perceived Usefulness (PU): „The degree to which a person believes that using a particular system would enhance his or her job performance. “ Both dimensions have a direct impact on an individual's attitude towards the use of a system and they are determined by external variables, such as demographic factors and personality traits. This theory proposes that PEOU and PU impact the attitude toward using the IT, and PU also has a straight effect on behavioral purpose. However, PEOU has an effect on PU. The attitude in turn has a direct influence on the behavioral Intention to Use, which in turn affects the actual system use. The development of the model is intended to provide a generalized form by which end-use behaviour can be explained for various computer technologies (Devasena, 2014).

2.1.2 The Stakeholder Theory

The stakeholder theory was coined by Freeman (1984) as a management instrument and has over the years evolved with high explanatory potential on firm performance. Stakeholder theory focuses explicitly on equilibrium of stakeholder interests as the main determinant of corporate policy. The most promising contribution to risk management is the extension of implicit contracts theory from employment to other contracts, including sales and financing (Cornell and Shapiro, 1987). In certain industries, particularly high-tech and services, consumer trust in the company being able to continue offering its services in the future can substantially contribute to company value.

However, the value of these implicit claims is highly sensitive to expected costs of financial distress and bankruptcy. Since cloud based softwares lead to a decrease in these expected costs, company value rises (Klimczak, 2005). Therefore, stakeholder theory provides a new insight into

possible rationale for project management. The theory is appropriate for the study since there is need to involve the interrelationship of project management team in both short and long run profitability estimation and this will ultimately increases the project performance levels in an organization and minimize the level of poor performance in Rwandan IT project.

2.2 Empirical Review

2.2.1. Effect of the cloud-based project planning on the project performance

Based on the experiences of active project managers, Bajwa and Deichmann (2019) investigated which variables influence the acceptance of cloud-based project management tools by project managers and management personnel in Sweden. A research model based on the Technology Acceptance Model (TAM) 2 was applied. To analyse the data, a Cronbach alpha analysis and a regression analysis were performed by using the software Superior Performing Software System (SPSS). The research identified the variables Subjective Norm, Output Quality and Result Demonstrability as the most important, with a significant impact on Perceived Usefulness. The Perceived Usefulness, together with the Perceived Ease of Use, influences the Intention to Use and thereby the acceptance of cloud-based project management tools by project managers and management personnel. In summary, it can be stated that cloud-based project management tool providers, who intend to implement cloud-based project management tools, should in particular focus on the Output Quality of the data.

Sastoque *et al.* (2016) saw cloud based project management as significantly impacting both the public-private partnership (PPP) and public projects whose origin can be traced to social projects in Nigeria. The study found that the country has involved PPP in the construction, transport, telecommunications and power generation projects. Those countries yet to use PPP in projects development are hindered from doing it by poor legislation, uncertainties in risky identification and financial constraints.

Otaalo *et al.,* (2019) aimed to investigate the effect of cloud based project management practices on road construction projects performance in Kenya. The instrument of data collection were structured questionnaires. The target population consisted of 80 project managers, road engineers, project managers, road supervisors, road inspectors, road surveyors and contractors in Kakamega County. The unit of analysis were ongoing and completed road projects implemented by Kakamega county government. Simple random sampling used to select 80 of whom 70 respondents returned the questionnaires representing 87% respondents. The findings showed that risk identification has a positive and significant effect on cloud based project management practices in road construction projects. Risk analysis has positive and significant effect on the cloud based project management practices in road construction projects.

Ayinkamiye (2020) carried out to analyze the role of project planning on the performance of Government project in Rwanda, a case study of Gishoma Power Plant Project. The four hypotheses were formulated and the descriptive survey design study was conducted on 11 respondents through purposive sampling based on questionnaire. Collected data sets were analyzed by SPSS- 20 software. The study employed the regression model to study the effect of project planning on the performance of Gishoma Power Plant project. The results showed that the planning practices are existing to Gishoma Power plant project and this contribute significantly to the performance of the project. The results based on OLS model show that technology contribute to enhance project planning which affects statistically and significantly project performance resulted in time, cost, and quality variables. Furthermore, this study did not find the effect of project planning on Client / stakeholders satisfaction. This result suggested that they must be extensive research for Project planning and Client / stakeholders satisfaction performance.

2.2.2. Determine the effect of project collaboration on the performance

Kavitha (2021) asserted that the success of a project is all about finding a great idea for managing the projects. Effective management and technical support are required for the success of a large-

scale project. Managing and storing such large-scale projects and their relevant details such as assigned employees, client information, skill-set requirements in one place for a longer period with easy accessing and manipulation of the same is a tedious process. The author proposed a cloud-based application that aims to eliminate these difficulties by providing a platform to read, store, and manage projects' details with high optimization algorithms and user-friendly/minimalist UI/UX with more security levels. By using this application, it'll be easier to plan projects while taking previous track records into account. Additionally, it can make sure that people are working on the right things at the right time. As the project teams are getting remote and larger, better collaboration is required and our application, which is a cloud-based technology, facilitates this seamless collaboration around the globe in a click.

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Using the WASAC Rwanda and the Japan International Cooperation Agency (JICA) executed project SUS water & sanitation project no: p-rw-f00-016 as a case study, Ndungutse (2021) investigated the link between cloud based project management and project performance. The researcher identified some issues with the project, but they were quickly discovered and effectively resolved, resulting in successful execution. The researcher proved that the lack of collaboration by the three implementing parties caused timeline problems resulting in expenses and cost overruns.

2.2.3. Effect of project monitoring on project performance

The goals of Bachleda and Ouaaziz (2017) are the operationalization and rethinking of widely acknowledged influencing elements on cloud computing-related technology adoption. The evaluation also gives a general picture of relevant empirical research on cloud computing that is based on diffusion of innovation (DoI) and technology acceptance model (TAM) theories. The study of the attributes "relative advantage," "image," "compatibility," "complexity," and "trust and security" is therefore prioritized.

Bello, Oyedele, Akinade, Bilal, Delgado, Akanbi, Ajayi, Hakeem A. Owolabi (2020) found that cloud computing technologies have revolutionized several industries for several years. Although the construction industry is well placed to leverage these technologies for competitive and operational advantage, the diffusion of the technologies in the industry follows a steep curve. This study therefore highlights the current contributions and use cases of cloud computing in construction practices. As such, a systematic review was carried out using ninety-two (92) peer-reviewed publications, published between 2009 and 2019. A key highlight of the findings is that cloud computing is an innovation delivery enabler for other emerging technologies (building information modelling, internet of things, virtual reality, augmented reality, big data analytics) in the construction industry. As such, this paper brings to the fore, current and future application areas of cloud computing in the construction industry. The paper also identifies barriers to broader adoption of cloud computing in the construction industry and discusses strategies for overcoming these barriers.

According to the survey carried out by Ishimwe (2021) examined the results of an online survey study, which was conducted to investigate the use of software PM tools in Rwanda. The research was carried out to find out, what are the key elements and players that leat to choose a project management tool. The result shows that the most important analytical functions for chosing in a

by project managers are “Simplicity”, “Ability to integrate with other tools, as well as, provide time estimation feature” and “project progress & changes”

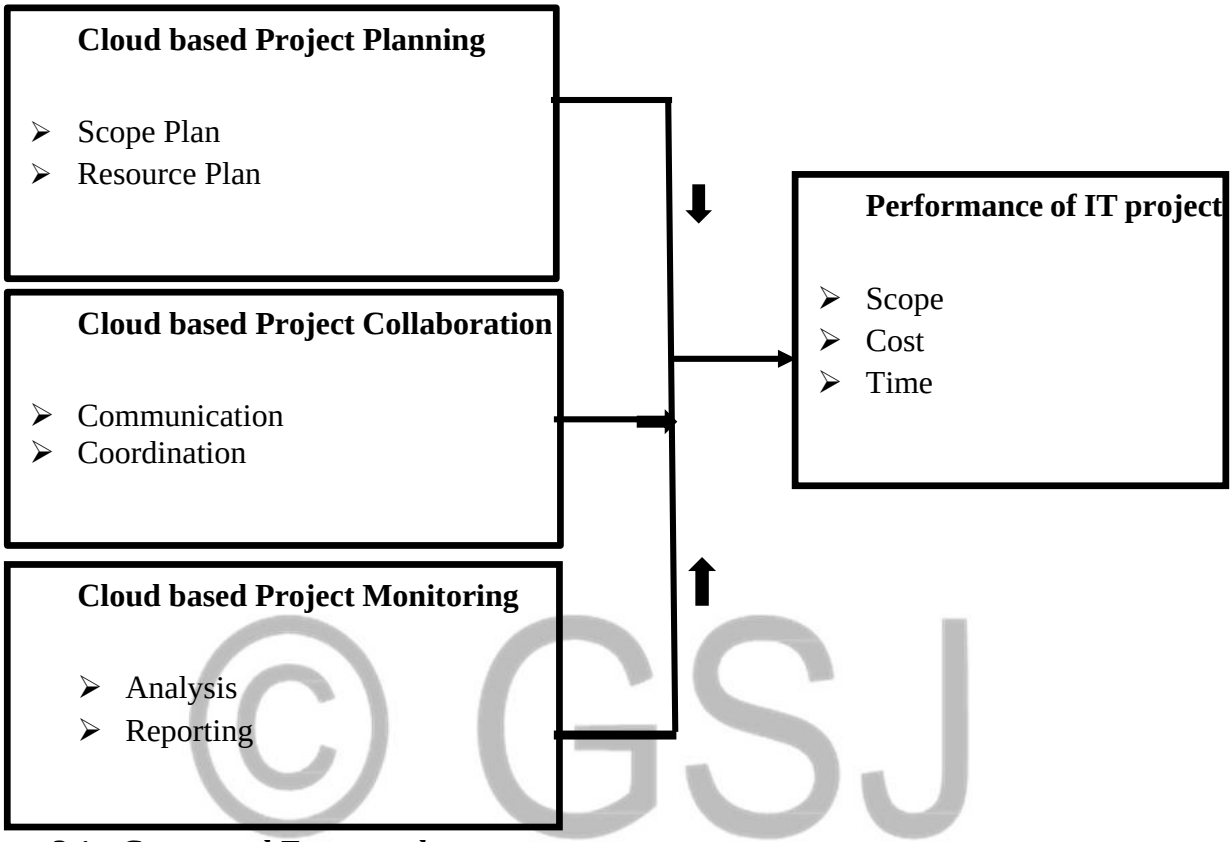

Figure 2.1.- ***Conceptual Framework***
Source: Researcher (2023

3.0 Research Design

Tehh (2018) avers that a research design is a plan mooted to answer a research question and advocates for a good research design that ensures collection of data that is good enough to answer the research question. The present study uses descriptive research design with the primary goal of gathering the perceptions of respondents on the cloud based project management practices and performance of IT projects in RADP II. The Rwanda Information Society Authority (RISA) is the authority in charge of monitoring the digital agenda of Rwanda, and thus it has a lot of IT projects aiming at transforming Rwanda into the digital hub within the East African Region (RISA, 2020). The researcher chose to conduct this study here because it is easily accessible and to provide input to improve project performance by adoption of effective cloud-based management within IT project.

Therefore, the study's overall target population is 189 respondents in different categories as public sector and private sector. These individuals were chosen as the study's target audience because they will provide information on the cloud-based management tools used by the project and their contribution on the performance of the IT projects. The sample size was 128

Kombo and Tromp (2006) define sampling technique as the process of choosing a group of people or things from a predetermined population to investigate. In this research, the stratified sampling technique was used for determining a representative population which is 128 employees and contractors acting within RADP I in different functions were selected for the present study and the total sample size is 128 respondents. Those functions were considered as strates, and a certain portion of those strates was selected for the study. Both primary and secondary data was collected in the study. Primary data refers to the information gathered directly by the researcher from respondents using a closed questionnaire. To support the main information and tie the results to other methods already in use, a desk review of available literature will be conducted. The researcher will distribute self-administered questionnaires to selected respondents. The questionnaire design will use the Likert scale having five anchors—strongly disagrees, disagree, neutral, agree, and strongly agree—to capture respondents' perspectives about cloud based project management and ICT projects performance within the case study. It will administrate to 128 respondents selected for this study.

A pilot study is defined as a small-scale test of the methods and procedures to be used on a larger scale (Saunder et al. 2012). Within this study, a pilot study will be conducted with the aim of testing the level of clear understanding of each of the statement contained in the questionnaire. This will help to measure if the meaning of the statements is properly communicated as originally planned in each construct. The essence of conducting a pilot study is to reduce the likelihood of making a research errors in formulation of questionnaire's construct. The pilot study will be conducted in a contractor company called Saltel Company Ltd, which is an IT company with more than 10 years in the field. Copies of the questionnaire will be distributed to 20 employees of Saltel Company Ltd and based on the outcomes of the pilot study, the researcher may revise and edit the questionnaire's statements that may not be clear, while some of them may be reworded especially those that will not properly be answered by the respondents as expected.

4.0 Findings and Discussion

Table 4.1: Correlation Coefficients

		Scope	Cost	Time	Performance
Cloud based Planning	Pearson correlation	1			
	Sig. (2-tailed)	0.000			
Cloud based collaboration	Pearson correlation	0.713**	1		
	Sig. (2-tailed)	0.000			
Cloud based Monitoring	Pearson correlation	0.284**	273**	1	
	Sig. (2-tailed)	.067	.085		
Performance	Pearson correlation	.704**	.572**	.568**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	98	98	98	

****. Correlation is significant at the 0.05 level (2-tailed).**

The study results presented in Table 4.1 shows that correlation between Cloud based management practices of RDAP I whereas Cloud based Planning has strong positive correlation (0.704 and P value =0.00). This suggests that improved risk identification procedures help to improve performance. These findings are in line with Bajwa and Deichmann (2019) assertion that The Perceived Usefulness, together with the Perceived Ease of Use, influences the Intention to Use and thereby the acceptance of cloud-based project management tools by project managers and management personnel in project planning.

Cloud based collaboration has moderate positive correlation (0.572 and P value =0.00) with performance of RADP. This suggests that improved cloud based collaboration help to improve performance. These findings concur with those of Kavitha (2021), who discovered that as the project teams are getting remote and larger, better collaboration is required and our application, which is a cloud-based technology, facilitates this seamless collaboration around the globe in a click.

Cloud based Monitoring has moderate positive correlation (0.568 and P value =0.00) with performance of RDAP I. These findings are in line with those made by Ishimwe (2021), who found that the most important analytical functions for choosing in a by project managers are “Simplicity”, “Ability to integrate with other tools, as well as, provide time estimation feature” and “project progress & changes”.

4.3.2. Diagnostics test of the regression model

After the regression model was run, post-estimation tests were carried out to make sure the model fit the data well and that the estimates it produced were accurate and trustworthy. Statistical tests for conditional diagnostics were successfully completed in this study. Both normality and multicollinearity were examined in the study.

Multicollinearity test: Multicollinearity, which is a situation that is not ideal, is defined as high correlations between the independent variables. The Variance Inflation Factor (VIF) was utilized to assess multicollinearity in the multiple regression models. Zikmund, Babin, Carr, and Griffin (2013) state that when two or more variables have a Variance Inflation Factor (VIF) of 5 or above, one of them should be taken out of the regression analysis because this denotes multicollinearity. As a result, if a study's variables have a Variance Inflation Factor of 5 or more, at least one of them must be subtracted from the other.

Table 4.2: Test for Multicollinearity

	Collinearity Statistics	
Model	**Tolerance**	**VIF**

Cloud based Project planning	0.803	1.245
Cloud based Project collaboration	0.596	1.678
Cloud based project monitoring	0.461	2.167

Source: Primary Data (2023)

Table 4.2, indicated that all the independent variables were not highly correlated with each other as indicated by the Variance Inflation Factors (VIF) of below five. Since all 3 variables has VIF which is less than 5 indicating that there is no multicollinearity. Therefore, all variable of predictors were included in the model.

Testing of normality: To ascertain whether the data was accurately modeled and regularly distributed, tests for normality were run. Both groups' samples came from populations with the same distributions, which is the null hypotheses. The data is normal if the Kolmogorov-Sminorv test's Sig. value is larger than 0.05. The data considerably deviate from a normal distribution if it is less than 0.05. (Zikmund *et al,* 2013).

Table 4.3: One-Sample Kolmogorov-Smirnov Test

Variables	N	Normal parametersa		Most extreme differences			Kolmogrov-smirnov Z	Asymp. Sig. (2-tailed)
		Mean	SD	Absolute	Positive	Negative		
Cloud based Project planning	95	3.9684	0.84582	0.266	0.23	-0.266	3.98	0.056
Cloud based Project collaboration	95	4.1305	0.51812	0.191	0.144	-0.191	2.854	0.864
Cloud based project monitoring	95	4.1773	0.31232	0.132	0.071	-0.132	1.975	0.051
Project Performance	95	4.1223	0.45418	0.167	0.122	-0.167	2.504	1

Source: Primary Data (2023)

The table 4.3, showing that Sig. value of Kolmogorov-Sminorv of Cloud based Project Planning is equal to 0.0560 which is greater than 0.05 implies that Cloud based Project Planning data is normal because Sig. value of Kolmogorov-Sminorv is greater than 0.05 level of significance

The table 4.3, showing that Sig. value of Kolmogorov-Sminorv of cloud based project collaboration is equal to 0.0864 which is greater than 0.05 implies that cloud based project collaboration data is normal because Sig. value of Kolmogorov-Sminorv is great than 0.05 level of significance

The table 4.3, showing that Sig. value of Kolmogorov-Sminorv of cloud based project monitoring is equal to 0.0510 which is greater than 0.05 implies that cloud based project monitoring data is normal because Sig. value of Kolmogorov-Sminorv is great than 0.05 level of significance

The table 4.8, showing that Sig. value of Kolmogorov-Sminorv of project performance is equal to 1.000 which is great than 0.05 implies that performance data is normal because Sig. value of Kolmogorov-Sminorv is greater than 0.05 level of significance. The study concluded that since all variable both independent and dependent are normally distributed, the researcher is allowed to regress the model by using linear regression analysis.

4.3.3. Multiple linear regression on effect of Cloud based Project Planning on performance

The study sought to identify the effect of Cloud based Project Planning on performance in IT projects in Rwanda by using multiple linear regression model to determine the effect of each predictor such as Scope plan and resource plan as component of Cloud based Project Planning on performance of IT projects in Rwanda. The regression models were run to test whether the model is significant or not. The Coefficient (β), t-statistic, and Prob. were used to confirm the statistical significance. Additionally, at a 5% level of significance, a statistically significant association between the dependent variable and an independent variable from the model was accepted. In order to calculate the measures of the multiple regressions for the study, the analysis used the Statistical Product & Service Solutions (SPSS) version 27.0. Model relationship with cloud based management practices these variables can be arranged in a function or equation as follows:

Performance = $Y=\beta 0+\beta 1\ X1+\beta 2\ X2+\varepsilon$, Model 1

X1 = Scope plan, X2= resource plan

Table 4.4: Model summary on Cloud based Project Planning and performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.968a	.937	.789	.47155

a. Predictors: (Constant): Scope plan and resource plan

The results from the above table 4., the value of coefficient of determination (R-Square) was .937 (93.7%) and the adjusted coefficient of determination (Adjusted R square) was .789 (78.9%) an indication that the variation of 78.9% in performance was due to changes in Cloud based Project Planning, which implies that its two variables (Scope plan and resource plan) contributes to 78.9% on performance in RDAP I. Since the variables in the model or not in count 100%, therefore there

are other factors that influence performance of IT projects in Rwanda that are not included in the model which account for 21.1%.

Table 4.5: ANOVA on Cloud based Project Planning and performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.879	2	1.411	6.351	.030a
	Residual	.667	95	.222		
	Total	**0.73**	**97**			

a. Predictors: (Constant): Scope plan and resource plan

b. Dependent variable: Performance

The results in Table 4.5 show that the model as a whole was significant at 5% level of significance. The calculated F statistic of 6.351 and the calculated p-value of =.030 is less than the Critical p-value of =.05 level of significance, making the entire model significant. Therefore, this implies that the variables: Scope plan and resource plan had significant effect to the variation of performance. Therefore, it can be concluded that the R and R2 between Cloud based Project Planning and performance of RDAP I is statistically significant, and Cloud based Project Planning can significantly affect performance.

Table 4.6: Regression coefficients on Cloud based Project Planning on performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.667	1.785		7.097	0.006
	Scope plan	0.219	0.444	1.907	0.750	0.035
	Resource Plan	0.682	0.577	1.861	1.732	0.014

a. Dependent Variable: Performance

Table 4.6 provides the summary of results of regression analysis for the effect of scope plan and resource plan on performance of RDAP I in Rwanda. The results indicate that scope plan (β1= .219; t= .750, p-value=0.035<0.05), and resource plan (β2= .682; t= 1.732, p-value=0.014 <0.05)

have positive and significant effect on performance of RDAP I. This shows that 1 per cent increase in scope plan and resource plan will lead to 0.219% and 0.682% increase in performance of RDAP I.

Therefore, the study rejected the null hypotheses Ho1 that stated that Cloud based Project planning (scope plan and resource plan) has no statistical significant effect on the performance of IT projects in Rwanda, as it was proven that Cloud based Project planning in RDAP I had statistical significant effect on performance in RDAP I. The findings are in agreement with Ayinkamiye (2020) who carried out a research to analyze the role of project planning on the performance of Government project in Rwanda, and who concluded that technology contribute to enhance project planning which affects statistically and significantly project performance resulted in time, cost, and quality variables

5.0 Conclusions

On the basis of findings from chapter 4, the study concluded that there is significant and positive effect of cloud based management practices on the performance of RDAP I. Therefore, based on the result showed from the test of hypotheses in table 4.10, table 4.13, and table 4.16, all null hypotheses were rejected at 5% level of significance due to the fact that the results indicated that the variables: Cloud based Project Planning, cloud based project collaboration, and cloud based project monitoring had significant effects to the variation of project performance in RDAP I measured in terms of scope, cost and time. Therefore, objectives of this research were achieved very well

5.1 Recommendations

In line with some weaknesses found within the research, therefore the following recommendation are proposed to improve performance of RDAP I:

1. The findings in table 4.6 showed that respondents disagreed with a statement stating that Competent contractors are selected on time thanks to the cloud based management as indicated with a low mean= 2.99 and heterogeneity standard deviation of 0.77 implying that the respondents have dissimilar views upon the statement. Hence, the study recommends that RDAP I may focus on linking their schedule for contractors' recruitment with its cloud management as the delay in selecting contractors may hinder its performance. The cloud based management may be a solution to the issue as it was proven to be an effective tool to managing contractors.

2. The RDAP I also has to assure that these contractors are paid at time as it was proven that the respondents disagreed with the statement stipulating that Thanks to the cloud management, there is no delayed payment of contractors which impacts the timely completion of the project with low

mean= 2.98 and standard deviation which is 0.88 is more than 0.5 (heterogeneity) and implies that the respondents have dissimilar views on the statement. Hence, the study recommends that RDAP I should enhance the way it manages the payment and risk connected with supplier, and the cloud is recommended to allow the project to resolve this issue.

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