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The Impact of Information Technology on Project Management Performance

(A Case Study of Vision City Project Phase 1)

A thesis to be submitted in partial fulfilment of the requirements for the award of the degree of master of business administration at university of Rwanda

Presented

By

Sandra Mukesha

Supervisor: Dr SHEMA Jean Bosco

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DECLARATION

I, **Sandra Mukesha** solemnly declare that this research is entirely the fruit of my efforts and initiation. It has never been produced or submitted to any institution of higher learning for any award.

Signature…….....

Date…….

SANDRA MUKESHA

APPROVAL

This is to certify that this report was written and compiled by **Sandra Mukesha** under my supervision until it's completion and is now approved in partial fulfilment of the requirements of the award of a Master's degree of Business Administration with specialization in Project Management at the University of Rwanda.

Signature: .....

Date: .....

Dr SHEMA Jean Bosco

ACADEMIC SUPERVISOR

LIST OF ABBREVIATIONS

DV:	Dependent Variable
IT:	Information Technology
ICT:	Information Communication Technology
IV:	Independent Variable
OAG:	Office of Auditor General
PMIS:	Project Management Information System
SPSS:	Statistical Package for Social Scientists
TAM:	Technology Acceptance Model

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ABSTRACT

This study entitled "The Impact of Information Technology on Project Management Performance". Information technology is defined as 'the use of electronic machines and programs for the processing, storage, transfer and presentation of information. Project management (PM) is a complex effort, designed to comply a client's needs, which is uncommon, limited by time, budget, resources, and scope. Development projects are most of the time acknowledged as successful when they are concluded on time, within budget, and in line with specifications and to stakeholders' contentment. However, currently, many government projects in Rwanda exceed the original cost; get cancelled prior to completion, while others fail on terms of the delivered functionality. This study was guided by the objectives such as: to assess the effectiveness of information technology tools during project management of Vision City Project Phase 1, to measure the performance of the Vision City Project Phase 1 and to examine the relationship between information technology on project management performance of Vision City Project Phase 1. Descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation. The design involves primary research methods for the collection of primary data. The data was then entered into a computer program called Statistical Package for Social Sciences (version 21) for analysis and interpretation. Descriptive analysis was used to analyse the data received from the respondents. This was involved descriptive tools such as percentages and frequency distributions. Ordinal logistic regression was used to examine the relationship between the dependent variables and the set of independent variables at 5% level of confidence. The study results showed that that majority of the respondents strongly agreed that information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success with the average mean is 3.925 which is strong and average standard deviation of 0.3175 that showed the homogeneous of responses. The average mean on performance of the Vision City Project Phase 1 is 4.2 which is strong and average of standard deviation is 0.42 that showed the homogeneous of responses. Last but not least, an ordered logit model was estimated to examine whether data storage mediums, data storage softwares, digital data and recording mediums predict project management performance. Together, the predictors accounted for a significant amount of variance in the outcome, likelihood ratio $X^2(4) = 33.8$, $p < .05$. and this made a researcher to confirm **H_1:** by saying that **t**here is a significant relationship between information technology and project management performance of Vision City Project Phase 1. And reject **H_O:** by saying that there is no significant relationship between information technology and project management performance of Vision City Project Phase 1.

Key words: Information Technology, Project, Project Management and Performance.

CHAPTER ONE:
INTRODUCTION

Development projects are most of the time acknowledged as successful when they are concluded on time, within budget, and in line with specifications and to stakeholders' contentment. This stud analyses the impact of information technology on project management Performance and this part focuses on background, problem statement, objectives, significance of the study, and scope of the study and its limitations.

1.1 Background of the Study

Information Technology (IT) is critical in today's economy as large financial and business transactions are made every day, which require robust systems to support them, thus leading to substantial investment on IT systems (Gingnell et al., 2014).Due to the increase in globalization and advancement of technology all around the world, organizations are implementing latest IT applications in order to enhance their operations and to provide the optimum value to their customers. By definition, information technology is defined as 'the use of electronic machines and programs for the processing, storage, transfer and presentation of information' (Björk, 1999). It includes automation, multimedia, and telecommunications. In short, IT is the use of software, hardware, and communication to process data in the organization.

According to Larson and Gray (2009), project management(PM) is a complex effort, designed to comply a client's needs, which is uncommon, limited by time, budget, resources, and scope. Information technology (IT) plays a significant role for improving business processes and has significant effects on project time, cost and quality in the housing sector. It has also brought many advantages and opportunities to almost every industry in operation speed, collaboration, accessibility and exchange of information (Stewart & Mohamed, 2003).The use of IT improves coordination and collaboration between firms participating in a housing project (Nitithamyong & Skibniewski, 2004).In place of project managers, automated processes, systems and bots could manage the multiple, disparate and rapidly evolving work elements.

For the past few decades, there has been a widespread acceptance of need for developing project management. There has been a development of ideas beyond traditional tools and techniques commonly used in project management which has led up to what is called the

Third-Generation of project management (Maylor, 2010). This stage is greatly influenced by the changes that have occurred in modern technology over the last decades. Especially the communication technology has led to the emergence of virtual teams as a means of running projects these days. There has also been considerable development in planning tools and both of these changes have the potential to drastically change the way we work in projects (Maylor, 2010).

Globally, the technological innovations have also affected how governments and towns plan and implement projects in the society. The changes in planning tools in combination with citizen's passionate use of social media and the rise of new technology in recent years has led up to those governments and public institutions are increasingly working with citizens to give them more of a stake in the policy-shaping process through public consultation (Wandhöfer et al., 2013). Wandhöfer et al., (2013) means that this new e-participation is fostering communication and interaction between governments on one side and the citizens of the community on the other, this interaction provides feedback on planned projects and adjustments can be planned quicker than ever before.

In Africa, Walumbwa, Maidique and Atamanik (2014) describe managing is a constant task, managers have to make quick decisions when there are risks every day. Managers are described as the trigger pulling, far-reaching consequences takers for employees, stakeholders and organizations. Walumbwa et al., (2014) furthermore state that managers one generation ago relied on a team of advisors to help them make decisions and also a room of number-crunchers to help them do the manual work of analyzing data. Today technology have introduced ways in which information can be dealt to the decision-makers much easier, simple internet searches or browsing company record without many problems (Walumbwaet al.,2014). The application of right technology on construction projects can streamline project manager's roles and speed task completion time. The true significance of technology in project management is the way in which it is used, it can improve communication, help in risk valuation and control scheduling, but only under assumption that appropriate tools are used in the right manner and at the right time.

In Rwanda, OAG (2019) noted that on 41 contracts, RDTA extended period of completing work in the range of 50% and 250% from the initial planned period. Further, on 32 contracts, amount of Frw 42,995,285,540 was added to initial contract amount to finalize the work. Management attributed these variations to various reasons including: delays in payment of

contractors' invoices, delayed road design studies, delays in payments for expropriation, unforeseen adverse climatic conditions with heavy rainy seasons leading to obstacles such as landslides on some sections of the roads and unforeseen additional works required (OAG, 2019). While the variations in cost and time were justified, some of reasons are pointers of existing gaps in planning, and execution of road projects. The above variations ultimately result in delayed completion of works and may therefore undermine value for money on expenditure incurred on road design studies, construction, rehabilitation and maintenance projects (OAG, 2019).

Furthermore, on 15th December 2016, the contract worth Frw14,588,258,580 was signed between RTDA and MOD/Engineering Brigade for the urgent works for design and construction of Rubagababa and Satinsyi bridges located in Ngororero and Nyabihu Districts for twelve (12) months from the date of signature of the contract (OAG, 2018). The expected completion date was 14th December 2017. Delay in completion and approval of works design. As per contract, there should have been works design to be executed. However, the audit revealed that up to 19th January 2018, the design of works to be executed was not yet approved; therefore, construction works could not commence. Due to this delay, up to the time of audit in March 2019, the construction works were at starting stage (OAG, 2019). This research therefore intends to assess the impact of information technology on project management performance.

1.2 Problem Statement

Managing a project in this era is greatly connected with the use of technology and project teams in many sectors now face obstacles they did not face ten years ago (Anantatmula 2008). Development projects are most of the time acknowledged as successful when they are concluded on time, within budget, and in line with specifications and to stakeholders' contentment. However, currently, many government projects in Rwanda exceed the original cost; get cancelled prior to completion, while others fail on terms of the delivered functionality (OAG, 2017). Some of these projects include the delayed completion of works for lot 7 of the electrification project in Ngororero District. A preliminary literature review shows that past studies have mainly focussed on the application of information technology (IT) in various sectors such as agriculture, education, small and medium enterprises (SMEs) and in cooperate organizations (Gingnell et al., 2014). However, limited research has

explored the role of information technologies in project management performance of housing (real-estate) projects. Additionally, the few studies that have looked at the impact of information technology on project management, have explored this study mostly in the construction projects specifically in developing countries (Adzroe, 2015). Therefore, this study aims to close this gap by assessing the impact of information technology on project management performance.

1.3 Objectives of the Study

1.3.1 Main Objective of the Study

The purpose of this study is to assess the impact of information technology on project management performance with a case study of Vision City Project Phase 1. Larson and Gray (2009) defined Project Management (PM) as a complex effort, designed to comply a client's needs, which is uncommon, limited by time, budget, resources, and scope.

1.4 Specific Objectives of the Study

1) To assess the effectiveness of information technology tools during project management of Vision City Project Phase 1.
2) To measure the performance of the Vision City Project Phase 1.
3) To examine the relationship between information technology on project management performance of Vision City Project Phase 1.

1.5 Research Questions

More specifically, the following research questions need to be addressed:

1) How effective are the information technology tools used during the project management of Vision City Project Phase 1?
2) How has the Vision City Project Phase 1 performed?
3) Is there a relationship between information technology and project management performance of Vision City Project Phase 1.

1.6 Hypothesis

H_O: There is no significant relationship between information technology and project management performance of Vision City Project Phase 1.

H_1: There is a significant relationship between information technology and project management performance of Vision City Project Phase 1.

1.7 Significance of the Study

1. This study will provide more information to the body of knowledge on the influence of information technology on project management performance in the housing projects.
2. Information to be obtained from this study can be used to frame more policies in relation to information technology on project management of housing projects in Rwanda.
3. Based on this gaps that will be identified in this study, the researcher will suggest areas for further research that future scholars and academician can further knowledge on.

1.8 Scope of the Study

1.8.1 Content Scope

This study mainly looked at the impact of information technology on project management performance. Specifically, it found out the information technology tools that are used by the project management, assess the effectiveness of information technology tools during project management and last but not least, examine the relationship between information technology on project management performance.

1.8.2 Geographical Scope

This study was carried out from Gacuriro and Kinyinya in Kigali City, Rwanda. These places are being selected by the researcher because it's where the Vision City Project Phase 1 is located.

1.8.3 Time Scope

This study covered a period of 2012 to 2020. This period of this is being selected by the researcher because according to the Rwanda Social Security Board (RSSB) annual report of 2012, these projects were supposed to kick off in 2012 and end in 2020.

1.9 Limitations of the Study

Limited funding: The entire research process is expensive especially secretarial work which includes; typing, printing, editing, materials like papers, pens and other activities such as carrying out desktop research, carrying out data collection, buying food and transport costs.

Limited access to respondents where people may not be willing to give some information: Some respondents may not be willing to give some information for different reasons some of whom might be busy at the time of data collection. The researcher however will make it clear to the respondents that the purpose of the research is purely academic and that information to be obtained will be treated with utmost confidentiality.

Limited time: According to the University of Kigali calendar, Master's research has to be carried out in about two semesters this period of time may not sufficient for the researcher to write all the five (5) chapters of this research paper together with data collection.

CHAPTER TWO:

LITERATURE REVIEW

This chapter contains research findings by various researchers on impact of information technology on project management performance. The information will be collected from different sources such as; textbooks, professional journals among others. This will enable the researcher to acquire current knowledge about the study hence determined the research gap.

2.1 Theoretical Review

2.1.1 Technology acceptance model (TAM)Theory

Information technology (IT) adoption in the management of projects has received substantial consideration in the last decade. Numerous theoretical models have been suggested to explain end-users' acceptance behavior. Among them, the technology acceptance model (TAM) proposed by Davis (1989) is widely applied and empirically tried. There have been tens of empirical studies conducted on TAM since its inception compared with its contending models, TAM is believed to be more frugal, projecting, and vigorous (Venkatesh& Davis, 2000).

Apart from its possible theoretical contributions, a meta-analysis on TAM is also significant to IT project management performance. By understanding the fundamental experiences to user acceptance, IT managers can take more effective interferences to achieve greater technology acceptance or usage thus affecting the performance of a given project. As Benbasat and Zmud (1999) noted, IT project management needs prescriptions. Moreover, the different IT researchers should not only apply rigorous methodology best suited to their research objectives, but also produce relevant and consumable research for practitioners. To be specific, the use of Project Management Information Systems (PMIS) is regarded to be beneficial to project managers because of the supposed contribution regarding timelier decision making and project success (Raymond & Bergeron, 2008).

Consequently, even if mankind has a great past of creating projects, little has gathered from times of this type of human activity and treating each project as unique with its own difficulties and possibilities are further growing the pressure on the project manager (Maylor, 2010). In conclusion, the aim of the model is to give the reasons on the factors of acceptance of IT that are able of determining behaviors of an individual throughout the user groups and

end users computing technologies, and also being theoretically justified and parsimonious and thus making the theory simpler but so much comprehensive to various stakeholders such as project managers in the construction industry.

2.2 Empirical Review

2.2.1 A project

According to Maylor (2010), a project is a task that has a beginning and an end" is often insufficient (Maylor, 2010). A project ought to have a beginning and an end but also be provisional in aspects of group constellation and after completion the funding ceases. The task of the project should also be concentrated on deliver a particular result, even though the project does not have to start with a clear idea of what will be achieved and how (Maylor, 2010). Similar definition of a project is given by Larson and Gray (2011) but besides being unique, temporary and focused a project is also characterized by strict performance requirements. Larson and Gray (2011) also add the cross-department group constellation as an important part of the uniqueness of a project. Snijders, Wuttke, Zandhuis and Newton (2012) support the earlier mentioned definition of a project but also add that a project may be associated with a high level of doubt and difficulty due to its unique nature and the fact that it diverges from an organization's prevailing processes and routines.

2.2.2 Information Technology

Information technology is defined as 'the use of electronic machines and programs for the processing, storage, transfer and presentation of information' (Björk, 1999). It comprises automation, multimedia, and telecommunications. In brief, IT is the use of software, hardware, and communication to process data in the organization. Information Technology (IT) is important in today's economy as large commercial and business transactions are made every day, which require vigorous systems to support them, consequently leading to considerable investment on IT systems (Gingnell et al., 2014).

2.2.3 The effectiveness of information technology tools during project management

Numerous firms pursue to attain very competitive advantages and thus improve organizational performance by investing in technology but the role of technology and its impact on project performance depends on how the technological systems within an

organization is designed (Anantatmula,2008). Anantatmula (2008) further states that it is vital to recall that technology alone is not the answer for improving project performance but rather it is a new technology which has brought a lot of reimbursements for project manager that can be used to facilitate the work.

Besner (2009) acknowledged that projects are most regularly used in information technology (IT), software development, business process reorganization and research and development. The task of Project Management Information System has been pronounced as significant to the attainment of project goals and the execution of project strategies.

PMIS have become all-encompassing systems that support the project's entire life-cycle. To support project managers in their planning, organizing, control, reporting and decision-making tasks on the one hand and evaluating and reporting, it seems to be essential to make use of PMIS. As part of the project management system, the PMIS (project management information system) are a means for the project managers to be supported in their decision making.

PMIS are important building blocks of efficient and effective project management and have considerably changed from been just scheduling applications to complex information systems that cover wide range of project processes while addressing multitude of stakeholders (Kaiser et al., 2010). They can support project managers in their planning, organizing, control, reporting and decision making tasks while evaluating and reporting at the same time (Raymond et al. 2008). PMIS is considered beneficial to project managers due to it's the alleged contribution concerning timelier decision making and project success (Raymond et al., 2008).

Something of hands-on relevance that was found by Derous, Ryan, and Serlie (2015) is the conclusion that given a specific subgroup of people, organizations cannot assume a consistent hiring decision with the group. Technology may streamline some of the process because of the way a resume and working relations are to be presented, but there are still some which is up to human judgment and therefore this inconsistency.

The limitations of projects are hardly the undistinguishable today as they once were and the growth in new understanding has improved the difficulty of projects because projects include the latest technology (Larson &Gray, 2011). In the present new normal of globalization,

outsourcing and increased competition, intangible assets such as understanding are emerging as key value for all the projects. In this technology-driven business atmosphere projects are due to their density compelled to utilize technology in order to benefit from all team members (Anantatmula, 2008).

2.2.5 Factors that hinder the use of information technology in the management of projects

Kerzner (2013) says that project management is successful if its practical tactic of process integration, process creativity, effective planning, execution, supervising and control, and lastly closure to accomplished finished projects. In the same way, Heagney (2011) echoed that project management is extremely actual particularly in Information System (IS) due to its nature of process based. Furthermore, the consecutive phases of project management directly improve IS development, making it a precious means in enabling successful conclusion of system matching to its original desires.

In the same way, Kroenke (2008) defined Information System (IS) as an interaction formed by users and information technology to indeed attain some organizational tasks and purposes. This communication can happen within or across organizational borders. An information system is the technology an organization uses and the way in which the organizations interact with the technology and the way in which the technology works with the organization's business processes. Hence, Information System (IS) is the interconnection and operation of information technologies and human managerial skills to attain business efficiency and quality.

Project organization is one of the key factors for successful project delivery. They consist of multidisciplinary personnel and work processes with multiple tools. According to Linderoth (2010) and actor network theory, project workers are parts of a social network. Due to disruptive nature of building and construction projects, the challenge is to maintain and re-establish the network in which BIM is used in consecutive projects. When project organization changes from one project to another, mode of operation changes requiring people to adapt and learn new practices.

According to Kautto (2012), in constructionof projects and in the detailed design phase structural engineer's design has to include connections between structural elements and, based on contract agreement, all cast-in cavalries in the BIM model. At this time, there are

not many software capable of doing this in a cost-efficient manner. This narrows the scope of available software but to figure out of necessary features, a lot of research and testing have to be realized per proposed software. Due to high demand of advanced features required by the highest level of BIM, full implementation will take a lot of time. However, it is noteworthy that design standards vary between countries thus different tools can be usable in different places. To open up more the difficultness of finding suitable software, some examples are given in the next paragraphs.

Regularly, if new ideas are introduced from a supporting element, they tend to encounter obstacles on the way (Autodesk, 2012). Users are not allowed or do not want to spend their time on understanding and testing new potential tools. Sometimes the supporting element does not understand the need of project delivery and may introduce less viable tools. Ultimately, if the management is not interested, the project will be silently put aside. As in software business in general, the timing and sales skills are crucial. An idea has to be presented and sold at the right moment for a specific need and people. If the high level management is specifically interested on something, resources will be allocated. This may lead to awkward situations if the management does not really know or understand what they want and does not have competence to evaluate impacts on other matters (Autodesk, 2012).

For example, engineering consulting companies tend to have licenses for tens or even hundreds of different kinds of software. If the idea is to change document management system for the whole company, it will affect all above mentioned software including all other ICT systems as well as work processes. The great idea may become costly and resource intensive project for many years (Autodesk, 2012). A knowledgeable chief intelligence officer, with respectable experience and negotiation skills, is clearly an asset. He can influence the high level management and own employees to go to right direction. To summarize and to be effective, a BIM technology implementation must reach across a business.

2.2.5 Relationship between information technology on project management performance

The recent year's technological innovations have altered many aspects of our everyday life and are forcing us to rebuild our ingrown habits. A meeting is no longer required to take place on the same physical location but can instead be hosted with all project members via a

virtual meeting (Anantatmula, 2008). Technology can be of great support for the project manager in managing projects successfully but as always there are challenges, the challenges most prevailing today may not have been present a decade ago.

Also Liu and Yuan (2015) acknowledge that the rise of new technology has introduced great benefits for governmental organizations such as; increased efficiency in operations, integration of operations and customized service delivery. Further Liu and Yuan (2015) also agrees upon that new technology has increased the level of communication between the public agencies and citizens, and also brought some levels of engagement of the public in decision and policy making (Liu & Yuan, 2015).

Ali, Anbari, and Money (2008) argue that Information systems are developed using Information technology to assist people in performing their tasks. Project Management Information System is an example of these information systems and is widely regarded as an important building block in project management. These systems have continued to evolve from just being planning, scheduling and resource management information systems to complex, distributed, multi-functional systems that can easily generate information necessary to make decisions, improve the efficiency of implementation among other functions within life cycle of the project.

These PMISs allow for quick review and easy periodic updating; they filter and reduce data to provide information on summary, exception, or what if bases. With an effective PMIS (project management information system) the project manager need not wait for days or peruse through reams of data to identify problems and determine project status (Slotegraaf&Pauwels, 2008).

According to Kaiser et al.,(2010) the use of Project Management Information System is based on the belief that their cost will be offset by the benefits that come along with it. The broadening of Project Management Information System scope assists organizations to not only manages individual projects but the whole project portfolios.

Kang et al., (2008) investigated the use of IT and its impact on project and company performance in the construction industry. They found that increased IT use is generally correlated with improved performance especially for schedule performance.El-Saboniet al., (2009) examined the use of modern electronic communication management systems, and how

these systems affect the success of construction projects in the United Arab Emirates. Based on their case study results, electronic communication has a positive effect on schedule and decision-making.

Additionally, PMIS are an example of these information systems and are widely regarded as an important building block in project management. These systems have continued to evolve from just being planning, scheduling and resource management information systems to complex, distributed, multi-functional systems that can easily generate information necessary to make decisions, improve the efficiency of implementation among other functions. What distinguishes PMIS from other classes of information systems is the vastly unstable nature of their usage setting, that is to say; project environments, and as such they need to be more customizable in their functionality than most other enterprise information systems (Ali et al.,2008). Lee et al.,(2011) argues that for efficient work performance among the project team members; PMIS supports three basic functions namely communication, collaboration and community. Availability of high quality information in PMIS is essential since it assist the project manager to make sound and timely decision thus improving on his/her performance.

2.3 Gaps in Literature Review

A preliminary literature review shows that past studies have mainly focussed on the application of information technology (IT) in various sectors such agriculture, education, small and medium enterprises (SMEs) and in cooperate organizations (mostly in the human resource department). However, limited research has explored the role of information technologies in project management performance of housing (real-estate) projects. Additionally, the few studies that have looked at the impact of information technology on project management, have explored this study mostly in the construction projects such as roads. For example, according to Adzroe (2015), the use of information technology has become a non-negotiable aspect in the construction industry. It provides new opportunities to innovative construction companies so as to enhance the process of communication, collaboration and exchange of information.

Furthermore, the evolution in project management has led to a shift from implementation of projects that develop on analysis approach and intuition to sophisticated integrated project management systems (Ngugi& Nyandika, 2014). However, the literatures still show only a small number of researches that have looked at the impact of information technology on

project management performance of housing projects specifically in developing countries such as Rwanda. Therefore, this study aims to contribute to the limited existing literature by examining the opinions of housing (real-estate) professionals about this subject.

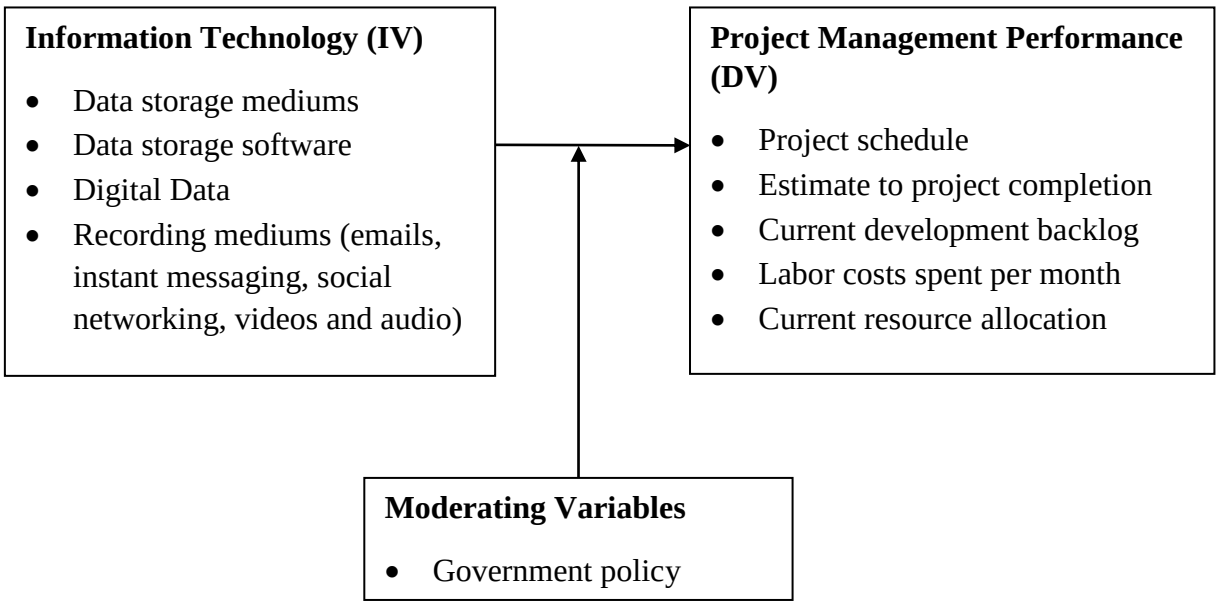
2.4 Summary of Literature

In this technology-driven business atmosphere, project managers due to the complexity of their projects, they are obligated to use technology in order to benefit from all team members (Anantatmula, 2008). The recent year's technological advances have altered many aspects of our everyday life and are forcing us to rebuild our ingrown habits. A meeting is no longer required to take place on the same physical location but can as an alternative be hosted with all project members via an online platform meeting (Anantatmula 2008). Technology can be of great support for the project manager in managing projects successfully but as always there are tests, the tests most prevailing today may not have been present a decade ago. Further Liu and Yuan (2015) also agrees upon that new technology has improved the level of communication among the government agencies and citizens, and also brought some levels of engagement of the public in decision and policy making (Liu & Yuan, 2015).

2.5 Conceptual Framework

As seen in the conceptual framework below, information technology (IT) use software, hardware, and communication to process data during the management of a project. However, information technology tools such as data storage mediums, data storage software and recording mediums such as emails are used in almost all stages of project cycle. Key performance indicators for project management performance in this study will include; project schedule, estimate to project completion, current development backlog, labor costs spent per month and current resource allocation. Current resource allocation Government policies such as the tax policy can equally affect project management performance since it influences the budgeting and planning.

Figure 1: Conceptual Framework showing the relationship between IT and project management performance



CHAPTER THREE:
METHODOLOGY

This chapter presents the research methodology that will be adopted for this study. Section 3.1 discusses the research design, 3.2 discusses the study area, 3.3 defines the study population, 3.4 discusses the sample size determination procedures, 3.5 discusses data collection sources, 3.6 discusses the data collection methods, 3.7 discusses quality control, 3.8 discusses the measurement of variables, 3.9 discusses data Analysis, 3.10 discusses the ethical consideration

3.1 Research Design

The study applied a non-experimental design called descriptive survey research design. According to Aggarwal (2008) descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation. This type of research method is not simply amassing and tabulating facts but includes proper analyses, interpretation, comparisons, identification of relationships or trends. The design involves primary research methods for the collection of primary data. The justification for using this design is that it clearly explores the existing status of two or more variables at a given time.

3.2 Study Population

The study population comprised of project managers and site engineers that are part of the Vision City Project Phase 1. According to the Rwanda Social Security Board (RSSB 2015),the Gacuriro and Kinyinya Housing Project which had a target of setting up 1,000 housing units was implemented with the guidance of 30 project managers and 25 site engineers thus making a population of 55 respondents. Therefore, this study had 55 respondents from which a sample was selected.

3.3 Sample Size Determination

This study useddifferent levels of sampling. First, the researcher used cluster sampling where she put housing projects in Kigali into two clusters; one was the public/government housing projects and the other one was for private housing projects. Furthermore, from the government housing projects, the Vision City Project Phase 1 was randomly selected. Vision

City Project Phase 1 was selected because they are one of the government housing projects that were completed in the estimated project completion period with the use of information technology.

Secondly, the sample size of individual participants was obtained basing on the Krejcie and Morgan's 1970 table for sample determination clearly shows that from a population (N) of 55 respondents, the sample size (S) is 48. Therefore a sample of 48 respondents was selected using a probability sampling method called simple random sampling. This method of sampling was used because it gives every respondent an equal chance of being selected into the sample, hence establishing objectivity in sample selection.

3.4 Data Collection Sources

This study used both primary and the secondary data sources of data. Primary data will be the data collected for the first time from respondents (project managers and site engineers) who are familiar with the variables under study. Secondary data was also collected by using documentary review such as; Text books, Journals, Newspapers, and Magazines.

3.5 Data Collection Methods

This study used use open-ended and close-ended types of questionnaires as the data collection tools to be used by the researcher. An open-ended question asks the respondent to formulate his/her own answer, whereas a closed-ended question has the respondent pick an answer from a given number of options and the questions should flow logically from one to the next. To achieve the best response rates, questions flow from the least sensitive to the most sensitive, from the factual and behavioural to the attitudinal, and from the more general to the more specific. Questionnaires were used in this study because they have advantages over some other types of surveys in that they are cheap, do not require as much effort from the questioner as verbal or telephone surveys, and often have standardized answers that make it simple to compile data. As a type of survey, questionnaires also have many of the same problems relating to question construction and wording that exist in other types of opinion polls. These questionnaires were self-administered by the principal researcher.

3.6 Measurement of Variables

A Likert Scale was used in the questionnaire to measure the views to presented by the respondents. A Likert scale will further be used in the questionnaire to measure the attitudes presented by the respondents. To be specific, it was used to understand the extent to which the respondents agree or disagree with given statements in regard to study variables. A Likert Scale will be indicated as follows; Strongly Agree = "SA"(5), Agree = "A"(4), Neutral = "N"(3), Disagree = "D"(2) and Strongly Disagree = "SD"(1). Furthermore, the study used a multiple linear regression model to analyse the relationship between the dependent variable and the independent variables.

Mean(X)

The most common expression for the mean of a statistical distribution with a discrete random variable is the mathematical average of all the terms. To calculate it, add up the values of all the terms and then divide by the number of terms. This expression is also called the arithmetic mean. The mean of a statistical distribution with a continuous random variable, also called the expected value, is obtained by integrating the product of the variable with its probability as defined by the distribution (Aggressti& Franklin, 2000).

Evaluation of mean

Mean	**Evaluation**
1.00 -1.80	Very Weak
2.81 - 2.60	Weak
2.61 - 3.40	Moderate
3.41 - 4.20	Strong
4.21 - 5.00	Very Strong

Source: *(Aggresti, 2009)*

Standard Deviation (σ)

The standard deviation is a measure that is used to quantify the amount of variation or dispersion of a set of data values.A standard deviation close to 0 indicates that the data points tend to be very close to the mean (also called the expected value) of the set, while a high

standard deviation indicates that the data points are spread out over a wider range of values. Standard deviation helps to measure how far or near the mean.

Interpretation of standard deviation (SD)

$SD \leq 0.5$ Respondents' homogeneity of perception

$SD \geq 0.5$ Respondents' heterogeneity of perception

Source: *Agresti and Franklin, (2009)*

Evaluation of Standard Deviation

Standard deviation	**Level spreading**
$\sigma < 0.5$	Homogeneous
$\sigma > 0.5$	Heterogeneous

Source: *(Saunder, 2008)*

The interpretation of results followed the analysis so as to draw conclusions and recommendations about the findings.

3.7 Data Analysis

The data that was collected was first be edited for uniformity, precision, wholeness, consistency and will be later arranged to enable tabulation coding before the final analysis. The data was then entered into a computer program called (SPSS) Statistical Package for Social Sciences (version 21) for analysis and interpretation. Descriptive analysis was used to analyse the data received from the respondents. This was involved descriptive tools such as percentages and frequency distributions. Ordinal logistic regression was used to examine the relationship between the dependent variables and the set of independent variables at 5% level of confidence.

3.8 Quality Control

3.8.1 Validity testing

Validity is the best available approximation to the truth or falsity of a given inference, proposition or conclusion (Cook & Campbell, 1979).

Table 3.1: Validity testing

According to William (2005), the research instrument that the researcher intends to use is questionnaire. The validity of this instrument was established by having it cross examined for approval by a research consultant, to ensure that the information they have generated is appropriate and consistent before analysis. In addition, after-test was to confirm the reliability of the questionnaire. The validity interval is from 0 up to 1. 0 means full of errors whereas 1 means absence of errors. Validity of above 0.5 is assumed to be valid.

In this research, the content validity index was used. Content validity is the degree to which an instrument has an appropriate sample of items for the construct being measured and is an important procedure in scale development. Content validity index (CVI) is the most widely used index in quantitative evaluation. In this research, the content validity index was calculated from the formula below:

CVI=n/N Where

CVI: Content Validity Index

N: Total number of items in questionnaire

n: Number of relevant items in the questionnaire

Example: In this research the total number of items in questionnaire (N) is equal to 21

The number of relevant items in questionnaire (n) is equal to 18

Then the content validity index (CVI) is equal to 18/21= 0.85. Since the content validity index (0.85) is greater than 0.5 then the instrument declared to be valid.

3.8.2 Reliability testing

According to Amin (2005), test-retest reliability can be used to measure the extent to which instruments produced consistent scores when the same group of individuals is repeatedly measured under the same conditions. The results from the pre-test were used to modify the items in the instruments. A Cronbach's alpha correlation coefficient of greater than 0.5 was considered to have passed the reliability test and instrument considered suitable for use.

Table 3.2: Reliability testing

Cronbach's alpha correlation coefficient	**Percentage**
>0.5	95% of the questionnaires
<0.5	5% of the questionnaires

According to this study, 95% of the questionnaires used, they had a Cronbach's alpha correlation coefficient of 0.5 and above, while only 5% had that one below 0.5.

3.9 Ethical Consideration

The research started by obtaining an introductory letter from the University and this letter was delivered to the respondent's organizations. This researcher would at this point seek the respondents' consent before involving them in the study. The researcher also sought the respondents' information given is treated with utmost confidentiality while presenting results.

CHAPTER FOUR:
RESULTS AND DISCUSSION

This chapter presents the study results and discussion of the research findings. Furthermore, SPSS 16.0 was used to generate the frequencies, percentages, descriptive statistics and to establish the relation between the dependent and the independent variables of the study. Specifically, the data analysis was in line with specific objectives where patterns were investigated, interpreted and implications drawn on them.

4.1 Response Rate

Table 4.1: Rate response

Response Rate	Frequency	Percent (%)
Responded	30	62.5
Non-response	18	37.5
Total	**48**	100.0

Source: Survey Data (2020)

The sample size of this study was 48 respondents. Those filled and returned questionnaires were 30 respondents making a response rate of 62.5%. According to Mugenda & Mugenda (1999), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. This means that the response rate for this study was good and therefore enough for data analysis and interpretation.

4.2 Demographic Data

The study sought to establish the demographic data of the respondents. The demographic data of the respondents were categorized according to; sex, age and education level as seen below.

4.1.1 Sex of respondents

Table 4.2: Sex of respondents who took part in the study

Category	Frequency	Percent (%)
Male	19	63.3
Female	11	37.7
Total	**30**	**100**

Source: Survey Data (2020)

Study results showed that the majority of respondents who took part in the study were males (63.3%), while the rest were females (37.7%). This therefore implies that most of the workers that took part of the Vision City Project Phase 1 were males.

4.2.2 Age of respondents

Table 4.3: Age of respondents who took part in the study

Category	Frequency	Percent
Below 30 years	4	13.3
30 - 39 years	5	16.7
40 - 49 years	13	43.3
50 years and above	8	26.7
Total	**30**	**100**

Source: Survey Data (2020)

Study results in table 4.3 show that the majority of the respondents that took part in the study at Vision City Project Phase 1 were between the ages of 40-49 (43.3%). Furthermore, other respondents were 50 years and above (26.7%), between the ages of 30-39 (16.7%) and below the ages of 30 (13.3%). This therefore implies that most of the workers that took part of the Vision City Project Phase 1 were mature in age.

4.2.3Education level of respondents

Table 4.4: Education level of respondents who took part in the study

Category	Frequency	Percent
Primary	0	0
Secondary	1	3.3
Bachelor's	24	80
Master's	5	16.7
PhD	0	0
Total	**30**	**100**

Source: Survey Data (2020)

Study results in table 4.4 show that the majority of the respondents who took part in the study atVision City Project Phase 1 had attained a Bachelor's degree (80%) as their highest levels of education. Others had acquired Master's degree (16.7%) and secondary (3.3%) as their highest levels of education. Last but not least, no respondent had ever acquired primary education and PhD as their highest level of education. This therefore implies that most of the workers that took part of the Vision City Project Phase 1 were literate.

4.3 Effectiveness of information technology tools during project management

Table 4.5: Packages of IT used inVision City Project Phase 1

No	IT package	Purpose
1.	Sure Track Management Tool	Project performance management
2.	Emails	Communication
3.	WhatsApp	Communication
4.	Cameras	Monitoring performance
5.	Computers	Recording information

Source: Secondary data (Vision City monthly report November, 2018)

As seen in table 4.5 above, various Information Technology (IT) packages were used in the Vision City Project Phase 1 to help support the management of the project from the start till then end. Some of the IT packages included Sure Track Management Tool which was majorly used for the management of the project, emails and WhatsApp which were used for communication, cameras that were used for monitoring project performance and computers which were used to record and store all important information. Primary data was further

collected to understand or examine the effectiveness of the information technology tools during project management as seen in Table 4.6 below.

Table 4.6: Effectiveness of information technology tools during project management

Statement	N	Mean	SD
Information technology systems such as the Sure Track Project Management Tool supported our project managers to multi-task	30	4.0	0.31
Information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success	30	5.0	0.12
Information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success	30	4.0	0.08
Information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success	30	2.0	0.21
The Vision City Project Phase 1 due to its complexity was compelled to utilize technology in order to benefit from all team members	30	5.0	0.73
Information technology softwares that were used on the Vision City Project Phase 1 supported the management of our project in a cost-efficient manner	30	3.2	0.42
Information technology allows for quick review and easy periodic updating; they filter and reduce data to provide information on summary, exception, or what if bases	30	4.0	0.26
Information technology tools such as emails and WhatsApp helped quicken the communication process during the management of the Vision City Project Phase 1	30	4.2	0.41

Source: Survey Data (2020)

As seen in table 4.6, the study results show that majority of the respondents agreed information technology systems such as the Sure Track Project Management Tool supported our project managers to multi-task with a mean of 4.0 which is strong and a standard deviation of 0.31 that showed the homogeneous of responses. Study results further showed that majority of the respondents strongly agreed that information technology is considered

advantageous to project managers because of the alleged contribution regarding timelier decision making and project success with a mean of 5.0 which is very strong and a standard deviation of 0.12 that showed the homogeneous of responses. Study results also showed that most of the respondents agreed that information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success with a mean of 4.0 which is strong and a standard deviation of 0.08 that showed the homogeneous of responses.

Additionally, study results further showed that most of the respondents disagreed that information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success with a mean of 2.0 which is weak and a standard deviation of 0.21 that showed the homogeneous of responses. Study results showed that majority of the respondents strongly agreed that the Vision City Project Phase 1 due to its complexity was compelled to utilize technology in order to benefit from all team members with a mean of 5.0 which is very strong and standard deviation of 0.73 that showed the homogeneous of responses. Study results further showed that majority of the respondents were neutral to the fact that information technology softwares that were used on the Vision City Project Phase 1 supported the management of our project in a cost-efficient mannerwith a mean of 3.2 which is moderate and standard deviation of 0.42 that showed the homogeneous of responses.

Study results showed that majority of the respondents agreed that Information technology allows for quick review and easy periodic updating; they filter and reduce data to provide information on summary, exception, or what if bases with a mean of 4.0 which is strong and standard deviation of 0.26 that showed the homogeneous of responses. Last but not least, study results further showed that most of the respondents strongly agreed that information technology tools such as emails and WhatsApp helped quicken the communication process during the management of the Vision City Project Phase 1 with a mean of 4.2 which is strong and standard deviation of 0.41 that showed the homogeneous of responses. The average mean is 3.925 which is strong and average standard deviation of 0.3175that showed the homogeneous of responses.

The result above refers to what Anantatmula, (2008) wrote by saying that many organizations seek to gain competitive advantages and improve organizational performance by investing in technology but technology's role and impact on project performance depends on how the

technological systems within an organization is designed. Parks (2005, cited in Lee et al. 2011) argue that for efficient work performance among the project team members; PMIS supports three basic functions namely communication (PMIS delivers related knowledge and information promptly between members of the team via either external or internal networks), collaboration (PMIS supports an active cooperative management system among the members) and community (PMIS supports accumulation of related information and data through information sharing).

4.4 An assessment of the performance of the Vision City Project Phase 1

Table 4.7: Assessment of the performance of the Vision City Project Phase 1

Planned Project Start Date	4th October 2013
Actual Project Start Date	4th October 2013
Planned Project completion Date	4th July 2015
Actual Project completion Date	31st July 2018
Planned Budget	$99 million
Actual Budget	$89.1 million

Source: Secondary data (Vision City monthly report November,2018)

According to the Vision City monthly report of November 2018, as seen in table 4.7 above, this project started on the very date (4th October 2013) it had been planned to start. However, it didn't end on the exact date it had been planned to end. This project ended 3 years after its planned end date. Moreover, Vision City project phase 1 had a planned budget of $99 million, however, 90% ($89.1 million) was actually spent. The fact that the project costed an amount which was within the project budget was a key indicator of good project performance. Furthermore, all the Good for Construction drawings were successfully issued to CCECC as per contract schedule, during the period from October 2013 to January 2014. Revised drawings also were issued during the course of construction based on the requirement recognized by client/consultants. ST4 issued the revised design for 4 BHK semidetached houses on 30 October 2014 St 5 November 2014. CCECC notified that they will consider construction start date for these houses accordingly. ST4 redesigned the roof from truss roof system to concrete roof system (as it was in SYN design during tender) for section 2 villas & townhouses and issued the drawings in the first week December 2014. Furthermore, SYN/ST4 summarized the consolidated revised drawing list of section 2 buildings, corresponding to contract drawing schedule.

Additionally, the cost saving exercise between ST4 and CCECC was not concluded as both are having dispute on the quantities and design changes. Joint exercise for measurement of section 2 works and external works carried out by SYN, ST4 and CCECC from 4 November 2014 to 26 November 2014. As discussed in the executive meeting held on dated 26 November 2014, the joint measurement sheets were signed by all parties (CCECC, ST4 & SYN). ST4 informed in the meeting that they have submitted cost saving report to DDL without copying SYN.

On 16 December 2014, UDL issued a letter suspending ST4 contract with a notice period of 15 days. Accordingly, ST4 involvement is not in the job from 31 December 2014. Value engineering proposal discussed between CCECC/SYN/UDL and USD 6.3 Million saving is agreed and signed by all parties (CCE, SYN, UDL) in January 2015. This exercise is done since CCE has raised concern on increase of construction cost due to redesign of section 2 by ST4. KPMG conducted a forensic audit from March to May 2015 and submitted the final forensic audit report in the first week of June 2015. As advised by UDL, SYN shared all the relevant documents requested by KPMG during the period of their audit. As advised by UDL, SYN submitted scenario summary report on 05 June 2015 showing 3 scenarios (Proceeding with CCECC with an addendum, termination of contract of CCE and appointing new contractor, continuing with CCE and giving part work to other contractor). Based on the various meetings, proposal submissions and auditors (KPMG) report, UDL had further meeting with CCE in the month of June and July 2015 to finalize the addendum for the construction contract.

According to these discussions UDL and CCECC agreed for USD 99.5 Million as total construction contract amount. To meet this amount SYN did value engineering on fire doors and CCE also agreed cost saving of approx. SD 503,000/ on this item. As per the addendum, 8 months extension was given for the contract completion, accordingly project would have been completed by 14 April 2016. However the progress recorded as of 14 April 16 was 74.8%. SYN has shared a report giving comments against each Item that CCE has highlighted as reason for delay in their claim, for internal review of UDL. SYN has written letter to CCE on 21 Nov 16 with attachments (MIS, delay log, progress assessed in %age) showing project status as of 15 Nov 16 and again reminded to depute more skilled technicians/ specialized sub-contractors to complete job immediately. Also given notification

that delay damages will be applied in the next IPC since the works are not completed by 15 Nov 16 as agreed in second addendum.

CCE submitted a letter on 5th Dec 16 requesting time extension to complete the project, CCE highlighted that delay is mainly due to IPC payment delay which has effected procurement of materials and specialist services. Also requested additional time for completing the variation works that were instructed after signing second addendum on 4 Aug 16, SYN has replied the letter on 16 Dec 16 giving point wise clarification to the issues highlighted in CCE's letter, based on construction contract clauses. Also arranged a joint meeting with UDL/CCE/SYN on 23 Dec 16. In the meeting UDL/SYN asked CCE to submit a detailed completion program and completion milestones with histogram for review and considering presenting UDL board for their comments/ approval on CCE's time extension claim.

Table 4.8: Performance of the Vision City Project Phase 1

Statement	N	Mean	SD
The Vision City Project Phase 1 was started on the exact date as it was planned	30	5.0	0.48
The labor costs spent per month for the Vision City Project Phase 1 exceeded what was planned	30	4.0	0.50
Rwanda Social Security Board (RSSB) as a key stakeholder is pleased about the progress of the Vision City Project Phase 1	30	4.0	0.12
All the project activities were carried out in accordance to the project original timeline	30	5.0	0.41
All the housing units that are part of the Vision City Project Phase 1 meet the standards set out in our quality plans	30	3.0	0.59

Source: Survey Data (2020)

Study results showed that most of the respondents strongly agreed that the Vision City Project Phase 1 was started on the exact date as it was planned with a mean of 5.0 which is very strong and standard deviation of 0.48 that showed the homogeneous of responses. Furthermore, the study results showed that majority of the respondents agreed that the labor costs spent per month for the Vision City Project Phase 1 exceeded what was planned with a mean of 4.0 which is strong and standard deviation of 0.50 that showed the homogeneous of responses. Study results also showed that majority of the respondents agreed that Rwanda Social Security Board (RSSB) as a key stakeholder is pleased about the progress of the

Vision City Project Phase 1 with a mean of 4.0 which is strong and standard deviation of 0.12 that showed the homogeneous of responses.

Study results also showed that majority of the respondents strongly agreed that all the project activities were carried out in accordance to the project original timeline with a mean of 5.0 which is very strong and standard deviation of 0.41 that showed the homogeneous of responses. Last but not least, study results further showed that majority of the respondents stayed neutral on the fact that all the housing units that are part of the Vision City Project Phase 1 meet the standards set out in our quality plans with a mean of 3.0 which is moderate and standard deviation of 0.59 that showed the heterogeneous of responses. The average mean is 4.2 which is strong and average of standard deviation is 0.42 that showed the homogeneous of responses.

The results above refers to what Kaiser, (2010) pointed out that information technology is an important building block of efficient and effective project management and have considerably changed from been just scheduling applications to complex information systems that cover wide range of project processes while addressing multitude of stakeholders. Kerzner (2013) also pointed out that project management is successful due to its methodological approach of process integration, process creativity, effective planning, execution, supervising and control, and lastly closure to accomplished completed projects. Larson &Gray (2011) wrote that the constraints of projects are hardly the same today as they once were and the growth in new knowledge has increased the complexity of projects because projects encompass the latest technology.

4.5 Relationship between information technology on project management performance

Ordinal logistic regression model was used to assess the relationship between information technology on project management performance.

Table 4.9: Ordinal logistic regression results for information technology and project management performance

	Estimate	Std. Error	Wald	df	Sig.	95% CI Lower Bound	Upper Bound
Data storage mediums	.784	.149	1.124	1	0.879	3.122	6.283
Data storage softwares	.180	.067	22.69	1	0.001	1.129	5.242
Digital data	.037	.009	4.05	1	0.894	.987	1.32

Recording mediums	312	.089	17.53	1	0.007	3.456	8.565

X^2=33.8 R^2= .39

Source: Survey Data (2020)

An ordered logit model was estimated to examine whether data storage mediums, data storage softwares, digital data and recording mediums predict project management performance. Together, the predictors accounted for a significant amount of variance in the outcome, likelihood ratio $X^2(4) = 33.8$, $p < .05$.

Only data storage softwares, $b = .180$, $SE = .067$, Wald $X^2(1) = 22.69$, $p < .05$, and recording mediums, $b = .333$, $SE = 1.032$, Wald $X^2(1) = 14.556$, $p < .05$, predicted the project management performance. Overall, the model accounted for 39% of the variance in the outcome, with McFadden's pseudo-R^2= .39. This made a researcher to confirm **H_1:** by saying that **t**here is a significant relationship between information technology and project management performance of Vision City Project Phase 1. And reject **H_O:** by saying that there is no significant relationship between information technology and project management performance of Vision City Project Phase 1.

CHAPTER FIVE:
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the final summary of the research findings, the conclusion, the recommendations and suggestions for future research. Both the summary of findings, conclusion and recommendations are based on the objectives of the study such as to assess the effectiveness of information technology tools during project management of Vision City Project Phase 1, to measure the performance of the Vision City Project Phase 1 and to examine the relationship between information technology on project management performance of Vision City Project Phase 1.

5.1 Summary of Findings

5.1.1Effectiveness of information technology tools during project management

Various Information Technology (IT) packages were used in the Vision City Project Phase 1 to help support the management of the project from the start till then end. Some of the IT packages included Sure Track Management Tool which was majorly used for the management of the project, emails and WhatsApp which were used for communication, cameras that were used for monitoring project performance and computers which were used to record and store all important information.

Primary data was further collected to understand or examine the effectiveness of the information technology tools during project management. The study results therefore show that majority of the respondents agreed information technology systems such as the Sure Track Project Management Tool supported our project managers to multi-task with a mean of 4.0 and a standard deviation of 0.31. Study results further showed that majority of the respondents strongly agreed that information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success with the average mean is 3.925 which is strong and average standard deviation of 0.3175 that showed the homogeneous of responses and study results also showed that most of the respondents agreed that information technology is considered advantageous to project managers because of the alleged contribution regarding timelier decision making and project success.

5.1.2 An assessment of the performance of the Vision City Project Phase 1

According to the Vision City monthly report of November 2018, this project started on the very date (4th October 2013) it had been planned to start. However, it didn't end on the exact date it had been planned to end. This project ended 3 years after its planned end date. Moreover, Vision City project phase 1 had a planned budget of $99 million, however, 90% ($89.1 million) was actually spent. The fact that the project costed an amount which was within the project budget was a key indicator of good project performance. Furthermore, all the Good for Construction drawings were successfully issued to CCECC as per contract schedule, during the period from October 2013 to January 2014. Revised drawings also were issued during the course of construction based on the requirement recognized by client/consultants. ST4 issued the revised design for 4 BHK semidetached houses on 30 October 2014 St 5 November 2014. CCECC notified that they will consider construction start date for these houses accordingly. ST4 redesigned the roof from truss roof system to concrete roof system (as it was in SYN design during tender) for section 2 villas & townhouses and issued the drawings in the first week December 2014. Furthermore, SYN/ST4 summarized the consolidated revised drawing list of section 2 buildings, corresponding to contract drawing schedule. Study results showed that the average mean on performance of the Vision City Project Phase 1 is 4.2 which is strong and average of standard deviation is 0.42 that showed the homogeneous of responses.

5.1.3 Relationship between information technology on project management performance

Ordinal logistic regression model was used to assess the relationship between information technology on project management performance. An ordered logit model was estimated to examine whether data storage mediums, data storage softwares, digital data and recording mediums predict project management performance. Together, the predictors accounted for a significant amount of variance in the outcome, likelihood ratio $X^2(4) = 33.8$, $p < .05$.

Only data storage softwares, $b = .180$, $SE = .067$, Wald $X^2(1) = 22.69$, $p < .05$, and recording mediums, $b = .333$, $SE = 1.032$, Wald $X^2(1) = 14.556$, $p < .05$, predicted the project management performance. Overall, the model accounted for 39% of the variance in the outcome, with McFadden's pseudo-$R^2 = .39$.

5.2 Conclusions

The main objective of the study is to assess the impact of information technology on project management performance with a case study of Vision City Project Phase 1. Study results revealed that majority of the respondents agreed information technology systems such as the Sure Track Project Management Tool supported our project managers to multi-task with a mean of 3.925 which is strong and average standard deviation of 0.3175that showed the homogeneous of responses. The average mean is 4.2 which is strong and average of standard deviation is 0.42 that showed the homogeneous of responses. Last but not least, an ordered logit model was estimated to examine whether data storage mediums, data storage software's, digital data and recording mediums predict project management performance. Together, the predictors accounted for a significant amount of variance in the outcome, likelihood ratio $X^2(4) = 33.8$, $p < .05$. This made a researcher to confirm **H_1:** by saying that **t**here is a significant relationship between information technology and project management performance of Vision City Project Phase 1. And reject **H_O:** by saying that there is no significant relationship between information technology and project management performance of Vision City Project Phase 1.

5.3 Recommendations

From the findings of this study, the researcher wishes to make the recommendations below.

1. The project managers and site engineers in different housing projects should be well qualified even up to the level of masters in order to order to ensure proper management of development projects with the available information technology systems. This is because highly qualified project managers and site engineers can easily handle the IT packages which are used in project management better than the less educated.
2. All government and private sector housing projects are encouraged use utilize the use of information technology because they generate, relevant, accurate and secure information needed for the effective and efficient management of the project and decision making. Furthermore, it is also because, study results showed that IT significantly impacts the management of a project.
3. IT usage has a positive impact on the success of the projects especially during the design phase and the performance of schedule and cost. Therefore, it is recommended that implementing an IT strategy and adapting new technologies are some of the

critical elements in project management success. This is because IT quickens and also simplifies the manner in which a number of activities can be carried out.

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Appendix A: Questionnaire

Dear research participant,

My name is **Sandra Mukesha**, a student from the University of Rwanda at the College of Business and Economics. I am pursuing a Master's degree of Business Administration with specialization in Project Management. I am currently carrying out research about the impact of information technology on project management performance with a case study of Gacuriro and Kinyinya Vision City Housing Project. I would like to invite you to participate in this study. Your answers will not be shared with anyone outside this project. Your name will not appear on the survey questionnaire and all the information will be treated with utmost confidentiality. At the end of the study, we will put all the answers together and make a report. Once the study is finished the completed questionnaire will be destroyed. The survey will only take you no more than 10 minutes to complete and there are no costs to you. Your participation is voluntary and you can withdraw at any time without penalty. By completing the survey, you indicate that you voluntarily participate in this research.

Thank you.

SECTION A: Bio-Data and Demographic Information

Please tick [√] the appropriate box.

A1. Sex:	1. Male 2. Female
A2. Age:	1. Below 30 years 2. 30- 39 years 3. 40-49 years 4. 50 years and above
A3. Education level:	1. Primary 2. Secondary 3. Bachelor's 4. Master's 5. PhD

SECTION B: Effectiveness of information technology tools during project management

To what extent do you agree or disagree to the following statements in regard to effectiveness of information technology tools during project management. Indicate your choice by placing an **[√]** under your answer choice. Where; Strongly Agree=SA, Agree=A, Neutral=N, Disagree=D and Strongly Disagree=SD.

No	**Effectiveness of information technology tools**	**SA**	**A**	**N**	**D**	**SD**
B1	Information technology softwares such Primavera P6 and Microsoft project helped project managers at Gacuriro and Kinyinya Vision City Housing Project to multi-task.					
B2	Information technology is considered advantageous to project managers because of the alleged contribution regarding timely decision making and project success.					
B3	Gacuriro and Kinyinya Vision City Housing Project due to its complexity was compelled to utilize technology softwares such as Primavera P6 and Microsoft project in order to benefit from all team members.					
B4	Primavera P6 and Microsoft project supported the management of the Gacuriro and Kinyinya Vision City Housing Project our project in a cost-efficient manner.					
B5	Primavera P6 and Microsoft project enables quick review and easy periodic updating, these softwares filter and reduce data to provide information on summary and exception bases.					
B6	Information technology tools such as emails, WhatsApp, Skype, Zoom among others quicken the communication process during the management of Housing projects.					

SECTION C: Performance of the Gacuriro and Kinyinya Vision City housing project

To what extent do you agree or disagree to the following statements in regard to performance of the Gacuriro and Kinyinya housing project. Indicate your choice by placing an [√] under your answer choice. Where; Strongly Agree=SA, Agree=A, Neutral=N, Disagree=D and Strongly Disagree=SD.

No	**Performance of the Gacuriro and Kinyinya Vision City housing project**	**SA**	**A**	**N**	**D**	**SD**
C1	The Gacuriro and Kinyinya Vision City Housing project was started on the exact date as it was planned.					
C2	The labor costs spent per month for the Gacuriro and Kinyinya Vision City Housing project exceed what was planned.					
C3	Rwanda Social Security Board (RSSB) as a key stakeholder is pleased about the progress of Gacuriro and Kinyinya Vision City Housing project					
C4	All the project activities were carried out in accordance to the project original timeline.					
C5	All the housing units that are part of the Gacuriro and Kinyinya Vision City Housing projectmeet the standards set out in our quality plans.					

SECTION D: Relationship between information technology on project management performance

To what extent do you agree or disagree to the following statements in regard to relationship between information technology on project management performance. Indicate your choice by placing an **[**√**]** under your answer choice. Where; Strongly Agree=SA, Agree=A, Neutral=N, Disagree=D and Strongly Disagree=SD.

No	**Relationship between information technology on project management performance**	**SA**	**A**	**N**	**D**	**SD**
D1	Information technology softwares such as the Primavera P6 and Microsoft project were important building blocks of efficient and effective project management of Gacuriro and Kinyinya Vision City Housing project.					
D2	Primavera P6 and Microsoft project supported our project managers and engineers in their planning, organizing, control, reporting and decision-making tasks.					
D3	Information technology has been important in supporting us achieve project goals and the implementation of project strategies					
D4	Primavera P6 and Microsoft project also supported the process of monitoring and evaluating of the Gacuriro and Kinyinya Vision City Housing project					
D5	Information technology has brought a lot of benefits for the technical staff that can be used to facilitate the work					
D6	Information technology has become inclusive that it supports the project's entire life-cycle					
D7	In our present economy characterized by globalization, outsourcing and increased competition, information technology is emerging as key value for all projects					

Thank you for your time

Appendix B: Krejcie and Morgan, 1970's table of sample determination

Table 6.1: Sample size selection from a known population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Source: Krejcie and Morgan, 1970 ***Note: N is population size; S is the sample size***

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