ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

OFFICE OF GRADUATE STUDIES

THE INFLUENCE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY SOLUTIONS USE ON PROJECT PERFORMANCE: A CASE OF EMERGENCY AND DEVELOPMENT FOOD SECUIRTY ACTIVITIES WITHIN CATHOLIC RELIEF SERVICES - ETHIOPIA

By: Abdisa Gurmessa

Advisor: Solomon Markos (Asst. Professor, PhD)

Research project as in partial fulfillment of the requirements for the award of the degree of Master of Project Management

February 2021

Addis Ababa, Ethiopia

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A Research project submitted to Ababa University School of Commerce Graduate Program as in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Project Management

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Statement of Declaration

I, Abdisa Gurmessa, have carried out independently a research project on the topic entitled "The influence of information and communications technology solutions use on project performance" in partial fulfillment of the requirement for the Degree of Master of Art in Project Management with the guidance and support of the research advisor Solomon Markos (Assist. Professor, PhD)

This study is my own work that has not been submitted for any Degree or Master program in this or any other institutions.

Abdisa Gurmessa

Signature: _____

Date: _____

Addis Ababa, Ethiopia

Statement of Certification

This is to certify that Abdisa Gurmessa has carried out this research project on the topic entitled “The influence of information and communications technology solutions use on project performance” under my supervision. This work is original in nature and it is sufficient for submission for the partial fulfillment for the award of Degree of Master of Art in Project and Management.

SOLOMON MARKOS (Assist. Professor, PhD)

Signature: _____

Date: _____

Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

GRADUATE PROGRAM

Research Project for MA in Project Management

By:

Abdisa Gurmessa

SOLOMON MARKOS (Asst. Professor, PhD)	_____	_____
Advisor	**Signature**	**Date**
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Examiner	**Signature**	**Date**
_____	_____	_____
Examiner	**Signature**	**Date**

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Acronyms/Abbreviations/Initialisms

COVID-19	Corona Virus Disease 2019
CRS	Catholic Relief Services
EEFs	Enterprise Environmental Factors
GKIM	Global Knowledge Information Management
ICT	Information and Communications Technology
NGO	Non-Governmental Organization
OPAs	Organizational Process Assets
Oxfam	Oxford Committee for Famine Relief
PMD Pro	Project Management for Development
PgMD Pro	Program Management for Development
PMLC	Project Management Life Cycle
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMIS	Project Management Information System
PMPG	Project Management Process Group
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
US	United States
UTAUT	Unified Theory of Acceptance and Use of Technology

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Abstract

The use of ICT, these days, is away from want and nearly becoming a need. Every one of us uses ICT for some purpose or in different ways. Catholic Relief Services uses ICT to manage its projects. The organization has been investing to acquire, adopt, customize, or develop ICT solutions to improve its programmatic performance and comply with different donor requirements. ICT has been in use for project planning, execution, monitoring, and evaluation, and closing. Thus, this study has examined whether the use of ICT in project management might have related to project performance or not. To this effect, the researcher distributed a questionnaire consisting of closed and open-ended using Google Forms to all targeted development and emergency project staff to collect primary data. The researcher also interviewed to gather specific information from key informants. The researcher observed all ethical issues and tested the reliability of the measuring scale using Cronbach's Alpha. The researcher analyzed the collected data using descriptive and inferential statistics and has presented the result using tables. The study revealed that ICT use for managing project phases is significantly associated with project performance. Similarly, the study showed that enterprise environmental factors and organizational process assets influence the association between ICT use and project performance. The study recommends researchers carry out rigorous research to cover more aspects to reveal more existing relationships based on the findings. However, in the meantime, the agency continues testing more applications, giving refreshment training on usage, and encourages staff to use solutions that have more features.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

De Wet, Koekemer and Nel (2016) expressed that the growth in infiltration of technology into our society was mainly the cause of the change made in our world in the past tens of years. Marius (cited in De Wet et al., 2016) stated that the growth in technology changed the way people interact, think, and accomplish their tasks. Thus, the researcher has understood that technology is something beyond want and in near future, if not now, it would become a need in everyday life. In this regard, De Wet and Koekemoer (2016) stated that technology provides mobility, and it quickly changes. Its functional feature makes it an everyday tool of society.

Internet, a global network of computers, is one of the technologies that has enabled the data connectivity between computers. The number of people who are using internet has grown fast. According to De Wet and Koekemer (2016), in 2011, the number of Internet users in South Africa was 8.5 million and this number increased to 24.9 million in 2014 within three years. The research summarized that currently 90 per cent of the mentioned users access the internet facility using their mobile devices. According to Internet World Stats (usage and population statistics), Internet penetration of Africa in Q1-March 2020 was 39.3%, and that of Ethiopia (population=114,963,588) was 17.8% (percent population). The Internet penetration for Ethiopia was low (17.8%) as compared to that of Egypt (Population=102, 334, 404) which was 48.1%. But the Internet Growth % of Ethiopia from 2000-2020 was 204,972%, which was high as compared to that of Egypt (Population=102, 33,404) is (10,840%).

The global interconnection of networks has facilitated the use of various information and communications technology (ICT) solutions. Wikipedia described Information and communications technology (ICT) as an umbrella or a broader term for information technology that intends to refer to all unified communications. Different websites and articles have been discussing the use of technology such as storing and retrieving information in digital form. In addition to storage and retrieval, ICTs has also enabled people to transmit, and manipulate information effectively in a digital form. These technologies are numerous in number and type, thus, discussing them all in here is beyond the scope of this paper, however, the paper discusses the common ones to make clear for the reader to which technologies this paper is referring to in its subsequent discussions. Different articles have described some of

these technologies as Internet and wireless networks, including cell phones. Other technologies have been related to computers, software, and videoconferencing. Social networking technologies have also been known as highly popular. In addition, other media applications and services like radio and television have also been known as growing technologies. In fact, there are various types of existing and emerging technologies, but the main purpose of these technologies is to enable people to become more effective in their work as well as enable them to perform their work at ease with efficiency.

ICT not only has enabled users to be more effective in their daily work, but also enabled them to have an effective mechanism to transfer or share information among themselves. Non-governmental Organizations (NGOs) that are working on emergency projects mainly use ICT to share or transfer information. In this regard, Raspopovic & Vasić (2014) stated the importance of ICT as technology that helps people to become more effective and make their work easier which makes ICT as a daily required tool in everyday life of humans. The research also added the use of ICT in terms of enabling communication to be effectively conducted that made it more essential in making decisions and in emergency situations because of its support in making high response speed. In addition, the way this information could be transferred to the receiver and communicated were also regarded important. It was also stated that such nature of ICT could aid humanitarian relief effort to ease the challenge they face in coordinating aspects of communications and its protocols among concerned parties or organization. The paper has summarized that ICT, thus, helped the organizations to overcome the challenges they face while coordinating communication across the institutions.
Saab et.al (cited in Raspopovic & Vasić (2014)) stated that "*Non-governmental organizations (NGOs) are organizations who are mostly engaged in emergencies in order to help people that are faced with natural disasters such as fires, floods, storms, violence, people and conflicts, genocide, etc.*". According to Saab, ICT has contributed to the growth of NGOs; the adoption of these technologies to their organization's process enabled NGOs to grow. Regarding the growth of NGOs Hruska (2003) stated that the integration of ICT in organizational processes was mainly the reason for today's NGO to grow exponentially. Not only ICT influenced NGO to grow but NGOs have also been working on exploring new technologies to improve the ICT usage in their projects. In this regard Oxfam (2017) stated that working with older technologies were the reasons to improve situations. In addition, adapting existing tools was also one of the practical ways to improve situations. Other reasons such as compromising on the requirements and collaborating on building solutions all

emerged as practical ways to improve the situation. Oxfam has found out in a study on building products, only 26% of survey respondents thought NGOs should build their own products. The percent of respondents who considered customizing existing product or adopting it were 90% of all survey respondents. That concluded the adaptation could minimize the duplication of effort that would happen if a solution were to be built from scratch.

Cognizant of the importance of ICT, Catholic Relief Services (CRS) has a strategy for ICT. For example, CRS, globally, is currently using digital tools to support COVID-19 response strategy with a goal to "*help people survive with dignity and restore their lives and communities*" and with one of the strategic objectives to "*Mitigate health impact of COVID-19*" toward achieving one of the intermediate results, on which CRS Ethiopia is working, that is "*Health systems provides quality COVID-19 services across the continuum of core*". To this effect, CRS Ethiopia is using "*CommCare* [provider is Dimagi and external to CRS] *to track procurements and dispatches of essential medical supplies and cleaning materials for catholic health facilities and for partners to be used at distributions.*" The organization is also using internally developed or adopted technologies. In general, Catholic Relief Services has been highly utilizing ICT solutions for managing its projects starting from portfolio management down to each project activity in project processes. However, assessing the effectiveness of the tools across the country program and implementing the result of the assessment would make the users more effective. For example, instead of MS Project, many project managers are using Microsoft excel in planning, and this has always been triggering the researcher to conduct an assessment to sort out which ICT software solution would make the managers more effective, though no research have been carried out yet. However, the aim of this research is to assess the influence of ICT solutions use on effective project performance.

1.2 Background of the organization (project)

Catholic Relief Services was founded in 1943 by the Catholic Bishops of the United States to serve World War II survivors in Europe. Since then, CRS have expanded in size to reach more than 130 million people in more than 100 countries on five continents. For over 75 years, CRS' mission has been to assist impoverished and disadvantaged people overseas, working in the spirit of Catholic social teaching to promote the sacredness of human life and the dignity of the human person. Although CRS’s mission is rooted in the Catholic faith, its

operations serve people based solely on need, regardless of their race, religion, or ethnicity. Within the United States, CRS engages Catholics to live their faith in solidarity with the poor and suffering people of the world (CRS, 2018a).

CRS began working in Ethiopia since 1958 at the invitation of the Episcopal Conference of Ethiopia. Since that time, CRS' programs and missions have adapted and grown in response to and in tandem with the changing reality of the lives of the poorest of the poor. CRS' initial programming was focused on small scale charity and relief projects. However, during the years 1984-1986, a wide-spread drought and famine in Ethiopia resulted in one of the largest humanitarian crises of the past century. CRS responded to this crisis by implementing an emergency response operation known as the Joint Relief Partnership (JRP). This was an ecumenical collaborative effort that included CRS, the Ethiopian Catholic Church, the Ethiopian Evangelical Church Mekane Yesus, and the Lutheran World Federation. In 1987 the Ethiopian Orthodox Church also joined the JRP consortium. The JRP delivered life-saving food (primarily from the US Government and European Community) that saved the lives of millions of Ethiopians. This program was the largest relief operation ever undertaken by CRS.

Starting in the 1990s until now, CRS diversified its programming to include a more holistic, community and partner-based approach focusing on root causes of poverty. As a result, CRS developed strong partnerships with the local Catholic Church in order to address chronic food insecurity. Meanwhile, CRS maintains its emergency response capacity and leads the Joint Emergency Operation coordinating several international and national NGOs, coordinating closely with the Government of Ethiopia and the donor, the US Government via USAID's Food for Peace Office. CRS is implementing two priority USAID Activities - the USAID Feed the Future (FtF) funded Ethiopia Livelihoods Resilience of Oromia (LRO) and USAID's Office of Food for Peace (FFP) funded Development Food Security Activity (DFSA), also known as the Ethiopian Livelihoods & Resilience Program (ELRP). Both programs are implemented in Oromia regional state with CRS' DFSA also working in Dire Dawa Administrative Council. (CRS web, Nov 2020).

Information and Communications Technology for Development (ICT4D) is the practice of utilizing technology to assist poor and marginalized people in developing communities. CRS applies technology at scale to increase its reach and effectiveness with evidence that CRS is improving the lives of people it serves (CRS, 2017). CRS employs information and

communications technology for development (ICT4D) across the gamut of its programming-from its signature activities in emergency response, agriculture, and health to its complementary efforts in education, microfinance, peace building, and water and sanitation (CRS and ICT4D, 2018b). CRS has been using technology across its hundreds of projects since 2010 (CRS, 2017)**.**

1.3 Problem statement

Scanlin (cited in Chan, 2014) revealed that communication takes about 75-90% of a project manager's time and information that is why; it should be to be up-to-date and available when needed. It was also pointed out that the interpretation of communication is in most cases the base for explaining the cause of project failures.

Generally, projects managers, team and others require ICT to communicate. Many project-based organizations have project implementers (partners), donors, stakeholders and others which are not local to the project owner, thus, communication among these parties is an essential task. Regarding the communication among stakeholders, Saeed (cited in Raspopovic and Vasić, 2014) stated the following: "*These partners and collaborators are often located all around the world, which in turn requires effective and prompt communication for the best results.*" Accordingly, without ICT tools, project communications would not be effective.
The advancement of ICT aided researchers to find new methods of data collection and analysis and use of ICT as tools; the use of the tools for data collection and analysis were the evolutionary result of telephone surveys, the use of computerized data analysis and the use of cell phones and pagers in collecting data at random intervals, the use of the Internet in research, and the use of Personal Digital Assistants (Benfield and Szlemko, 2006). Therefore, it was important to study the use of effective ICT solutions or tools for its effectiveness in project data collection for project monitoring and evaluation performance.

In 2012, a discussion on ICT was held between e-Agriculture community and FAO, and World Bank. According to the e-SOURCEBOOK of the ICT Forum, much time and methodological planning and implementation was required to collect data and carryout the monitoring and evaluation tasks as all these tasks were previously being performed manually with the help of paper and pen and this made the result then prone to error. According to the discussion, not only error but it was also difficult to do at large scale as its transaction cost was also high. It was also raised that such challenges of conventional or traditional ways

associated with remote data collection, and monitoring and evaluation have been reduced due to the advancement of technology and its real time decision supporting use. Among these ICT tools, hardware solutions such as tablets and mobile phones, and software solutions or applications having the capacity to create digital surveys were the ones mentioned. The forum explained that the software would allow users to upload data to storage facilities in real-time and the main reason of the forum was aiming at exploring digital options for such activities. In the forum or discussion, it was also focused on identifying the influence the use of the digital tools would have, and the application of using such hardware and software components and the experience of using these technologies.

Saeed et al. (2008) pointed out that many research efforts were made to examine the possible capacity and paybacks of introducing information technology in voluntary organizations and its impacts or consequences. According to the Saeed et al. literatures of research conducted recently on organization have indicated that a lot of voluntary organizations were yet at their early stage of IT adoption. The reasons stated for that were the lack of funding, the diversity in operations and the lack of having stable organizational structures. These key aspects were the reason why IT support in humanitarian organizations became an interesting and emergent field of research. Therefore, the researcher aimed at assessing the gap in the agency in the use of existing or emerging technologies.

Currently, COVID-19 has affected the way we have been doing business. Covid-19 has made situations difficult for project managers to visit partners, conduct training, hold meetings and discussions face to face without necessary protective supplies, and, even, in the presence of protective supplies, these should be conducted with do cares. Catholic relief services health project has assumed additional new tasks to mitigate the spread of the corona virus among staff and partners. The project has been procuring, receiving, and distributing protective supplies to CRS staff as well as its partners since Covid-19 happened. To this effect, effective information and communications technology was one of the required tools for the project. Thus, assessing the current effective ICT use for project management was essential.

Majority of project staff of Catholic Relief Services have started working from home. The sufficiency and effectiveness of current technologies in use at home might not be up to the expectations of project staff thus could affect their performance. Therefore, it was reasonable to assess how ICT affects the project managers in the use of ICT to manage projects from home (anywhere).

The use of ICT is not free from organization's processes, policy and procedures that may constrain its use. This was evidenced in the introductory part of this paper based on the work of Hruska (2003) that stated NGOs integrated ICT into their organizational processes. Therefore, procurement processes and policy, donor policy, ICT use policy and procedures, etc., could all influence the effective use of ICT solutions. Similarly, the organization environment factors such as project staff ICT use skill, ICT support situation and support structure at different level, and usages of ICT for team management, etc., could also influence the effective use of ICT solutions. Thus, the study was important in evaluating whether these organizational assets and organization environmental factors were also influencing the use of ICT solutions or not. Generally, it is believed that the role of ICT is to support project activities. However, the use of ICT can also limit project activities, thus, as much as ICT enhances project performance, it may also constrain project performance (PMBOK, 2017). The type of ICT solutions in use in CRS, especially for project planning, is not uniform. In addition, the level of association and causal relationship between each aspects of project phase management and aspects of project performance has not been studied. Thus, the researcher was personally motivated to assess the type of ICT in use, the influence of ICT uses on project performance, the degree of associations and causal relationships of aspects of project management and project performance.

In summary the study aimed at answering all the following research questions related to the use of effective ICT solutions (hardware and software) for managing project performance across project life cycle (PLC) and assessing the extent to which the technologies influenced the project activities. The study also explained the extent to which ICT use and project performance are related. It would also check the type and level of association between project performance and organizational project environment factors such as project staff ICT usage skill, ICT support staffing and structure who support the technology; and with the processes of the organization such as ICT use policy, donor related ICT policy, technology acquiring processes, technology resource allocation and authorization procedures. By answering the research question, the result of the study would contribute to the agency in standardizing ICT use and decreasing software learing curve for better project performance .

Gaps in Literature Reviewed

Regarding the use of ICT for managing various projects, several studies have been carried out at the global, national levels, and at project levels; however, the studies focused on their own

specific objectives and may also specific to a few countries, or specific to sectors such as education, construction, and health. This study focuses on CRS, a relief agency, working on Development Food Security Activities (DFSA) and Emergency project. Thus, the points discussed in this study are specific or limited or related to DFSA and its environment.

In the UK, Rimmington et al. (2015) carried out a study on the impact of information technology on construction projects. The study found that the primary use of ICT for com-munication in construction widens as ICT develops and interpersonal com-munication decreases. As the difference in the development of ICT level and macroeconomic factors, the study cannot be generalized to projects in Ethiopia.

In Tanzania, Ahadiel (2015) carried out a study on the influence of ICT on project management team performance. The study found that the adoption of new technology supports projects to stay competitive and improve the organizations' products and processes. Tanzania is a different country with a different project context from Ethiopia; thus, the study cannot be generalized or applied to the ICT adoption in Ethiopia projects.

In Brazil, Araújo et al. (2017) carried out a study on the importance of supplier management in project procurement management for project success. The study found that selecting the right supplier and evaluating is an essential task in project procurement. The systematic literature review focused on the criteria and the methods used to determine and assess suppliers for a project.

In Ethiopia, AAU, in Abune Gorgorios School Building Project, Dadi Weyifen (2018) conducted a study on the importance of project Planning, Monitoring, and Evaluation on project success. In addition to clear goals and objectives and planning processes, the information should be available, and real-time evaluation is essential. For information to be readily available and accessed in real-time, the availability of relevant ICT tools is necessary.

In Canada, Xie (2006) carried out a study on the evaluation of the EDRMS program. Xie concluded that the study's findings could not be generalized to all or any electronic document and record management system program or general users of EDRMS because every program has its unique environments. Besides, the research took the respondents for that particular purpose.

In South Africa, Chen et al. (2005) carried out a study on the interrelationship between document management, information management, and knowledge management. They found that there are similarities of the three that are overlapping, and somehow there also differences. Chen also indicated that the three's management is critical for an organization to succeed in today's competitive economic environment. Chen concluded that organizations should have electronic tools such as EDMS, which is used to manage information and knowledge. Chen also concluded that the overlapping relationship between document management, information management, and knowledge management implies that organizations that wish to use the three to accomplish their business objectives should use them combining into an overlapping and holistic whole. The gaps found were summarized as shown in table 1.1.

Table 1. 1: Summary of the research gaps

Variable	**Author**	**Purpose of the study**	**Key findings**	**Knowledge gap**
Project communication	Rimmington, Dickens and Pasquire (2015)	Effect of ICT adoption on construction projects in New York	The study found that Intranet is the most preferred for communication for most projects	The study is carried out in New York, which is different from Ethiopia, it cannot be generalized for Ethiopia
Project procurement	Araújo, M., Alencar, L., and Mota, C., 2017	Project procurement management	In the study of project procurement, it is found that the management of supplier is important.	Brazil can have macroeconomic factors and project procurement context and the study may not be generalized to Ethiopia situation.
Information sharing, Knowledge management	Braglia and Frosolini, 2012	An integrated approach to implement Project Management Information Systems within the Extended Enterprise	The study found that that software designed for complex project management allow not only effective and safe flow of information but also to better perform the planning, scheduling and controlling processes: they are a real asset for the whole project management.	Adoption of software varies with the perception, attitudes of users. Thus, cannot be generalized that all users have similar perception, attitudes and skill toward technology use.

	Hongli Song (2007)	Role of Information and Communication Technologies in Knowledge Management	It also found that different users with different purposes were significantly different in terms of the processes of using electronic resources; and that the relevance and the quality of information were important factors affecting the use of electronic resources.	The study is conducted in academic area, thus cannot be generalized to projects.
Project planning, scheduling, and resource allocation	Magnus C. Ohlsson and Claes Wohlin (1999)	A study of effort estimation during project execution.	The change in estimation error is insignificant to notice as more information becomes available.	It is hard to find an estimation has good correlation to project effort. Thus, preliminary and detailed planning is important rather than waiting till execution
	Dadi Weyifen (2018), AAU Ethiopia, in Abune Giorgis School Building Project.	The importance of project Planning, Monitoring and Evaluation on project success.	The study showed that the importance of information for planning and its accessibility in real time for project evaluation.	The importance of technology that facilitates effectiveness in project success clearly shown.
Team performance (management)	Ahadiel E. Mmbughu (2015)	The influence of ICT on Project management team performance.	adopting new technology has an effect to stay competitive, improve product and process for the organization and this can lead to tangible market advantages.	The study is conducted in Tanzania federation of cooperative, and the project sector is different, it cannot be generalized to emergency and development projects in Ethiopia.
Electronic Document/Record /knowledge management	Li Xie (2006)	Evaluation of the Electronic Document and Record Management Program in a Canadian Municipality	The findings of the study is that EDRMS cannot be generalized to all or any electronic document and record management system program or general users of EDRMS as every program has its unique environments and the respondent for the research were taken for that particular purpose.	There is no generalized knowledge. The study was not generalizable finding to all or any electronic document and record management system program or general users of EDRMS, as every program has its unique environments and the respondent for the research were taken for that particular purpose.
	Chen et al., 2005	Interrelationship between document management, information management and knowledge management	Document management is seen as one of the contributors to business efficiency and effectiveness. that document management, information management and knowledge management are not considered separate from each other in terms of their focus; rather, there are significant overlaps between them.	The study concluded that the integrated management is effective, but it can't be generalized to the management of the dissimilarities separately or in the integrated system. Thus, each organization can have its own management system

1.4 Research questions

A research question is a question that the study intended to answer; accordingly, this research was designed to answer the following research questions:

- What is the level of ICT solutions use in the management of projects across the project life cycle?
- What is the level of link between ICT solutions use and the project performance?
- What is a causal relationship between the use of ICT solutions and project performance?

1.5 Research Objectives

Research objectives are expectations the researcher set to achieve. Thus, the general and specific expectations for this study were given in the following two sections.

1.5.1 General Objectives

The general objective of this study was to assess or describe the use of effective information and communications technology solutions for project performance.

1.5.2 Specific Objectives

The specific objectives of this study were:

- To describe the level of information and communications technology (ICT) use in the management of emergency and development project throughout the project life cycle.
- To identify the level of link between the use of ICT solutions in project phases and the project performance.
- To determine the causal relationship between the use of ICT solutions in project phases and project performance.

1.6 Significance of the study

Effective ICT use enhances the performance of project management. In this regard, Mmbughu (2015) expressed the importance of using appropriate technologies in that proper use of technologies such as Information Communication Technology (ICT) is useful for facilitating successful project management, for ensuring successful project routines, thence,

organizational performance. Also, Gaith et al. (as cited in Wambui, 2017) revealed that information technology-enhanced project performance is used in Nigeria.

Cognizant of the importance of information and communications technology, Catholic Relief Services budgeted for information and communication technologies every fiscal year. Most of the standard technologies are acquired for local project use through headquarter in the US with the help of GKIM on providing specifications. The adoption of emerging technologies is also mainly managed at headquarter level. But local assessments such as this study would incorporate local-specific usage assessments. It would provide information on country-specific technology use experience such as the type of tools used, how often used, the indirect effect of Internet outage which affects project communication, access to cloud-based project budgeting system, access to knowledge base repositories, and online portfolio management system.

The study is also essential because it would provide information on the effective information and communications technologies to CRS projects. In relation to project management, the study might also be used as an input to functions during the development of ICT usage policy and procedures, during the revision of staffing, and in the development of a culture of adopting emerging technologies.

The research might also be used as a literature review in academic areas. It might contribute to the body of knowledge in project management as the study also examined the adoption of an effective technology such as drones in terms of use to enhance project performance.

Since the study also examined the use of effective ICT solutions in relation to project performance, it might also be used not only in developing the integration of ICT support into projects, but it would also help in forming necessary and effective bonding between the project and the supporting ICT. The researcher believed that the ICT support given would be more effective when both project staff and the supporting staff would appear somehow on the same page in understanding the association of aspects of the project and effective usage of ICT; thus, the outcome of the research would help in this direction.

1.7 Scope of the study

The study has been conducted to assess the effective use of ICT for development food security activities and emergency project performance in the CRS Ethiopia program.

Information on the use of ICT has been gathered from the agency's project staff. In addition, information on the project supporting people and organization (process, policy, procedure-related) have also been gathered from project staff. Since the need to refer to secondary documents of policies and procedures did not arise, documents were not referred to gather details of information on the study. Thus, the scope only targeted CRS project staff and did not target gathering secondary information from documents or from respective operations staff of supply chain, human resources, finance, and ICT; though, operation staff is working on project support-related activities. Accordingly, the study was based on the analyzed response of data collected from project staff to explain the relationship among the independent variables (ICT use for managing project phases), EEFs, OPAs and the dependent variable (project performance). Gathering information from the staff of partners, beneficiaries, and others was not the scope of this study as these parties were not the direct users of CRS's technologies under consideration in this research.

1.8 Limitation of the study

The research might not be generalized to other international non-governmental organizations (INGOs) or to a national level as each party has its own different project environment in relation to ICT use. It should be noted that the accuracy of the research result depends on the collected data which in turn depends on the respondents' skill and knowledge on the subject matter or on how they understand the questionnaire.

Finally, on the data side, during this research time, staff were working from remote (home) and busy with project activities at the same time; thus, the response rate (number) might not be highly sufficient enough as expected to generalize to the population outside of the study area, though, the researcher reminded participants via different communication channels such as email, phone call and in-person visiting those who were available at their office; however, in doing so, the researcher would have respected the right of those participants who did not want to respond.

1.9 Definition of terms

Information and Communications Technology (ICT): These were hardware and software solutions supporting effective project planning, execution, monitoring & evaluating, and closing.

ICT use: These were indicators of the type, level and frequency of hardware, software and data used to gather, process, and distribute project information, thus influencing project performance.

Project Planning/Design: These were processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project has undertaken to achieve.

Project Execution: These were processes performed to complete the work defined in the project management plan to satisfy the project requirements.

Project Monitoring and Evaluation and Controlling: These were processes required to track, review, and regulate the progress and performance of a project; the process also aimed at identifying areas requiring changes to a plan and accordingly initiating corresponding changes.

Project Closure: These were processes performed to formally complete or close the project, phase, or contract.

People: These were support staff giving support to users (project staff) of ICT solution for managing project phases (planning, executing, monitoring & evaluation, and closing projects) whose ICT support skill; team acquisition, development and management; support structure and staffing influences ICT use and project performance.

Processes/policy/procedures: These were the organizational process assets such as guidelines, standards, templates, methods, financial and change control procedures, resource control management, established structure, system of authority, culture of supporting objectives, etc. influencing the assurance of effective use of ICT for planning, executing, monitoring & evaluating, and closing of projects.

Project Performance: These were the completion of projects on schedule, within budget and as per the intended purpose and per objectives.

1.10 Organization of the study

The study was organized into five chapters. The first chapter was about the introduction and consisted of nine subtopics. The sub-topics were the background of the study, the background

of the organization, statement of the research problem, research question, objectives of the study, the significance of the study, the scope of the study, limitations of the study, definition of terms, and this section - the organization of the study. The second chapter would deal with the related literature reviewed on the study. Chapter three would deal with the research approach, design, and data collection methods methodology of the research. Chapter four would present the analysis of the research results, and chapter five would contain conclusions and recommendations. These were made based on the findings of the study. Finally, references, appendices, and other important documents have been attached in the last of the report.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter would explore the research studies on the effective use of information and communications technology (ICT) for project performance. The researcher, though, limited but explored related research done by other researchers and scholars to gain insight into factors affecting the use of ICT for project management. Many researchers have conducted research related to ICT in connection with the adoption and use of technology in construction projects, factors influencing the implementation of ICT projects, and the expected benefits associated with the technology use (Yang et al., 2011). The researcher has organized the results of the exploration to reflect the relevance of the objectives of this study to the research problem. Generic project phases of a project lifecycle, such as project planning, project execution, project monitoring & evaluation and control, and project closure, have been briefly described. The researcher has reviewed the literature on ICT use across a project life cycle, such as ICT use for scheduling, budgeting, resource allocation, team management, project communication, procurement management, and record management. Next, the researcher reviewed the intervening effect of people and processes on the adopting or using ICT for project performance. Finally, the researcher presented a conceptual framework that guides this research and shows how ICT is related to project performance. The influence of ICT on project performance is not much evident. Prior research has mainly focused on finding the effect of ICT on economic growth at a national level, sectoral levels such as Education, agriculture, food security, and user-level such as farmers.

2.2. Theoretical Literature Review

2.2.1 Project Management

Project

When organizations want to keep themselves competent, they set out projects (one-time work that has a beginning and ending time) to produce unique products, services, or results. Non-profit organizations also set out projects to address a humanitarian need with exceptional products, services, or results. In our globe, enormous projects are running at a specific point of time; however, each project is unique, meaning it produces a new product or services or

results we have not seen before. Westland, J., 2006 defined a project as an unusual endeavor to make a set of deliverables within the specified time, cost, and quality constraints. Thus, a project has a time frame or is temporary. PMI (2017) defined a project as a temporary effort that undertakes an endeavor to create a unique result, service, or product. PgMD Pro Guide (by PM4NGOs, 2018) also defined a project as "a temporary endeavor undertaken to create a unique product, service, or result." This definition is the same as the definition given in PMBOK Guide (PMI, 2017). According to PgMD Pro, "project delivers integrated outputs or deliverables"; accordingly considered that the better result or outcome of the project is, the better the project is to deliver specific benefits for communities within the time-bounded frame. The Guide also mentioned that the project depends on donor requirements to make the intended benefits measurable and cost-effective.

It has been known projects are driven by constraints, and different articles have described these competing constraints as time, budget, quality, resource, risks, and others. Accordingly, since completing projects consumes resources, they should be planned, organized, directed, and controlled correctly, and this requires using knowledge, skill, tools, and techniques. Besides, project guides and articles indicated that a constraint for one project might not be a constraint for another project, and balancing the restrictions determines the project's success.

Project management

PgMD Pro Guide has defined project management as the discipline of planning, organizing, and managing resources; the discipline aims to bring about the successful delivery of specific project goals, outcomes, and outputs. According to the PMD, achieving each aspect's goals, products, and results is a challenge that project management faces. The reason is that project management should not only try to achieve the elements but also should be able to manage project constraints in scope, schedule, budget, and quality. PMI (2017) defined project management as the application of skills and knowledge to a project activity. The stated definition was that the application of techniques and tools to the carried-out activities. The application of each description is to apply them to activities to meet project requirements. According to Westland (2006), project management is the skills, tools, and management processes required to undertake a project successfully. Thus, Westland summarized that project management incorporates sets of skills, a suite of tools, and a series of processes.

Project Life Cycle and Phases

The project life cycle indicates the beginning and the end of a project and its various phases. Ward and Chapman (1995) stated that project lifecycle could be commonly described in four phases: conceptualization, planning, execution, and termination. Westland (2006) also described the project lifecycle in terms of its four phases: Project initiation, planning, execution, and closing. PMBOK (2017) described a project life cycle as a sequence of phases, even though the phases can sometimes overlap. The Guide also explained that project phases could be defined differently by different organizations, and they have no clear boundary thus can sometimes overlap. The Guide also described the project phase as a group of logically related activities carried out to complete one or more deliverables in a planned, managed, and controlled way. According to the Guide, typical project phases can be Project Initiation (starting the project), Project Planning (organizing and preparing), Project Execution (carrying out the work), and Project Closure (ending the project).

Project Processes

Project management processes are another component of PMBOK Guide. PMI has briefly described Project management processes as a systematic series of activities focusing on an end-result; the Guide has logically grouped project management processes into five Project Management Process Groups (PMPG). These process groups are termed Initiating, Planning, Executing, Monitoring and Controlling, and Closing. The processes can be repeated in each phase hence independent of project phases and project application areas such as resource management, supply chain, information services, and finance or industry focus areas such as construction, aerospace, etc. According to PMI, the aim of each process group is: Initiating Process Group defines a new project, or it defines a phase of an existing project; Planning Process Group establishes the scope of the project or course of actions the project undertakes; Executing Process Group accomplishes the work packages defined in the project management plan to satisfy project requirements; Monitoring and Controlling Process Group tracks progress, review and regulate the progress and performance of a project and identifying areas requiring changes to a plan and accordingly initiating the relevant changes; and finally, the Closing Process Group formally completes or close a project, phase, or contract.

PMBOK summarized the interrelationship among components in projects such as PLC, phases, and processing groups as shown in figure 2.1.

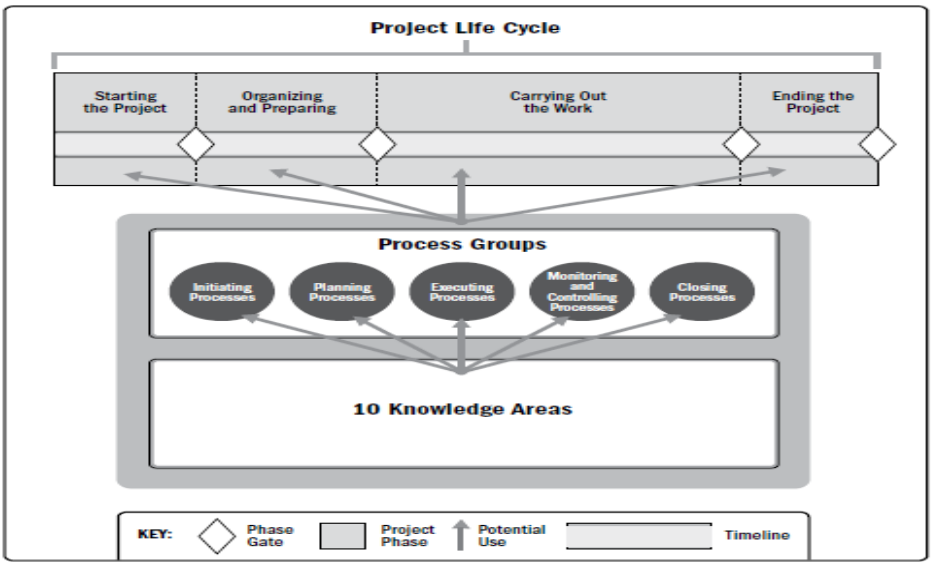

Figure 2. 1: Interrelationship of PMBOK® Guide Key Components in Projects

Source: PMBOK Guide 6th edition.

2.2.2 Project Management and Information Technology

PMBOK Guide (PMI, 2017) recognized the influence information technology has on project management. According to PMBOK® Guide, the influence of infrastructure technology hardware, infrastructure technology software, telecommunications channel, shared systems, and cloud computing was categorized under the internal enterprise environment factors (EEF) for a project, and the knowledge base and policies were categorized under the internal organizational process assets (OPA). Therefore, EEF (either internal or external to project) and OPA (internal to a project) were the two forms of support the organization and the wider community provide to assist project teams in managing and delivering their projects. The guide also stated that project managers use OPAs to improve the management of their project, and they manage it within the constraint and guidelines established by the EEFs. The guide generalized that without the necessary resources and support from the organization, it is nearly impossible to consistently deliver successful projects. Thus, EEFs and OPAs were the two factors that considered enhancing or, in some cases constraining projects. In connection with this, technology was intended to facilitate the effectiveness and efficiency of the project managers.

Generally, tools are required in the conversion of inputs to outputs to support or enhance the effectiveness of activities carried out in every organization-defined project phase. When used effectively, ICT is one of the tools that enable or facilitate project activities to produce output or to have an impact on goals.

2.2.3 Use of ICT in Project Planning: Scheduling, Budgeting, Resource Allocation

The researcher agrees that the successful completion of a project is something that is desired and should be worked toward achieving objectives in an effective and efficient manner measured through its known dimensions - on schedule, within budget, and per scope. But the definition of project success was a discussion point in several articles, according to Bannerman (2008). Bannerman pointed out that though several discussions have been carried on, the definition of project success consensus has not been reached in those discussion works of literature. But according to PMBOK, success can be achieved through applying project management practices. Thus, project management, according to PMBOK, is accomplished through applying and integrating the project management processes given as initiating, planning, executing, monitoring, and controlling, and closing in PMBOK. However, some projects are complex, and others are even extremely complex enough to accomplish easily; thus, the management of such projects needs ICT tools that aid project management.

This study has focused on the effect of ICT as an enabling or facilitating tool to improve the chances of project success in meeting its objectives. Among these technologies and use, planning and modeling software, document management technologies, hardware infrastructure, ICT usage skill, processes (e.g., processes to acquire hardware/support and forms used to control time, cost, quality, etc.), ICT use policy, etc. were the ones that this study has assessed to determine the extent in which they affect project performance. The use of these technologies across project lifecycle would improve the managers' performance in managing projects. According to several works of literature, since projects are implemented in an environment that can influence the project, project managers should know the project environment such as stakeholders, client/sponsors requirements, the company organization structure, new technology, competitors, market, rules, and regulations, etc. thoroughly. Since

projects are unique in some way, it is reasonable to briefly discuss the project lifecycle and its constituent phases.

ICT provides tools that aid project managers in planning and managing projects. These tools are known, in many articles, including PMBOK, like project management software systems (Tool). The tools were described as computer applications that are specifically designed to aid the project management team in the planning, monitoring, and controlling of the project. As per the description, the aid in monitoring and controlling, planning, and execution includes estimating cost (budgeting), scheduling, allocating and managing the resource (materials and personnel), managing communication and collaboration, analyzing risks, controlling documents, and managing records, and risk analysis. It has also been described that the tools have a basic or advanced feature that supports primary management processes simple and advanced.

In general, ICT has enabled project management to facilitate time-managed, cost-effective, and quality assured projects. For project managers, ICT is an essential tool and is not a simple enabler as the tool aids them to access any piece of needed information at any time anyplace so they will quickly make an appropriate decision on project issues on time (Laudon & Laudon, 2012). According to Ohlsonn & Wohlin (1999), research was conducted to find the effort needed to be applied to a software project in its execution stage. Accordingly, the research found appropriate measures to re-plan projects. The re-plan was supposed to boost the effort estimation as a lot of information became obtainable during project implementation. The study was so aimed to find the effort estimations evolved as a software project was performed. Dadi Weyifen (2018) conducted research on the importance of project planning in project success. Dadi stated that clear goals and objectives and planning processes are not the only factors to consider; the availability of information and real-time evaluation are also important factors. For information to be without delay available and accessed in real-time, the supply of relevant ICT tools is important. According to Westland (2006), project managers can use planning software, modeling software, etc., to improve the chance of project success.

PMBOK 2017 identified ten project knowledge areas or disciplines in project management, and every discipline would deal with a piece of a particular knowledge. According to the guide, all information of the rest of the nine disciplines were brought together in the Project Integration discipline, thus sharing of the knowledge on all disciplines is an important activity

instead of storing data of every discipline singly that makes an extra effort and separated storages. Thus, within the project management environment, integration includes characteristics of unification, consolidation, communication, and interrelationship. Therefore, multi-module ICT applications like enterprise resource planning (ERP), particularly extended versions, are important for integration. Every discipline has its own module to boost each knowledge areas; however, overall, their combined effect improves the integration of project knowledge areas. From different works of literature, bloggers, and others, it has been observed that MS project, Project scheduler, etc., are used for scheduling and resource allocation, whereas e-Budgeting (adaptive planning), Spreadsheets, accounting software, etc., are used for cost estimating and monitoring actual value versus budgeted value.

2.2.4 Use of ICT in Team and Talent Acquisition Management

Project people are the most valuable resources to manage in a project. People can make the project cost-effective and time-efficient or can create project failure. Human resource is expensive and managing them is complex. Managing the availability of resources and their skills is critical in project management. Thus, ICT tools that aid the management processes such as acquiring the right personnel, building them as a team (coordination), and developing their skills to receive payback from the skills are required. A study conducted in Cameroon by Piabuo et al. (2016) has determined the effect ICT use has on the efficiency of human resource management; accordingly, the study found that the association between the use of ICT and the human resource planning, acquiring, building, and developing, and evaluating (performance management) efficiency was positively significant. Pihir et al. (2008) stated that the importance of acquiring specific knowledge about project management and providing ICT support to increase the probability of project success. The researchers wanted to show the importance of project success and explored whether the Croatian companies educate employees in project management, the extent to which they educate them, and the extent to which the companies or employees use ICT as project management support. Thus, training staff in the use of ICT in connection with project management supports project success. For example, project resource planning software enables project managers to assess the right resource required for their efficiency and in their activity. Such software also aids managers in tracking project resource use and workload.

2.2.5 Role of ICT in Project Communication on Project Performance

The communication tool is at the core of project management, and its function stretches across project phases such as planning, execution, monitoring & evaluation phases. Successful communications on the project performance dimensions such as time, cost, scope, and quality require effective communication (Zulch, 2014).

Grudin & Poltrock (1989) stated that "*implementing tools for communication contributes to increased project communication efficiency*." Thus, effective communication enhances successful communication on dimensions of project performance; hence, project success; and the use of ICT tools improve communications effectiveness and efficiency.

The communications tool is an object that enables communication to occur between two or several project stakeholders. ICT solutions are objects that aid communication to occur among stakeholders through providing communication channels and platforms. The channel through which communication occurs is a medium through which the information travels, and a platform is a channel by which information flows (Robbins) as cited in (Berg, 2017).

Studies have found that project managers spend more than 90% of their communication time (Kloppenborg, 1900) as cited in (Andrade Rodríguez, 2017). Scanlin (cited in Chua, 2015) pointed out that communication consumes about 75-90% of a project manager's time, and information, therefore, needs to be current and available on-demand. Besides, it has been pointed out that the interpretation of communication in most cases is the root cause of project failures; thus, a project manager with strong communication skills can impact project success. For this and other purposes, various types of tools that can enhance communication have been developed and already used in project management. The way these tools have been adopted and used can affect their effectiveness. Thus, communications should be planned when and how it would take place. A solid communication plan increases the constancy of how the project is handled (Mooz, Forsberg, & Cotterman, 2002). Communication should address how it meets stakeholders' needs.

Several studies on communication flow showed that it should flow in all directions: upward, sideways, and downward for communication to fit in project management effectively. According to the studies, to easily communicate with the project manager, the project team and other participants should have tools to help them access the project manager. Several studies, websites, bloggers, etc., have been sharing their views that the availability of

practical ICT tools such as emails, phones, Instant chat, and calling software helps the project manager manage and control the project communication management. The views also indicated that virtual collaboration requires the commonly known collaboration and meetings tools such as Microsoft Teams, Cisco Webex, Zoom, Google Hangout, etc. These applications also allow shared files, chat, meetings, and calls (audio/video), and specifically, they aid project managers in conducting webinars and pieces of training. In general, collaborative tools support communication and collaboration by enabling people to work together. These tools facilitate communication transmission over a networked computer system that lets different people coordinate their work activities. For example, video conferencing (body language and tone of voice) is a tool that is used for collaboration taking place simultaneously, and email (written word and prone to error) is used for collaboration taking at different times. However, face to face meeting has high social presence than email which has a low social presence.

2.2.6 Use of ICT in Procurement

Boer et al. (2002) defined the term e-procurement as "using Internet technology in the purchasing process". Thus, ICT solutions should be adopted and used to make the procurement system operates appropriately and meet project challenges. Hence, computerization of the procurement system and the function upscale is a need in the current project management system. The Global procurement system has influenced the current procurement system. According to Thomson & Jackson (cited in Ngugi and Mugo, 2012), supply chain procurement professionals spend too much time "putting out fires" and reacting to daily problems. E-procurement would help a project manager address concerns such as a bidding process, fraudulent act, increasing accessibility, and increasing visibility to donors. While the use of ICT solutions is increasing the number of bidders, on the one hand, it is also decreasing the cost of collecting the information on the other hand.

All contract negotiations and management, supplier selection processes, requisitions, request for quotations, bid evaluations/offer analysis, etc., involve a decision-making process that can affect the project performance: time, cost, and specification/scope. The process of supplier can lead to project success or failure. Araújo et al. (2017) highlighted the importance of suppliers in the project's success or failure. Thus, the selection and evaluation of the supplier's performance play an essential role in the development of the project.

ICT has helped project organizations be visible to their donors and stakeholders in the processing and use of their supply chain; that is, it has helped facilitate a flow of project materials among stakeholders. According to Burt et al. (2010), information sharing is a crucial enabler of effective supply chain management; however, information sharing does not require technology, but technology is increasingly being used as the "vehicle of use."

As Spekman et al. (1999) stated, the advantage of information technology, as reported in the European Journal of Purchasing and Supply Management, certainly competitive advantage accrues to those who effectively adapt information technology to disseminate information within the supply chains better. Several industries consider their ability to link electronically is a right of entry and a prerequisite to be considered as a potential supply chain partner.

2.2.7. Use of ICT in Electronic Record Management

Document and Record Management System (EDRMS)

On the Technologies blog site (SEGUE Technologies of Tetra Company), Dmitriy (2013) has posted that a document management system (DMS) commonly provides storage of documents and versioning of documents and security and indexing and retrieval capabilities. The blogger also added a record management system (RMS) used for storing project records for evidence of activities as they have strict compliance requirements and are mostly unchanging. Owners of document management software such as Oracle, OpenText, etc., have indicated that they could use solutions to automate standardizing, organizing project documents. Cloud applications such as Dropbox, MS OneDrive, Google Docs, etc., also allowed users to work with their own content from any device and anywhere. MS Office suite is used to create documents, but document management software (DMS) must organize and maintain documents. Xie (2006) in his study on evaluation of electronic document management and record management program, summarized electronic record management as an application designed to improve the management of current electronic record in organizations frequently integrated with an electronic document management system, thus has become an electronic document/record management system (EDRMS).

Organizations must streamline critical business processes to become competitive and successful in today’s economic environment; thus, they should leverage enterprise information assets to decide at the minimum time possible. They must ensure document currency and simplify access to business knowledge on an enterprise basis. This indicates that

organizations need a system – the document management system- to provide and securely organize, manage, and share documents; this shows that a document management system should be in place to manage information and knowledge effectively. The electronic document management system (EDMS) is a tool used to manage information and knowledge (Chen et al., 2005).

According to the above views, documents consist of information that can be accessed and modified by users. At the same time, records provide evidence of activities within a particular company and often have stringent compliance requirements; thus, they are mostly unchanging. Therefore, a document management system is used to store, modifies and track documents. In contrast, records management systems are used to create, store, maintain, retrieve, disseminate, and disposes of project records such as contracts, legal government, and other regulated records. In connection with the above systems, different websites have also described Workflow as document management systems that are used to automate repetitive processes to fine-tune workflows or performance. Similarly, they have also described content management systems as a document management system that is used to organize and deliver different contents and media to web users.

Information Sharing

It has been known from studies that as the extent to which project know-how is expanding, sharing project information has become vital. Managing projects with significant values and complex nature are challenging and requires the project team and stakeholders to trust the project organization's relationship, structure, and culture of the project organization that impacts project information sharing. To this effect, studies have shown that proper information sharing requires a well-designed framework for managers to make accurate decisions; thus, for powerful project information sharing, the framework for sharing information must be appropriately designed. Therefore, well-designed information sharing frameworks are essential because they help project managers make correct decisions, implement the right ways, and end a project on time and within budget (Alexandra-Mihaela and Danut, 2013).

As a result of IT, expansions in organizations, the revolution in storing and transferring knowledge systems has become possible, for instance, due to portals. A current study confirmed that 68% of project teams use portals for knowledge management as this permits

accessible, effortlessly transferable, and concurrently usable information Thomas et al., (2007).

Research even proved that the advancement in technology has numerous advantageous effects on the management of a project. According to the studies, the expansion of Project Management Information Systems (PMIS) improves information sharing and decision making among the project participants. Applications designed for complex nature projects permit robust and secure information flow and support to the planning, scheduling better, and controlling processes; they're an actual asset for the complete project management (Braglia and Frosolini, 2014). Second, using information technology enables communication amongst project people, thus, optimizing project cost, and saves time, and reduce information loss on staff turnover for organizations (Landaeta, 2008). Finally, according to the articles, virtual exchanges have the asset of being extra inclusive for minorities, enhancing the team-building process and satisfaction. If a meeting is to be conducted face-to-face in advance of using computer-mediated communication throughout a project, the study conducted by del Carmen Triana et al. (2011) proved that the usage of digital exchanges first might have girls felt extra supported within inside the project and that is throughout the project complete duration. So, it must balance the intention of the extensive use of communication technology with the current findings on their couple of belongings within the sharing of information in project management. Social networking applications like Facebook, LinkedIn, and so forth are personal or individual networks of sharing information among the project team. These days, ICT that can enhance project-related virtual activities such as meetings, learning/training, events/workshops, and so forth are crucial.

Knowledge Management

Many researchers have acknowledged that information technology has already been in use in numerous projects. The evidence is often because of several organizations' activity in examining operations to find methods and improve their operational efficiency. Besides, their greater demands for cheaper and time-efficient have led to new processes; many of them adopted IT that supports them to improve performance. It has also been clear that the globalization effect engages project teams to reply swiftly to the environmental changes and achieve the enterprise goals. However, it is hard to manage different kinds of project knowledge and sources. Thus, knowledge management is changing into a crucial strategic issue in project management. Research also revealed that the anchor for knowledge

management is the idea that an organization's most valuable resource is the knowledge of its employees; works of the literature showed that ICT is a means to enhance knowledge management activities. (Yang et al., 2011)

Several studies have revealed that knowledge is an asset to an organization. Obviously, as a project team go with each project phase across the life cycle and complete a project, the team learns, which helps the team also have many accumulated information that may be lost during the project life cycle unless converted into knowledge and kept somewhere, thus, electronic means is required because electronic resources are readily available and easily accessible (Song, 2007). Therefore, to keep the learned knowledge as an asset for an organization, management support and the tools and processes of knowledge management must be in place. Organizations ought to have a culture of recognizing the worth of project information and knowledge as strategically important. Besides lessons learned from the project, project people must manage knowledge assets such as policies, guidelines, and other resources of all kinds. Besides, the project team must collect all information and knowledge to employ a system that will allow access and sharing for the project team when the need arises. ICT applications such as MS SharePoint, etc., can be used as a knowledge management platform. Udeaja et al. (cited in Mainga and Yan, 2009) stated that information could only become knowledge once one can realize and understand the patterns and their implications. Equally important, knowledge enables predicting future outcomes based on available information and data (Jashapara, 2004).

2.3 Conceptual Framework

Harindranath et al. (2007) revisited the role of ICT in development. The authors arrived at the relationship between the role of ICT and a development project is not crystal clear even if different frameworks are used. The summarized article described the association as "It is now widely accepted that Information and Communication Technologies (ICT) have an important role in national development. However, the nature of the link between the two remains unclear. Much of this state is due to a lack of clarity on how ICT is conceptualized in this context. While some conceptual frameworks have been proposed, they lack important aspects that can give a more comprehensive picture...."

As there is no single generic conceptual framework for the role of ICT in managing projects, the researcher has summarized the concepts raised in the conceptual framework shown in figure 2.2.

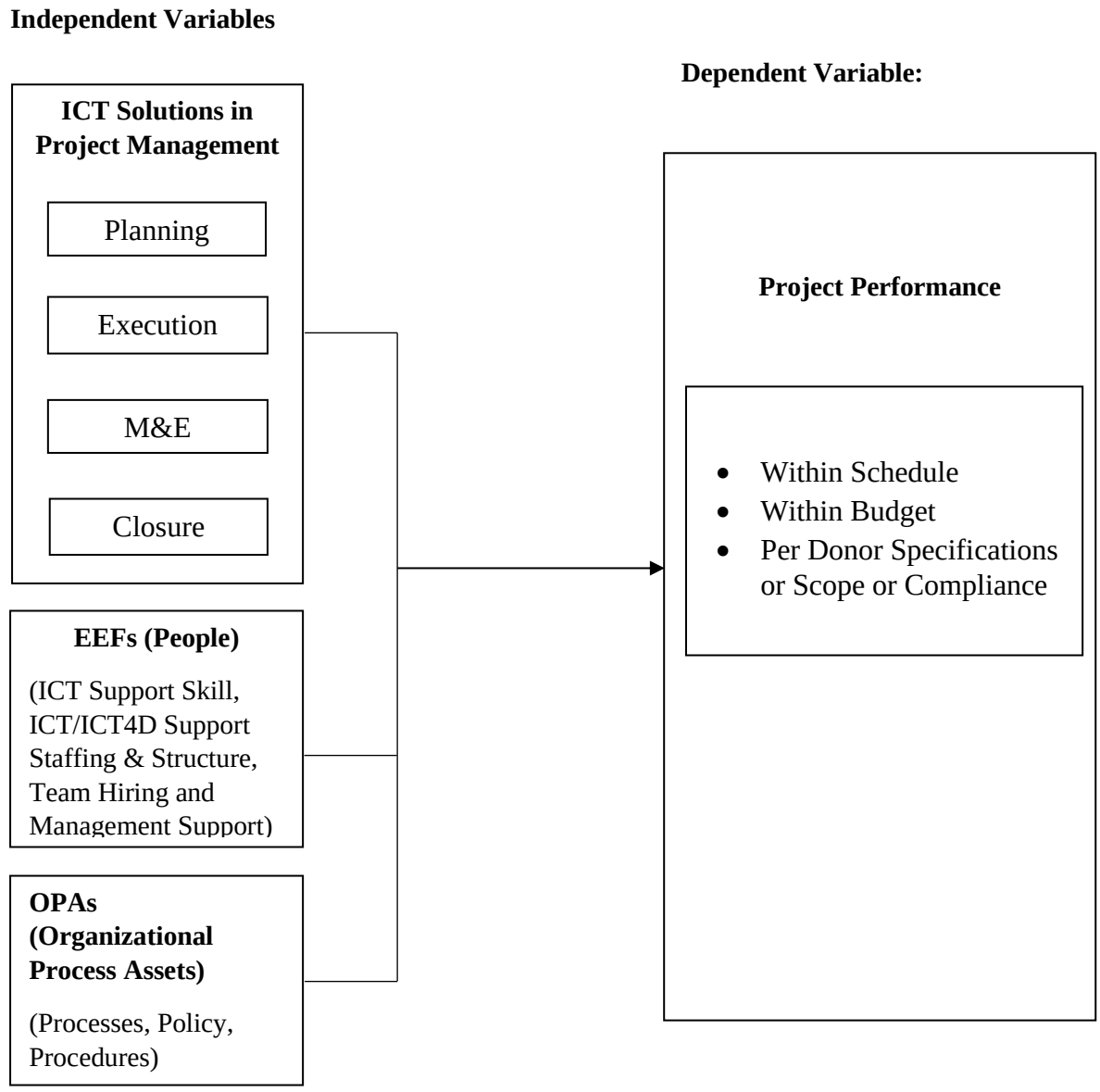

Figure 2. 2: Conceptual Framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Approach

There are three research approaches, namely: quantitative, qualitative, and mixed (triangulation) methods. The mixed method is the combination of the two approaches.

Kothari, (eBook 2004) defined that there are two fundamental research approaches, namely, the qualitative and the quantitative approach. According to Kothari, quantitative involves the generation of data in quantitative form. The data is subjected to rigorous quantitative analysis. But qualitative research is concerned with the subjective assessment of attitudes, opinions, and behavior. Qualitative research generates results in non-quantitative form; the data is not subjected to rigorous quantitative analysis.

Ragin (cited in Lawrence Neuman, 2014) explained how qualitative and quantitative approaches complement each other as data condensers or enhancers. According to Ragi, the key features of the qualitative approach can be seen when contrasted with quantitative data. While quantitative data techniques condense data so that the big picture can be seen, qualitative methods enhance data; thus, best understood and the key aspects of cases are more clearly seen. The researcher used mainly a quantitative approach, however, wherever possible qualitative approach was also used to support the main quantitative approach to take advantage of both quantitative and qualitative data available for the study.

3.2 Research Design

Creswell and Plano (as mentioned in Tesfaye Boru, 2018) defined a research design as the techniques for collecting, analyzing, decoding, and reporting data in research. Accordingly, the study adopted descriptive research (study) design to collect, analyze, translate, and report data on ICT solutions use in managing projects across the project life cycle. The study also used an explanatory design to explain the extent of independent variables' effect on ICT use for managing projects. According to Babbie 2007 (cited in Mwangi, 2015), descriptive research layout portrays the research variables by answering questions such as what, who, and how. Accordingly, the researcher has chosen the descriptive research design for this study because it also allows both data types, meaning quantitative and qualitative data, to find data and characteristics about a population being under the survey. Thus, the researcher used descriptive research design to examine about what, which, and how often and how project

aspects the participants used ICT for project performance through applying the quantitative research methods supported by qualitative methods wherever necessary. To gather information, the researcher used the survey technique, which provided descriptive information on present conditions. According to several articles, the benefit of using a survey is that it is economical and gathers data on a one-shot basis. Abiy et al. (2009) stated that surveys could enable collect data at a specific point of time to describe the characteristics of present conditions, etc., or figuring out the relationships that exist among particular events. Thus, the researcher made used the survey technique for the research and partly developed and partly adopted a questionnaire for data collection to be filled by respondents at their convenient time.

3.3 Population and Sample

3.3.1 Target Population and sampling frame

Kombo (as cited in Loru, 2005) has defined population as: "*Population can be defined as a group of individual, items or objects from which samples are taken from measurement.*" The population for this study was all project staff in CRS Ethiopia Program. There were 146 project staff targeted population for this research. However, target population in focus were 144 as two staff based outside of CRS Ethiopia (one staff was working from headquarter HQ (in the US) and another staff was working from a regional office based in Kenya) and not using CRS Ethiopia's infrastructure; thus, they were purposely excluded from this survey. The researcher acknowledged that any variations in target population number between the proposal submission and actual data collection time due to resignation, new joiners, illness, etc., would be considered and accordingly excluded new staff and resigned project staff from the population. The sampling frame for this research was all CRS Ethiopia program staff who had email addresses. The target population was fully within the sampling frame.

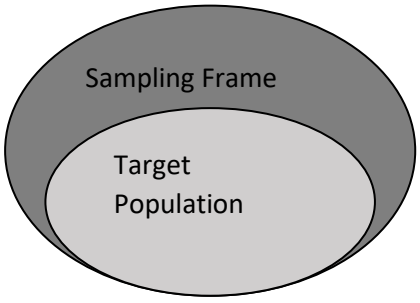

Figure 3. 1: Target population and sampling frame

3.3.2 Sampling techniques and Sample Size

Sampling Techniques

A sample is a selection of participants taken from the target population, a group the researcher wants to study. According to Landreneau and Creek (2009), there are two significant sample designs: the first group is probability sampling that includes some form of random selection in choosing the elements. Probability sampling comprises four main methods: simple random, stratified random, cluster, and systematic. The second group is a non-probability sampling, where nonrandom techniques select the elements randomly. Though such sampling is less likely than probability sampling to produce representative samples, researchers can use non-probability samples for three reasons: convenience, quota, and purposive. However, to increase the response rate, the researcher distributed survey questions to all available target populations.

Sample Size

Patton (2002) (as cited in Michelle Butina, 2015) says that the sample size depends on what one wants to know, the purpose of the inquiry, what is at stake, what is useful, what credibility, and what can be done with available time and resources. Through a web search, the researcher identified a sample size calculator, thus, adopted "The Survey System" online calculator to decide the sample size and decided to be 105, as shown in Figure3.3. The researcher used a 5% margin of error or confidence interval. However, the situation was not conducive to collecting sufficient data as many respondents were busy with a rebidding activity of a project with a substantial programmatic value. The researcher could not make sure whether project staff at Mekelle could participate due to connectivity issues; thus, the researcher decided and invited via email144 participants instead of 105 to increase the response rate.

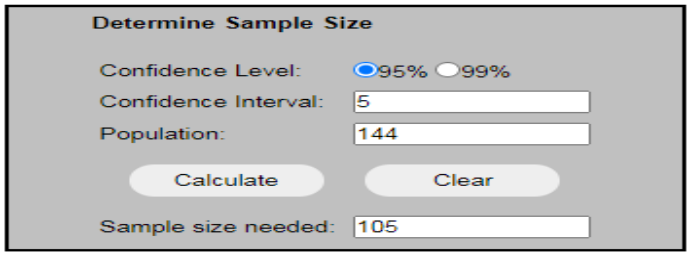

Figure 3. 2: Sample size

(Generated online at *https://www.surveysystem.com/sscalc.htm*.)

3.4 Data Type and Source

Denscombe (2010) observed that a questionnaire defines the problem and the study's specific study objectives. According to Denscombe (2010), a questionnaire is a research tool that comprises written questions to gather data directly from respondents without changing their views or providing them with information. Denscombe also pointed out that questionnaire is used in an environment when situations are open and allow obtaining full and honest responses. Thus, assuming CRS's social climate would enable one to get complete and real answers, the researcher prepared questionnaires and collected primary data from the participants. For this purpose, the researcher partly adopted the questionnaire approaches and partially developed the rest of the questionnaire aspects and formats for the ICT use and used it to obtain data. The researcher imposed structured questions as much as possible; however, the researcher has also imposed unstructured questions. The researcher adopted some question types, ratings, and agreement scales from the online survey system named "The Survey System" and from a researcher Wambui 2017.

The questionnaire items were mainly closed-ended; however, the survey included four open-ended type questions for participants to answer freely. Closed-ended questions were intended to allow respondents to respond in specific ways such as yes, no, poor, good, bad, moderate, to a small extent, to a great extent, to a very great extent, one week in a month, etc., on Likert scale ratings. But the researcher imposed open-ended questions to gather details on the specific ICT solutions they use. Such open-ended questions allowed some respondents to give their responses as they wish.

In summary, the researcher mainly used structured questions to conserve respondents' and researcher's time. Still, the researcher also ensured respondents by including open-ended questions, yet not restricted users from mentioning specific solutions they use freely. The researcher also interviewed four key informants focused on how organizational process assets and enterprise environmental factors influence ICT solutions to use for project performance to identify challenges and used it to support the quantitative analysis.

3.5 Validity and Reliability of the Research Instrument

Validity of the research instrument

Regarding validity and reliability, Heale and Twycross (2015), in their two-page correspondence on *v*alidity and reliability in quantitative studies, defined validity as a quantitative measurement that explains the extent of how accurate concepts are measured. The researcher contacted experts and gathered their expert opinions, which improved the content validity of the data.

Reliability of the research instrument

Heale and Twycross (2015) described reliability as a measure that relates to the consistency of a response (data) in which the response of a participant if a participant completes the same test and the response remains approximately consistent each time, thus there is no exact calculation for reliability. However, the reliability of the consistency would be measured using Cronbach's alpha that lies between 0 and 1. A higher value of alpha indicates that consistency exists between the items in the group of the aspects of the study. If Cronbach's alpha is greater than 0.7, it means that the consistency of the instrument is acceptable. The result of the reliability analysis was shown in table 3.1.

Table 3. 1: Cronbach Alpha

Construct	Cronbach's Reliability Alpha	Number of Items
ICT use in Managing Project Phases	.905	5
Project Performance	.764	3

(Source: SPSS output 2021)

3.6 Data Collection Procedures and Tool

The researcher distributed the questionnaire to respondents mainly via designing a Google survey form to let participants fill it out at their convenient time and to reduce the Covid-19 transmission issue. In addition, a word document form has also been shared via email in case respondents face challenges with connectivity to do online on Google form. The researcher

reminded the respondents via email and phone to encourage them to participate before closing the form. The form was online and open to participants for five working days.

3.7 Ethical Consideration

The researcher reminded the participants via email and phone; however, the researcher also respected the right of participants not to respond. The researcher also respected the confidentiality of respondents using anonymous communication, such undiscovered feature of email, and did not cache their email address too. The researcher disclosed in the questionnaire that a complete or any part of their response and personal information, by any means, would not be disclosed to a third party or misused other than for this research input purpose only. The researcher respected and not violated the policy of the organization. Data would only be used with respect to the policy of stakeholders, and to that effect, the researcher sought advice from project owners on the use of information. In general, the right of the respondents was clearly written on the questionnaire.

3.8 Data Analysis and Presentation

Babbie (cited in Mwangi, 2015) stated that the type of data analysis tool required to do analysis would depend on the type of data collected; there are two types of data: namely, one of the data is qualitative, and the other one is quantitative. The qualitative data collected was checked for completeness, cleaned, and analyzed. The content was framed in terms of categories related to the topic. Challenges (barriers), know-hows of the informants, etc., were taken as a common frame to analyze the content. The content was summarized objectively as much as possible. The quantitative analysis used both descriptive and inferential statistics, and to analyze the collected quantitative data, the researcher used the Statistical Package for Social Sciences (SPSS) application software.

The researcher used descriptive statistics such as frequency, median, mode, and percentage to profile general information or characteristics of respondents and assessed the use of ICT and how often they use the solutions. To establish the associations among variables (dependent and independent), the researcher used correlation analysis. The researcher also used multiple regressions to explain relations among dependent and independent variables. The results of the analysis were presented in tables and figures such as pie charts and bars, and histograms. In addition, frequency analysis was also used.

CHAPTER FOUR: ANALYSIS AND DISCUSSION

4.1. Introduction

The researcher used the semi-structured interview to collect qualitative data. The researcher conducted four interviews face to face. During the interview, the researcher took notes (jotted down the response), wrote-up the letters, and got approval from the interviewees. After the approval, the researcher analyzed the collected responses in terms of matching contents, grouped, and summarized the responses to see the result. To avoid biasing and misleading approaches, the researcher took notes during the interview and requested verification of the respondents' content via email.

The discussion topic was how do organization ICT use, process assets, and project enterprise environmental factors influence project people's ICT use in project phases to accomplish projects effectively. The researcher imposed seven questions on the interviewees.

Saunders et al. (cited in Francis, 2015) alert the interviewer to be free from being biased or biasing. The data should be what the interviewees tell; thus, it should not be what the interviewer wants. In line with Sunders, qualitative research was conducted by applying semi-structured interviews (with four key informants), though the result cannot be generalized to the whole population (144 staff). It can give necessary information to the researcher if combined with the literature review.

4.2 Descriptive Analysis

4.2.1 Survey and Response Rate

The researcher designed the survey to collect responses from staff online using Google Forms. The same questionnaire was attached in the email and sent to participants if they face connectivity issues or technical issues related to the online form. The researcher used online survey system to calculate sample size and accordingly determined the size be 105. However. The working situation in the organization on the ground during the data collection was not inviting to just distribute survey questions to a smaller number of respondents as calculated as staff were tight. Thus, the researcher decided and invited 142 project staff (target population) to participate in the survey. Among these invited participants, 51 filled out the online survey, and three staff filled out the form sent via email. Since most teams were working from home, it wasn't possible to repeatedly visit face to face and encourage the

participants to fill out the form; however, the researcher sent a reminder via email; and communicated with some of them via phone. The response rate was about 38%. Patton (2002) (as cited in Butina, 2015) says that the sample size depends on what one wants to know, the purpose of the inquiry, what is at stake, what is useful, what credibility, and what can be done with available time and resources. The response 38% is sufficient as the sample (population) is homogeneous.

As there was no significant variation in the number of populations between the proposal submission and the actual data collection time, either due to resignation, new joiners, illness, etc., the researcher did not change the proposed population.

The survey consisted of 27 questions. The first five questions (part one) were aimed at gathering the general information on the respondents. The next 16 questions (part two) were aimed at assessing whether respondents use ICT in managing their project across the project life cycle, the type of ICT they use and how often they use the solutions. It was mainly analyzed using frequency analysis. The rest six questions (part three and part four) were aimed at analyzing mainly the associations and causal relations between ICT use and project performance using correlation and regression.

4.2.2 Respondents' General Information

Regarding demographic data, all respondents are in the same geographic area, and all are project staff. Thus, it wasn't required to analyze by location or department. However, the researcher interviewed key informants regardless of their position, age, gender, or academic education. The researcher included demographic data on sex, age, educational qualification, years of work experience in CRS, and current staff position for the closed survey.

Respondents by Sex

The researcher imposed this question to determine the gender balance of the respondents. However, the survey result showed 68.5% of respondents were male, and 31.5% were female. The researcher invited 56 female and 88 male respondents, and out of these figures, 30.4% from females and 42% from males responded. The difference was about 11.6%, which showed nearly gender was balanced. The results were as presented in table 4.1.

Table 4. 1: Gender Information of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Sex	Male	37	68.5	68.5	68.5
	Female	17	31.5	31.5	100.0
	Total	54	100.0	100.0	

(Source: SPSS output 2021)

Respondents by Age

48.1% of the respondents were of the age category 31-40 Years, and 29.6% were of the age category 41-50 Years. 13% of the respondents were of the age category 21-30 Years, and 7.4% were of the age category 60+Years. 1.9% was from the age category 51-60 Years. The researcher has received no response from the age category 18-20 Years. The result indicated that most of the project staff's age was between 31 and 40 Years (age category: 31-40 Years). The results were presented in table 4.2.

Table 4. 2: Age Information of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Age Category	18 - 20 Years	0	0	0	0
	21 - 30 Years	7	13.0	13.0	13.0
	31 - 40 Years	26	48.1	48.1	61.1
	41 - 50 Years	16	29.6	29.6	90.7
	51 - 60 Years	1	1.9	1.9	92.6
	61 + Years	4	7.4	7.4	100.0
	Total	54	100.0	100.0	

(Source: SPSS output 2021)

The median was 3.00 which indicated that most respondents were from the age category 31-40 Years. Thus, the mean is 3.00 which is in the age category 31-40 Years as shown in table 4.3.

Table 4. 3: Measure of central tendency

	Valid	Missing	Median	Mode
Age of respondent	54	0	3.00	3

(Source: SPSS output 2021)

The mean age was found to be 39.76 with a standard deviation 10.02. The result was shown in table 4.4.

Table 4. 4: Mean age and standard deviation

Age Category	Frequency (f)	Mid-Point (m)	Mean	Std
18-20 Years	0	19	39.76	10.02
21 - 30 Years	7	25.5		
31 - 40 Years	26	35.5		
41 - 50 Years	16	45.5		
51 - 60 Years	1	55.5		
61 + Years	4	65.5		

(Source: SPSS output 2021)

Respondents by Academic qualification

74.1% of the respondents were holding Masters (Second Degree), 20.4% were holding a first degree (undergraduate degree), 3.7% holding Ph.D. and 1.9% is holding Diploma. The result indicates that most of the project staff had a second degree as their highest education level, which shows they were qualified to respond. Most respondents had masters as their academic qualification with a mean (median) 3.00. The results were presented in table 4.5.

Table 4. 5: Academic qualification of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Academic qualification	Diploma	1	1.9	1.9	1.9
	First	11	20.4	20.4	22.2
	Masters	40	74.1	74.1	96.3
	PhD	2	3.7	3.7	100.0
	Total	54	100.0	100.0	

	Valid	Missing	Median	Mode
Academic Qualification	54	0	3.00	3

(Source: SPSS output 2021)

Respondents by Years of work experience in CRS

46.3% of respondents were from the work experience category 1-5 Years, and 24.1% were from the work experience category 6-10 Years. 11.1% of respondents were from the work

experience category 11-15 Years. Lastly, some respondents had worked for a long time (more than 20 Years), 11.2% in CRS, and knew the area. In summary, the result showed that most of the project staff had been working in CRS for between 1-5 Years with the median 2. The results were as presented in table 4.6.

Table 4. 6: Years of work experience of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Years of work experience in CRS	Below 1 Year	3	5.6	5.6	5.6
	1-5 Years	25	46.3	46.3	51.9
	6-10 Years	13	24.1	24.1	75.9
	11-15 Years	6	11.1	11.1	87.0
	16-20 Years	1	1.9	1.9	88.9
	21-25 Years	2	3.7	3.7	92.6
	26-30 Years	1	1.9	1.9	94.4
	31-35 Years	3	5.6	5.6	100.0
	36 + Years	0	0.0	0.0	
	Total	54	100.0	100.0	

	Valid	Missing	Median	Mode
Years Of Work ExperienceInCR	54	0	2	2

(Source: SPSS output 2021)

Respondents by their current position in CRS

29.6% of the respondents were from the S/Project Officer category, followed by 20.4% from the Technical Advisor category and 13.0% from the Project Officer category. The result indicates that most of the project staff were working in the Senior Project Officer position. In summary, the result showed that the respondents were from all positions; however, most respondents were working as a senior project officer position with a mean or median 5 (the ten positions were coded 0-9). The results were presented as shown in table 4.7.

Table 4. 7: Current work position of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Respondnets' current position	CoP, D/ CoP	4	7.4	7.4	7.4
	HoP, D/HoP	1	1.9	1.9	9.3
	Mid-level Mgmt	3	5.6	5.6	14.8
	Senior Mgmt	1	1.9	1.9	16.7
	Project Manager	6	11.1	11.1	27.8
	S/Project Officer	16	29.6	29.6	57.4
	Project Officer	7	13.0	13.0	70.4
	Data Management	0	0.0	0.0	70.4
	Project Assistant	5	9.3	9.3	79.6
	Technical Advisor	11	20.4	20.4	100.0
	Total	54	100.0	100.0	

	Valid	Missing	Median	Mode
Your Current Position	54	0	5	5

(Source: SPSS output 2021)

4.2.3 ICT Solutions in use in the Management of Project Phases

4.2.3.1 ICT in use for Project Planning

Respondents were asked whether they use ICT solutions for project planning or not. Out of 54 respondents, 66.7% of the respondents confirmed using ICT for project planning, while 33.3% do not use it. The results were shown in Table 4.8.

Table 4. 8: Project management software use for managing project planning phase

		Frequency	Percent
Staff who use project management software for project planning	No	18	33.3
	Yes	36	66.7
	Total	54	100.0

(Source: SPSS output 2021)

Respondents were also asked whether they use ICT solutions for each aspect or element of Project Planning: Scheduling, Budgeting and Resource Allocation. Accordingly, respondents who selected "Yes" (66.7%) in the above were asked to choose ICT applications they use for project planning aspects, namely scheduling, budgeting, and resource allocation. The respondents were optioned to select multiple applications each with a binary value yes (ticked) and no (unticked). About 47.2% of the respondents use MS Planner for project

scheduling, and 33.3% use MS Project. 27.8 % uses accounting SW for project budgeting, followed by MS project 22.2%. 33.3% uses MS Project for resource allocation. The results were shown in Table 4.9.

Table 4. 9: Software in use for aspects of project planning

Top two software in use for project scheduling	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
MS Planner	No	19	35.2	52.8	52.8
	Yes	17	31.5	47.2	100.0
	Total	36	66.7	100.0	
	Missing System	18	33.3		
	Total	54	100.0		
MS Project	No	24	44.4	66.7	66.7
	Yes	12	22.2	33.3	100.0
	Total	36	66.7	100.0	
	Missing System	18	33.3		
	Total	54	100.0		
Top two software in use for project budgeting	Scale	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Accounting software	No	26	48.1	72.2	72.2
	Yes	10	18.5	27.8	100.0
	Total	36	66.7	100.0	
	Missing System	18	33.3		
	Total	54	100.0		
MS Project	No	28	51.9	77.8	77.8
	Yes	8	14.8	22.2	100.0
	Total	36	66.7	100.0	
	Missing System	18	33.3		
		54	100.0		
Top software in use for project resource allocation	Scale	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
MS Project	No	24	44.4	66.7	66.7
	Yes	12	22.2	33.3	100.0
	Total	36	66.7	100.0	
	Missing System	18	33.3		
		54	100.0		

(Source: SPSS output 2021)

The researcher also asked respondents to freely mention any SW they use outside of the given list, and accordingly, 20% of the respondents said that they use MS excel. Finally, the researcher also asked the respondents to rate how often they use the ICT solution during project planning for each aspect in a month. Accordingly, 25.9% use the SW for one week in a month for scheduling projects. 27.8% uses for one week in a month for e_Budgeting. Lastly, 35.2% of the respondents use the SW for one week in a month to allocate resources to a project. The results were shown in table 4.10.

Table 4. 10: Frequency of ICT software use during project planning

Aspects of project planning	Scale	Frequency	Percent
Project scheduling	I do not use	5	9.3
	One week in a month	14	25.9
	Two weeks in a month	3	5.6
	Three weeks in a month	3	5.6
	Four weeks in a month	11	20.4
	Total	36	66.7
	Missing System	18	33.3
	Total	54	100.0
Project budgeting	I do not use	11	20.4
	One week in a month	15	27.8
	Two weeks in a month	5	9.3
	Three weeks in a month	3	5.6
	Four weeks in a month	2	3.7
	Total	36	66.7
	Missing System	18	33.3
	Total	54	100.0
Project resource allocation	I do not use	8	14.8
	One week in a month	19	35.2
	Two weeks in a month	4	7.4
	Three weeks in a month	1	1.9
	Four weeks in a month	4	7.4
	Total	36	66.7
	Missing System	18	33.3
	Total	54	100.0

(Source: SPSS output 2021)

4.2.3.2 ICT in use for Project Execution

Respondents were asked whether they use ICT solutions for project execution or not. Out of 54 respondents, 77.78% of the respondents confirmed using ICT for project execution, while 22.22% do not use it. The results were shown in Table 4.11.

Table 4. 11: Project management software use for managing project execution phase

		Frequency	Percent
Staff who use project management software for project execution	No	12	22.2
	Yes	42	77.8
	Total	54	100.0

(Source: SPSS output 2021)

The researcher asked the respondents to select ICT solutions or applications they used to manage aspects of the project execution phase. These aspects or elements of project execution were project procurement and project communication. The procurement aspects itself has adopted sub-elements E-requisition, E-evaluation, E-shipment follow-up, and E-payment. The project communication aspect has sub-elements Collaboration, Stakeholder management (reporting or support), Effectiveness of communication, and varieties of communication methods. The respondents were optioned to select multiple applications each with a binary value yes (ticked) and no (unticked).

About 61.0% of the respondents used MS Excel for project E-requisition and followed by 41.5% who use Online forms (OpEX). 45% uses MS Excel for project E-evaluation, followed by 40% who use Online forms (OpEX). 25% for E-shipment follow-up by 22.5% for supply chain management system, 34.1% uses Online forms (OpEX) for E-payment followed by MS Excel 24.4%. About 95% of the respondents used MS Teams mainly for project collaboration and followed by Email (88.1%). 90.2% uses Email for project Stakeholder management (Reporting) or support, followed by MS Teams (56.1%). 82.9% uses Email for its effectiveness for communication, while 75.6% uses MS Teams. 83.3% of the respondents said Email is their communication method, and MS Teams is for 61.9% of the respondents. 83.3% uses Email as verities of communication. The results were shown in Table 4.12.

Table 4. 12: Software in use for aspects of project execution.

Top two software in use for E_procurement	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
MS Excel	No	16	29.6	39.0	39.0
	Yes	25	46.3	61.0	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
Online Forms	No	24	44.4	58.5	58.5
	Yes	17	31.5	41.5	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
Top two software in use for E_evaluation	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
MS Excel	No	22	40.7	55.0	55.0
	Yes	18	33.3	45.0	100.0
	Total	40	74.1	100.0	
	Missing System	14	25.9		
	Total	54	100.0		
Online Forms	No	24	44.4	60.0	60.0
	Yes	16	29.6	40.0	100.0
	Total	40	74.1	100.0	
	Missing System	14	25.9		
	Total	54	100.0		
Top two software in use for E_shipment follow-up	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
MS Excel	No	30	55.6	75.0	75.0
	Yes	10	18.5	25.0	100.0
	Total	40	74.1	100.0	
	Missing System	14	25.9		
	Total	54	100.0		
Supply chain management sytem	No	31	57.4	77.5	77.5
	Yes	9	16.7	22.5	100.0
	Total	40	74.1	100.0	
	Missing System	14	25.9		
	Total	54	100.0		
Top two software in use for E_payment	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
MS excel	No	31	57.4	75.6	75.6
	Yes	10	18.5	24.4	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
Online forms	No	27	50.0	65.9	65.9
	Yes	14	25.9	34.1	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
Top two software in use for project collaboration	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Email	No	5	9.3	11.9	11.9
	Yes	37	68.5	88.1	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
MS Teams	No	4	7.4	9.5	9.5
	Yes	38	70.4	90.5	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
Top two software in use for project stakeholder management	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Email	No	4	7.4	9.8	9.8
	Yes	37	68.5	90.2	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
MS Teams	No	18	33.3	43.9	43.9
	Yes	23	42.6	56.1	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
Top two software in use for effective communication	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Email	No	7	13.0	17.1	17.1
	Yes	34	63.0	82.9	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
MS Teams	No	10	18.5	24.4	24.4
	Yes	31	57.4	75.6	100.0
	Total	41	75.9	100.0	
	Missing System	13	24.1		
	Total	54	100.0		
Top two software in use for verities of communication	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Email	No	7	13.0	16.7	16.7
	Yes	35	64.8	83.3	100.0
	Total	42	77.8	100.0	
	System	12	22.2		
	Total	54	100.0		
MS Teams	No	16	29.6	38.1	38.1
	Yes	26	48.1	61.9	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		

(Source: SPSS output 2021)

The researcher asked respondents to freely mention any SW they use outside of the given list and accordingly respondents mentioned various SW. Some of these software were:

- JRIS for joint review implementation support, SAVIX for sharing dashboards and BHA Google for monthly CSR, etc;
- CRS-Yammer and LinkedIn for social and professional networking;
- iForm and others for survey data collection;
- Zoom, Google meeting, Cisco Webex for communication with World Bank, etc. for coomunication and collaboration
- M-Birr for E-payment, , etc;
- WhatsApp, Telegram, etc for communication using hand-held devices, etc;

Finally, the researcher also asked the respondents to select how often they use the ICT solution during the project execution for each aspect in a month. Accordingly, 47.6% uses the SW for one week in a month for projects E_requisition, 52.4% uses the SW for one week in a month for E-evaluation, 59.5% do not use it for E-shipment follow-up,42.9% uses it for one week in a month for E-payment. Similarly, 69.0% of the respondents said they use the SW for four weeks in a month for collaboration; 45.2% uses it for four weeks in a month for Stakeholder management (Reporting) or support; 64.3% uses it for four weeks in a month for Effectiveness of communication; and lastly, 69.0% of the respondents use the SW for four weeks in a month for varieties of communication methods. The results were shown in Table 4.13.

Table 4. 13: Frequency of ICT software use during project execution

Aspects of project execution	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
E_Requision	I do not use	12	22.2	28.6	28.6
	One week in a month	20	37.0	47.6	76.2
	Two weeks in a month	3	5.6	7.1	83.3
	Three weeks in a month	2	3.7	4.8	88.1
	Four weeks in a month	5	9.3	11.9	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
E_Evaluation	I do not use	9	16.7	21.4	21.4
	One week in a month	22	40.7	52.4	73.8
	Two weeks in a month	4	7.4	9.5	83.3
	Three weeks in a month	2	3.7	4.8	88.1
	Four weeks in a month	5	9.3	11.9	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
E_Shipment follow-up	I do not use	25	46.3	59.5	59.5
	One week in a month	11	20.4	26.2	85.7
	Two weeks in a month	2	3.7	4.8	90.5
	Three weeks in a month	3	5.6	7.1	97.6
	Four weeks in a month	1	1.9	2.4	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
E_Payment	I do not use	18	33.3	42.9	42.9
	One week in a month	18	33.3	42.9	85.7
	Two weeks in a month	3	5.6	7.1	92.9
	Three weeks in a month	2	3.7	4.8	97.6
	Four weeks in a month	1	1.9	2.4	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
Collaboration	I do not use	1	1.9	2.4	2.4
	One week in a month	10	18.5	23.8	26.2
	Two weeks in a month	1	1.9	2.4	28.6
	Three weeks in a month	1	1.9	2.4	31.0
	Four weeks in a month	29	53.7	69.0	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
Stakeholder management (reporting or support)	I do not use	2	3.7	4.8	4.8
	One week in a month	15	27.8	35.7	40.5
	Two weeks in a month	2	3.7	4.8	45.2
	Three weeks in a month	4	7.4	9.5	54.8
	Four weeks in a month	19	35.2	45.2	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
Effectiveness of communication	I do not use	3	5.6	7.1	7.1
	One week in a month	6	11.1	14.3	21.4
	Two weeks in a month	2	3.7	4.8	26.2
	Three weeks in a month	4	7.4	9.5	35.7
	Four weeks in a month	27	50.0	64.3	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		
Varitie of communication methods	I do not use	3	5.6	7.1	7.1
	One week in a month	6	11.1	14.3	21.4
	Two weeks in a month	1	1.9	2.4	23.8
	Three weeks in a month	3	5.6	7.1	31.0
	Four weeks in a month	29	53.7	69.0	100.0
	Total	42	77.8	100.0	
	Missing System	12	22.2		
	Total	54	100.0		

(Source: SPSS output 2021)

4.2.3.3 ICT in use for Project Monitoring and Evaluation

The researcher asked respondents whether they use ICT solutions for project monitoring and evaluation.

Out of 54 respondents, 81.5% of the respondents confirmed using ICT for project monitoring and evaluation, while 18.5% do not use it. The results were shown in Table 4.14.

Table 4. 14: Project management software use for managing project monitoring and evaluation phase

		Frequency	Percent
Staff who useproject management software for project monitoring and evaluation	No	10	18.5
	Yes	44	81.5
	Total	54	100.0

(Source: SPSS output 2021)

The researcher asked respondents to select ICT SW they used to manage aspects of project monitoring and evaluation. These aspects were baseline data collection and benchmarking, implementation data collection (Tracking -actual data), data quality assurance, data analysis, data visualization, and reporting, data use/interpretation (Engaging stakeholder to give meaning, make project decision, answer learning question), document management, learning and knowledge management, and social accountability.

About 76.7% of the respondents use ComCare mainly for project Baseline Data collection and benchmarking. 75% uses ComCare for project Implementation Data Collection (Tracking -actual data), and 48.8% uses ComCare for Data quality assurance, and 61.4% uses SPSS for Data analysis. About 68.2% of the respondents used MS Power BI for project data visualization and followed by 47.7% who used MS Power BI for data use/interpretation (Engaging stakeholder to give meaning, make project decision, answer learning question). 50% used ComCare for Document Management, 36.4% uses ComCare, and 36.4 uses MS Power BI for Learning and knowledge management, and 29.5% uses short message, and 36.4 uses ComCare for Social Accountability. The results were shown in Table 4.15.

Table 4. 15: Software in use for aspects of project monitoring and evaluation.

Baseline data	**Scale**	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
	No	10	18.5	23.3	23.3
	Yes	33	61.1	76.7	100.0
ComCare	Total	43	79.6	100.0	
	Missing System	11	20.4		
	Total	54	100.0		
Implementation data	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	11	20.4	25.0	25.0
	Yes	33	61.1	75.0	100.0
ComCare	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data quality assurance	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	22	40.7	51.2	51.2
	Yes	21	38.9	48.8	100.0
ComCare	Total	43	79.6	100.0	
	Missing System	11	20.4		
	Total	54	100.0		
Data analysis	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	17	31.5	38.6	38.6
	Yes	27	50.0	61.4	100.0
SPSS	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data visualization reporting	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	14	25.9	31.8	31.8
	Yes	30	55.6	68.2	100.0
Power BI	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data use or interpretation	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	23	42.6	52.3	52.3
	Yes	21	38.9	47.7	100.0
Power BI	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Document management	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	22	40.7	50.0	50.0
	Yes	22	40.7	50.0	100.0
ComCare	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Learning (knowledge management)	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	28	51.9	63.6	63.6
	Yes	16	29.6	36.4	100.0
ComCare	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
	No	28	51.9	63.6	63.6
	Yes	16	29.6	36.4	100.0
Power BI	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Social accountability	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
	No	28	51.9	63.6	63.6
	Yes	16	29.6	36.4	100.0
ComCare	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
	No	31	57.4	70.5	70.5
	Yes	13	24.1	29.5	100.0
SMS short message service	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		

(Source: SPSS output 2021)

The researcher asked respondents to freely mention any SW they use outside of the given list, accordingly they mentioned the following main applications:

- Gateway for project document management;
- DropBox for work space (document sharing);
- AutoCAD;
- RedRose system; this is a solution for full project life cycle management;
- Interactive Voice Response (IVR) for service, and support.
- Infoveave reporting dashboards; this has been used for data collection, modelling, analysis visualize, sharing reports and data driven decisions.

Finally, the researcher asked respondents to select how often they use the ICT solution during project monitoring and evaluation in a month for each aspect of the montiroring and evauation. These aspects were Baseline Data Collection and Benchmarking, Implementation Data Collection (Tracking -actual data), Data Quality Assurance, Data Analysis, Data Visualization and Reporting, Data Use or Interpretation (Engaging stakeholder to give meaning, make project decision, answer learning question), Document Management, Learning and Knowledge Management, and Social Accountability.

Accordingly, 50.0% said they use the SW for one week in a month for baseline data collection and benchmarking projects. 40.9% use the SW for one week in a month for implementation data collection (Tracking -actual data), and 45.5% use it for one week in a month for Data quality assurance, followed by 45.5% use it for one week in a month for Data analysis. Similarly, 43.2% of the respondents said they use the SW for one week in a month for Data visualization and Reporting. 36.5% use the SW for one week in a month for data use/interpretation (Engaging stakeholder to give meaning, make project decision, answer learning question), and 43.2% use it for one week in a month for document management. Similarly, 43.2% of the respondents said they use the SW for one week in a month for Learning and knowledge management, and 43.2% of the respondents use the SW for one week in a month for social accountability. The results were shown in Table 4.16.

Table 4. 16: Frequency of ICT software use for project monitoring and evaluation.

Aspects of project monitoring and evaluation	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Basline data collection	I do not use	11	20.4	25.0	25.0
	One week in a month	22	40.7	50.0	75.0
	Two weeks in a month	2	3.7	4.5	79.5
	Four weeks in a month	9	16.7	20.5	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Implementation data collection	I do not use	2	3.7	4.5	4.5
	One week in a month	18	33.3	40.9	45.5
	Two weeks in a month	3	5.6	6.8	52.3
	Three weeks in a	5	9.3	11.4	63.6
	Four weeks in a month	16	29.6	36.4	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data quality assurance	I do not use	8	14.8	18.2	18.2
	One week in a month	20	37.0	45.5	63.6
	Two weeks in a month	2	3.7	4.5	68.2
	Three weeks in a	6	11.1	13.6	81.8
	Four weeks in a month	8	14.8	18.2	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data analysis	I do not use	7	13.0	15.9	15.9
	One week in a month	20	37.0	45.5	61.4
	Two weeks in a month	4	7.4	9.1	70.5
	Three weeks in a	2	3.7	4.5	75.0
	Four weeks in a month	11	20.4	25.0	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data visualization and reporting	I do not use	3	5.6	6.8	6.8
	One week in a month	19	35.2	43.2	50.0
	Two weeks in a month	5	9.3	11.4	61.4
	Three weeks in a	3	5.6	6.8	68.2
	Four weeks in a month	14	25.9	31.8	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Data use or interpretation	I do not use	5	9.3	11.4	11.4
	One week in a month	16	29.6	36.4	47.7
	Two weeks in a month	9	16.7	20.5	68.2
	Three weeks in a	3	5.6	6.8	75.0
	Four weeks in a month	11	20.4	25.0	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Document management	I do not use	3	5.6	6.8	6.8
	One week in a month	19	35.2	43.2	50.0
	Two weeks in a month	4	7.4	9.1	59.1
	Three weeks in a	4	7.4	9.1	68.2
	Four weeks in a month	14	25.9	31.8	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Learning (knowledge management)	I do not use	8	14.8	18.2	18.2
	One week in a month	19	35.2	43.2	61.4
	Two weeks in a month	2	3.7	4.5	65.9
	Three weeks in a	4	7.4	9.1	75.0
	Four weeks in a month	11	20.4	25.0	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		
Social accountability	I do not use	5	9.3	11.4	11.4
	One week in a month	19	35.2	43.2	54.5
	Two weeks in a month	4	7.4	9.1	63.6
	Three weeks in a	5	9.3	11.4	75.0
	Four weeks in a month	11	20.4	25.0	100.0
	Total	44	81.5	100.0	
	Missing System	10	18.5		
	Total	54	100.0		

(Source: SPSS output 2021)

4.2.3.4 ICT in use for Project Closing

The researcher asked respondents whether they use ICT solutions or applications for managing project closing. Accordingly, all participants responded to this question as given below.

Out of 54 respondents, 50.9% of the respondents confirmed that they use ICT solutions for project closing. The results were shown in Table 4.17.

Table 4. 17: Project management software use for managing project closure

		Frequency	Percent
Staff who use project management software for project closure	No	26	48.1
	Yes	28	51.9
	Total	54	100.0

(Source: SPSS output 2021)

The researcher asked respondents to select ICT SW they use to manage aspects of project closing. These aspects were project documentation and record management (Create Close Out Report); information storage, retrieval, and sharing; knowledge management (capture lessons learned); knowledge management (disseminate and use lessons learned) and project completion review (Post-implementation review - Project performance and conformance - and Post-implementation support). Accordingly, all respondets who ticked "Yes" in the above question has responded to this question as given below.

About 70.4% of the respondents said they mainly use email to share project documentation and record management (create and close out report). This was followed by 63% using network shared folders and 63% using email for information storage, retrieval, and sharing. Regarding knowledge management, 51.9% uses network shared folders to capture and store lessons learned (knowledeg management), and 59.3% uses email to disseminate and use the captured lessons learned (knowledge management). Finally, 51.9% of the respondnets said they use Microsoft Teams for project completion review. The results were shown in Table 4.18.

Table 4. 18: Software in use for aspects of project closure.

Document and record management	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Email	No	8	14.8	29.6	29.6
	Yes	19	35.2	70.4	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Information storage, retrieval and sharing	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Network shared folder	No	10	18.5	37.0	37.0
	Yes	17	31.5	63.0	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Email	No	10	18.5	37.0	37.0
	Yes	17	31.5	63.0	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Knowledge management, capture lessons learned	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Network shared folder	No	13	24.1	48.1	48.1
	Yes	14	25.9	51.9	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Knowledge management, disseminate and use lessons learned	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Email	No	11	20.4	40.7	40.7
	Yes	16	29.6	59.3	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Post implementation review	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
MS Teams	No	13	24.1	48.1	48.1
	Yes	14	25.9	51.9	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		

(Source: SPSS output 2021)

The researcher also asked respondents to freely mention any SW they use outside of the given list, and accordingly, only three respondents each mentioned one SW (Development USAID Informa, RedRose and Gateway).

Finally, the researcher asked respondents to select how often they use the ICT solution they ticked during project closing for each aspect in a month. Accordingly, 44.4 % responded they use the SW for one week in a month for Project Documentation and Record Management (Create Close Out Report), followed by 37.0% who use the SW for one week and 37.0% for four weeks in a month for Information storage, retrieval, and Sharing. 37.0% use it for one

week and 37.0% use it for four weeks in a month for Knowledge Management for Capture Lessons Learned, 48.1% use it for one week in a month for Knowledge Management, meaning disseminating and use lessons learned. Lastly, 51.9% of the respondents use the SW for one week in a month for project completion review (post-implementation review - project performance and conformance - and post-implementation support).

Table 4. 19: Frequency of ICT software use during project closure.

Aspects of project closure	Scale	Frequency	Percent	Valid Percent	Cumulative Percent
Project document and record management	I do not use	1	1.9	3.7	3.7
	One week in a month	12	22.2	44.4	48.1
	Two weeks in a month	2	3.7	7.4	55.6
	Three weeks in a month	1	1.9	3.7	59.3
	Four weeks in a month	11	20.4	40.7	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Information storage retrieval and sharing	One week in a month	10	18.5	37.0	37.0
	Two weeks in a month	3	5.6	11.1	48.1
	Three weeks in a month	4	7.4	14.8	63.0
	Four weeks in a month	10	18.5	37.0	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Knowledge management _capture lessons learned	I do not use	1	1.9	3.7	3.7
	One week in a month	10	18.5	37.0	40.7
	Two weeks in a month	5	9.3	18.5	59.3
	Three weeks in a month	1	1.9	3.7	63.0
	Four weeks in a month	10	18.5	37.0	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Knowledge management _disseminate and use lessons learned	One week in a month	13	24.1	48.1	48.1
	Two weeks in a month	6	11.1	22.2	70.4
	Three weeks in a month	1	1.9	3.7	74.1
	Four weeks in a month	7	13.0	25.9	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		
Post implementation review	I do not use	4	7.4	14.8	14.8
	One week in a month	14	25.9	51.9	66.7
	Two weeks in a month	1	1.9	3.7	70.4
	Three weeks in a month	1	1.9	3.7	74.1
	Four weeks in a month	7	13.0	25.9	100.0
	Total	27	50.0	100.0	
	Missing System	27	50.0		
	Total	54	100.0		

(Source: SPSS output 2021)

4.2.4 Influences of ICT use across Project Life Cycle, Enterprise Environmental Factors and Organizational Process Assets on Project Performance

4.2.4.1 Influence of ICT use across Project Life Cycle and Project Performance

The researcher asked the respondents to rate how ICT use influences the maangement of each project phases. The results were as presented in table 4.22.

Table 4. 20: Aspects of ICT use in each phase of PLC

Aspects of project phase	Mean	Std. Deviation
ICT use for project initiating	3.56	1.192
ICT use for project planning	3.93	1.043
ICT use for project execution	4.06	.979
ICT use for project monitoring and evaluation	4.22	1.127
ICT use for project closure	3.57	1.297

(Source: SPSS output 2021)

From the survey result, respondents indicated that ICT use influences the monitoring and evaluation phase of their project management to a very great extent, as shown by a mean of 4.22. They also indicated that ICT use influences the planning phase of their project management to a very great extent, as demonstrated by a mean of 3.93, respectively. Besides, the respondents also indicated that ICT use influences the initiating, execution, and closing phases of their project management to a great extent, as shown by a mean of 3.57, 4.06, and 3.56.

Factors influencing the use of ICT for project phases

The informants reported that ICT solutions were used to manage project phases; however, these software do not have all features in one package, thus using different software was a mandatory and this might increase cost. Thus, in some cases budget was a limiting factor to have expensive software. Some software also has steep learning-curves, and this limited the ICT use. As the organization is working with partners, the skill gap and ICT support structure between the organization and its partners was also a limiting factor to use ICT for enhancing project performance. The donor requirements were also influencing the use of ICT in some

cases where project staff could only use those technologies preferred by the donor. Thus, when different donors preferred different technologies for similar project tasks, these affects the uniformity in software use and might also influence accumulated learning skill. Some procurement processes might not be on spot thus could delay the use of technologies for project management.

4.2.4.2 Enterprise Environmental Factors and Project performance

The researcher asked the respondents to indicate the extent to which various aspects of enterprise environmental factors influence their project management. The results were as presented in table 4.21.

Table 4. 21: Aspects of EFFs.

Aspects of EEFs	Mean	Std. Deviation
ICT or ICT4D support staffing	3.65	1.289
ICT usage skill	3.91	1.109
ICT or ICT4D support structure	3.77	1.192
ICT use for acquiring team	3.47	1.222
ICT use for developing team	3.49	.985
ICT use for managing team (Performanace of team)	3.70	1.059

(Source: SPSS output 2021)

From the survey result, respondents indicated that ICT usage skill influences the management of their project (project performance) to a very great extent, as shown by a mean of 3.91. They also indicated that ICT or ICT4D support structure influences the management of their project to a great extent, as shown by a mean of 3.77. The respondents also indicated that ICT use for managing performances of team influence the management of their project to a great extent, as shown by a mean of 3.70. The respondents said ICT, or ICT4D support staffing impacts the management of their project to a great extent, as shown by a mean of 3.65. ICT use for developing teams influences the management of their project to a great extent, as shown by a mean of 3.49. Lastly, ICT use for acquiring teams influences the management of their project to a great extent, as demonstrated by a mean of 3.47.

4.2.4.3 Organization Process Assets and Project Performance

The researcher asked respondents to indicate the extent to which various aspects of organizational process assets influence their project management. The results were as presented in table 4.20.

Table 4. 22: Aspects of OPAs.

Aspects of OPAs	Mean	Std. Deviation
ICTuse for hardware acquiring process	3.34	1.341
ICT use for software acquiring process	3.95	.985
ICT use policy	3.61	1.198
ICT donor related policy	3.42	1.328
ICT resources use authorization and replacement procedures	3.58	1.004

(Source: SPSS output 2021)

From the survey result, respondents indicated that ICT use for software acquiring process influences the management of their project (project performance) to a very great extent, as shown by a mean of 3.95. They also indicated that ICT use policy influences the management of their project to a great extent, as demonstrated by a mean of 3.61. The respondents also indicated that ICT resources use authorization and replacement procedures influence the management of their project to a great extent, as shown by a mean of 3.58. ICT donor-related policy influences the management of their project to a great extent, as demonstrated by a mean of 3.42. Lastly, ICT use for hardware acquiring process affects the management of their project to a great extent, as shown by a mean of 3.34.

4.2.4.4 Project Performance (Management of Projects)

The researcher asked the respondents to rate the three aspects (dimensions) of project performance. The results were as presented in table 4.23.

Table 4. 23: Aspects of Project Performance.

Aspects of project performance	Mean	Std. Deviation
On Schedule	4.20	.762
Within Budget	4.06	.878
Per Donor Specification or Scope or Compliane	4.09	.853

(Source: SPSS output 2021)

According to the survey result, the respondents rated the within a schedule performance of their project management Excellent as shown by a mean of 4.20. The respondents rated within a budget of management of their projects as Good as demonstrated by a mean of 4.06. Lastly, they also rated the per donor specification of their projects as Good, shown by a mean of 4.09.

Factors influencing the use of ICT for project performance

According to the key informants, budget, and donor requirements (compliance) highly influences the use of ICT for project performance. The organization encourages the use of ICT; however, the encouragement was somehow limited due to donor requirements.

The availability of budget could also influence ICT use for project performance as project people were stretch with the limited technology to address all projects. The technology use has been at its grass root at woreda level with which the organization work through partner and this influenced project performance.

4.3 Inferential Analysis

4.3.1 Correlations of ICT use in Managing Project Phases, EEFs, OPAs and Project Performance

This section presents the result of the carried-out correlations and regression analysis to check whether a relationship existed among the identified factors. The research presented the correlation analysis first and then the relation analysis next. The study aimed to review the association between the explanatory variables and the dependent variables. The researcher used Spearman's correlation to examine whether an association exists between the **ICT use (IV)** for managing project across life cycle such as initiating, planning, execution, monitoring and evaluation, and closing; and with project performance with sub-factors such as within schedule, within budget and per donor specification. The conceptual framework indicated that there was association between EEFs and project performance; and between OPAs and project performance. Accordingly, the study checked the association between EEFs and project performance and between OPAs and project performance.

The researcher had already set a 95% confidence interval before data collection and tested the measuring scale's reliability to analyze the relations. Thus, the study checked the association at the preset 0.05 level (2-tailed) for significance and the coefficients for the relation's strength. The researcher used Spearman's correlation coefficient to test the association. The Spearman correlation coefficients' positive and negative signs indicate direct and inverse relationships, respectively.

In summary, the study used Spearman's correlation to examine the relationships between project performance (dependent variable) and **ICT use** (independent variable). Similarly, the study also used Spearman's correlation to find the influence of both enterprise environmental factors **EEFs** and organizational process assets **OPAs**, on the project performance (DV dependent variable).

4.3.1.1 Correlations when Within Schedule (aspects of Project Performance) is Dependent

The researcher ran the base case correlation to examine the association between ICT use (independent variable) and Within Schedule (project performance). The results were shown in table 4.24.

Table 4. 24: Correlation between ICT use and Within Schedule

		Within Schedule	ICT use for Project Initiating	ICT use for Project Planning	ICT use for Project Executig	ICT use for Project Monitoring and Evaluation	ICT use for Project Closing
Within Schedule	Correlation Coefficient	1.000					
	Sig. (2-tailed)						
	N	54					
ICT use for Project Initiating	Correlation Coefficient	.186	1.000				
	Sig. (2-tailed)	.179					
	N	54	54				
ICT use for Project Planning	Correlation Coefficient	.269*	.707**	1.000			
	Sig. (2-tailed)	.049	.000				
	N	54	54	54			
ICT use for Project Executig	Correlation Coefficient	.192	.564**	.758**	1.000		
	Sig. (2-tailed)	.165	.000	.000			
	N	54	54	54	54		
ICT use for Project Monitoring and Evaluation	Correlation Coefficient	.210	.365**	.592**	.745**	1.000	
	Sig. (2-tailed)	.127	.007	.000	.000		
	N	54	54	54	54	54	
ICT use for Project Closing	Correlation Coefficient	.008	.653**	.665**	.768**	.633**	1.000
	Sig. (2-tailed)	.954	.000	.000	.000	.000	
	N	54	54	54	54	54	54

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

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: SPSS output 2021)

The study result showed that there is a positive association between ICT use for project planning and project performance (Within Schedule) with a correlation coefficient .269 as shown in table 4.24. The association was significant as $p = .049$<0.05 level (2-tailed).

4.3.1.2 Correlations when Within Budget (aspects of Project Performance) is Dependent

The researcher ran the base case correlation to examine the association between ICT use (independent variable) and Within Budget (project performance). The results were shown in table 4.25.

Table 4. 25: Correlation between Within Budget and ICT use

		Within Budget	ICT use for Project Initiating	ICT use for Project Planning	ICT use for Project Execution	ICT use for Project Monitoring and Evaluation	ICT use for Project Closure
Within Budget	Correlation Coefficient	1.000	.335*	.383**	.459**	.534**	.385**
	Sig. (2-tailed)		.013	.004	.000	.000	.004
	N	54	54	54	54	54	54
ICT use for Project Initiating	Correlation Coefficient	.335*	1.000	.707**	.564**	.365**	.653**
	Sig. (2-tailed)	.013		.000	.000	.007	.000
	N	54	54	54	54	54	54
ICT use for Project Planning	Correlation Coefficient	.383**	.707**	1.000	.758**	.592**	.665**
	Sig. (2-tailed)	.004	.000		.000	.000	.000
	N	54	54	54	54	54	54
ICT use for Project Execution	Correlation Coefficient	.459**	.564**	.758**	1.000	.745**	.768**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	54	54	54	54	54	54
ICT use for Project Monitoring and Evaluation	Correlation Coefficient	.534**	.365**	.592**	.745**	1.000	.633**
	Sig. (2-tailed)	.000	.007	.000	.000		.000
	N	54	54	54	54	54	54
ICTuse for Project Closure	Correlation Coefficient	.385**	.653**	.665**	.768**	.633**	1.000
	Sig. (2-tailed)	.004	.000	.000	.000	.000	
	N	54	54	54	54	54	54

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

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: SPSS output 2021)

The study result showed that there is a positive association between Within Budget (project performance) and each aspects of ICT use for managing project phases (Initiating, Planning, Executing, Monitoring and Evaluation, Closure) with correlation coefficients .335, .383, .459, .534 and .385 respectively. The association between Within Budget and Project Initiating, between Within Budget and Project Planning, between Within Budget and Project Execution, between Within Budget and Project Monitoring and Evaluation, and between Within Budget and Project Closure was significant as $p = .013$<0.05 level (2-tailed), $p = .004$<0.05 level (2-tailed), $p = .000$<0.05 level (2-tailed) $p = .000$<0.05 level (2-tailed) and $p = .004$<0.05 level (2-tailed) respectively. The result showed that the ICT use for managing project phases has association with project budget.

4.3.1.3 Correlations when Per Donor Specification or Project Scope (Project Performance) is Dependent

The researcher ran the base case correlation to examine the association between ICT use (independent variable) and Per Donor Specification or Scope or Compliance (project performance). The results were shown in table 4.26.

Table 4. 26: Correlation between aspects of ICT use and Per Donor Specifications

		Per Donor Specification or Compliance or Scope	ICT use for Project Initiating	ICT use for Project Planning	ICT use for Project Execution	ICT use for Project Monitoring and Evaluation	ICT use for Project Closure
Per Donor Specification or Compliane or Scope	Correlation Coefficient	1.000					
	Sig. (2-tailed)						
	N	54					
ICT use for Project Initiating	Correlation Coefficient	.375**	1.000				
	Sig. (2-tailed)	.005					
	N	54	54				
ICT use for Project Planning	Correlation Coefficient	.437**	.707**	1.000			
	Sig. (2-tailed)	.001	.000				
	N	54	54	54			
ICT use for Project Execution	Correlation Coefficient	.370**	.564**	.758**	1.000		
	Sig. (2-tailed)	.006	.000	.000			
	N	54	54	54	54		
ICT use for Project Monitoring and Evaluation	Correlation Coefficient	.346*	.365**	.592**	.745**	1.000	
	Sig. (2-tailed)	.010	.007	.000	.000		
	N	54	54	54	54	54	
ICT use for Project Closure	Correlation Coefficient	.335*	.653**	.665**	.768**	.633**	1.000
	Sig. (2-tailed)	.013	.000	.000	.000	.000	
	N	54	54	54	54	54	54

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

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: SPSS output 2021)

The study result showed that there is a positive association between Per Donor Specification or Scope (project performance) and each aspects of ICT use for managing project phases (Initiating, Planning, Executing, Monitoring and Evaluation, Closure) with correlation coefficients .375, .437, .370, .346 and .335 respectively. The association between Per Donor Specification and Project Initiating, between Per Donor Specification and Project Planning, between Per Donor Specification and Project Execution, between Per Donor Specification and Project Monitoring and Evaluation, and between Per Donor Specification and Project Closure was significant as $p = .005$<0.05 level (2-tailed), $p = .001$<0.05 level (2-tailed), $p = .006$<0.05 level (2-tailed) $p = .010$<0.05 level (2-tailed) and $p = .013$<0.05 level (2-tailed) respectively. The result showed that the ICT use for managing project phases has association with project scope.

Project donors have their own requirements with respect to ICT. In addition they do also have requirements for project environment, policy, procedures etc. Therefore, it is reseaonable to check the level of associations between Project Scope Performance and Enterprise Environmental Factors (EEFs) and project performance, and between Project Scope Performance and Organizational Process Assets (OPAs).

Thus, the researcher has examined the association between the indpendent variable Enterprise Environmental Factors (EEFs) and Per Donor Specification or Scope or Compliance (project performance). The results were shown in table 4.27.

Table 4. 27: Correlation between Per Donor Specification and EEFs

		Per Donor Specification or Compliance or Scope	ICT or ICT4D Support Staffing	ICT Usage Skill	ICT or ICT4D Support Structure	ICT use for Acquiring Team	ICT use for Developing Team	ICT use for Managing Team (Performance of Team)
Per Donor Specification or Compliance or	Correlation Coefficient	1.000						
	Sig. (2-tailed)							
	N	54						
ICT or ICT4D Support Staffing	Correlation Coefficient	.362*	1.000					
	Sig. (2-tailed)	.017						
	N	43	43					
ICT Usage Skill	Correlation Coefficient	.464**	.673**	1.000				
	Sig. (2-tailed)	.002	.000					
	N	43	43	43				
ICT or ICT4D Support Structure	Correlation Coefficient	.420**	.851**	.740**	1.000			
	Sig. (2-tailed)	.005	.000	.000				
	N	43	43	43	43			
ICT use for Acquiring Team	Correlation Coefficient	.350*	.712**	.428**	.786**	1.000		
	Sig. (2-tailed)	.022	.000	.004	.000			
	N	43	43	43	43	43		
ICT use for Developing Team	Correlation Coefficient	.349*	.712**	.542**	.714**	.780**	1.000	
	Sig. (2-tailed)	.022	.000	.000	.000	.000		
	N	43	43	43	43	43	43	
ICT use for Managing Team_Performanac	Correlation Coefficient	.471**	.656**	.658**	.637**	.676**	.804**	1.000
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	
	N	43	43	43	43	43	43	43

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

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: SPSS output 2021)

The study result showed that there is a positive association between Per Donor Specification or Scope (project performance) and each aspect of EEFs with correlation coefficients .362, .464, .420, .350, .349 and .471 respectively. The association between Per Donor Specification and ICT or ICT4D Support Staffing, between Per Donor Specification and ICT Usage Skill, between Per Donor Specification and ICT or ICT4D Support Structure, between Per Donor Specification and ICT use for Acquiring Team, between Per Donor Specification and ICT use for Developing Team, and between Per Donor Specification and ICT use for Managing Team

(Performance of Team) was significant as $p = .017$<0.05 level (2-tailed), $p = .002$<0.05 level (2-tailed), $p = .005$<0.05 level (2-tailed), $p = 0.022$<0.05 level (2-tailed), $p = 0.022$<0.05 level (2-tailed) and $p = 0.001$<0.05 level (2-tailed) respectively. The result showed that the ICT use for managing project phases has association with project scope.

The researcher also examined the the association between the indpendent variable Organizational Process Assets (OPAs) and Per Donor Specification or Scope or Compliance (project performance). The results were shown in table 4.28.

Table 4. 28: Correlation between Per Donor Specification and OPAs

		Per Donor Specification or Compliance or Scope	ICT use for Hardware Acquiring Process	ICT use for Software Acquiring Process	ICT use Policy	ICT donor Related Policy	ICT Resources use Authorization and Replacement Procedures
Per Donor Specification or Compliance or Scope	Correlation Coefficient	1.000					
	Sig. (2-tailed)						
	N	54					
ICT use for Hardware Acquiring Process	Correlation Coefficient	.151	1.000				
	Sig. (2-tailed)	.366					
	N	38	38				
ICT use for Software Acquiring Process	Correlation Coefficient	.206	.403*	1.000			
	Sig. (2-tailed)	.216	.012				
	N	38	38	38			
ICT use Policy	Correlation Coefficient	.349*	.262	.247	1.000		
	Sig. (2-tailed)	.032	.113	.136			
	N	38	38	38	38		
ICT donor Related Policy	Correlation Coefficient	.194	.359*	.178	.690**	1.000	
	Sig. (2-tailed)	.243	.027	.284	.000		
	N	38	38	38	38	38	
ICT Resources use Authorization and Replacement	Correlation Coefficient	.161	.354*	.370*	.494**	.493**	1.000
	Sig. (2-tailed)	.335	.029	.022	.002	.002	
	N	38	38	38	38	38	38

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

**. Correlation is significant at the 0.01 level (2-tailed).

(Source: SPSS output 2021)

The study result showed that there is a positive association between Per Donor Specification or Scope (project performance) and ICT use Policy (aspect of OPAs) with correlation coefficients .349 as shown in table 4.28. The association was significant as $p = .032$<0.05 level (2-tailed).

In summary, there was a positive relationship between project schedule performance and ICT use for project initiation, between project schedule performance and ICT use for project planning, between project schedule performance and ICT use for project execution, between project schedule performance and ICT use for project monitoring and evaluation, and between project schedule performance and ICT use for project closure. However, the relationship was significant only for project planning.

There was a positive relationship between project budget performance and ICT use for project initiation, between project budget performance and ICT use for project planning, between project budget performance and ICT use for project execution, between project budget performance and ICT use for project monitoring and evaluation, and between project budget performance and ICT use for project closure. The relationships are significant for each project phase.

In summary, there was a positive relationship between project scope performance as per donor specification and ICT use for project initiation, between project scope performance and ICT use for project planning, between project scope performance and ICT use for project execution, between project scope performance and ICT use for project monitoring and evaluation, and between project scope performance and ICT use for project closure. The relationships are significant for each project phase.

There was a positive relationship between project scope performance (per donor specification) and each aspect of EEFs (ICT or ICT4D Support Staffing, ICT Usage Skill, ICT or ICT4D Support Structure, ICT use for Acquiring Team, ICT use for Developing Team, ICT use for Managing Team - Performance of Team). The relationships are significant for each enterprise environmental factor (EEF).

There was a positive relationship between project scope performance (per donor specification) and each aspect of OPAs (ICT use for Hardware Acquiring Process, ICT use for Software Acquiring Process, ICT use Policy, ICT Donor Related Policy, ICT Resources use Authorization and Replacement Procedures. However, the relationship was significant only for ICT use Policy).

4.3.2 Regression Analysis

Multiple Linear Regression (MLR) is the statistical model used to predict the relationship between a predicted (dependent or outcome) variable and the predictors (independent or explanatory) variables. In line with the set objective, the researcher examined the causal relationship between Within Schedule project performance and ICT use, between Within Budget and ICT use, and between Per Donor Specification and ICT use, EEFs, OPAs.

4.3.2.1 within Schedule

The researcher regressed the independent variable (**ICT use for Project Planning**) against dependent variable (**Within Schedule**). The results were presented in table 4.29.

Table 4. 29: Effect of ICT use for managing project phases on Within Schedule

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.28	.079	.061	.738

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.419	1	2.419	4.439	.040
	Residual	28.340	52	.545		
	Total	30.759	53			

Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.400	.395		8.617	.000
ICT use for Project Planning	.205	.097	.280	2.107	.040

(Source: SPSS output 2021)

The variation in **Within Schecule** project performance can be explaind by **ICT use for Project Planning**. The R-square in the Model Summary is .079. This shows that ICT use in managing the five project phases can explain 7.9% of the variation in Project Schedule Performance. Other factors not considered in this study explain 92.1% of the variation in the depnendent variable, Within Schedule project performance.

From the analysis of the ANOVA above, the researcher has determined whether the model is a good fit for the data. The model is significant since $p = .040 < 0.05$ (2-tailed). The model is statistically significant to establish the influence of ICT use for project planning on the project schedule performance.

The variable **ICT use for Project Planning** have a positive relationship (t-coefficient is positive) with the model and its contribution is significant. Using the regression coefficients, the statistical model of the regression is:

$Y = 3.40 + 0.205*(\text{ICTuse for project planning}) + \varepsilon$

4.3.2.2 within Budget

The study regressed indpendent variables (**ICT use for Project Initiating**, **ICT use for Project Planning, ICT use for Project Execution, ICT use for Project Monitoring and Evaluation**, and **ICT use for Project Closing)** against the dependent variable **Within Budget**. The results were presented in table 4.30.

Table 4. 30: Effect of ICT use for managing project phases on Within Budget

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.553	.305	.233	.769

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.468	5.000	2.494	4.220	.003
	Residual	28.365	48.000	.591		
	Total	40.833	53.000			

Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.081	.492		4.230	.000
	ICT use for Project Initiating	.041	.150	.056	.275	.784
	ICT use for Project Planning	-.098	.199	-.116	-.492	.625
	ICT use for Project Execution	.284	.231	.317	1.231	.224
	ICT use for Project Monitoring and Evaluation	.239	.167	.307	1.434	.158
	ICT use for Project Closure	.014	.146	.020	.094	.926

(Source: SPSS output 2021)

The variation in **Within Budget** project performance can be explaind by **ICT use for Project Initiating**, **ICT use for Project Planning, ICT use for Project Execution, ICT use for**

Project Monitoring and Evaluation, and **ICT use for Project Closing**. The R-square in the Model Summary is .305. This shows that ICT use in managing the five project phases can explain 30.5% of the variation in Project Budget Performance. Other factors not considered in this study explain 69.5% of the variation in the depnendent variable - Within Budget project performance.

From the analysis of the ANOVA above, the researcher has determined whether the model is a good fit for the data. The model is significant since $p = .003 < 0.05$ (2-tailed); it is statistically significant to establish the influence of ICT use for managing project phases on the project budget performance.

While all the indpendent variables ICT use for Project Initiating, ICT use for Project Executing, ICT use for Project Monitoring and Evalating, ICT use for Project Closing have positive relationship (t-coefficients are positive) with the model; ICT use for Project Planning has a negative relationship (t-coefficient is negative) with the model. The variables' contributions are not significant. Using the regression coefficient table, the model of the regression for Budget (Y) is:

Y = 2.081 + .41*ICT use for Initiating - .098* ICT use for Planning + .284* ICT use for Executing + .239* ICT use for Monitoring & Evaluation + .014*ICT use for Closing + ε

4.3.2.3 per Donor Specification (Scope or Compliance)

The three independent variables ICT use, EEFs and OPAs were significantly correlated with dependent variable Per Donor Specification. Before regressing these variables against Per Donor Specifications, the researcher first tested for collinearity. The results were presented in table 4.31.

Table 4. 31: Test on collinearity.

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	EEFs	.710	1.409
	OPAs	.710	1.409

a. Dependent Variable: ICT use

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	OPAs	.934	1.071
	ICTuse	.934	1.071

a. Dependent Variable: EEFs

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	ICTuse	.925	1.081
	EEFs	.925	1.081

a. Dependent Variable: OPAs

(Source: SPSS output 2021)

The result showed no multicollinearity within the data as the values of the VIF were under three, which is perfect. The VIF values for each explanatory variable were 1.409, 1.071, and 1.081, respectively, for each case where ICT use is considered dependent, EEFs is considered to be dependent, and OPAs is considered dependent. Therefore there is no multicollinearity issue among the three predicting variables: ICT use, EEFs, and OPAs.

The study then regressed indpendent variables (**ICT use** for manging project phases), **EEFs** and **OPAs** against the dependent variable **Per Donor Specification**. The results were shown in table 4.32.

Table 4. 32: Effect of ICT use, EEFs and OPAs on Per Donor Specification

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.516	.266	.192	.656	.266	3.620	3	30	.024

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.667	3	1.556	3.620	.024
	Residual	12.891	30	.430		
	Total	17.559	33			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.376	.686		3.463	.002
	ICTuse	.074	.135	.091	.552	.585
	EEFs	.330	.144	.432	2.297	.029
	OPAs	.078	.176	.083	.442	.662

(Source: SPSS output 2021)

The variation in **Per Donor Specification** project performance can be explaind by the aspects of **ICT use** for manging project phases, **EEFs** and **OPAs**. The R-square in the Model Summary is .266. This shows that ICT use for managing project phases, EEFs and OPAs together can explain 26.6% of the variation in Project Scope Performance. Other factors not considered in this study explain 73.4% of the variation in the depnendent variable - Per Donor Specification (Scope) project performance.

From the analysis of the ANOVA above, the researcher has determined whether the model is a good fit for the data. The model is significant since $p = .024 < 0.05$ (2-tailed). The model is statistically significant to establish the influence of ICT use for managing project phases, EEFs and OPAs on the project per donor specification performance.

All the indpendent variables ICT use for managing project phases, EEFS and OPAs have positive relationship (t-coefficients are positive) with the model. Using the regression coefficients, the model of the regression for Per Donor Specification (Y) is:

$Y = 2.376 + 0.074*(ICTuse) + .330*(EEFs) + .078*(OPAs) + \varepsilon$

ICT use and Scope (Per Donor Specification)

The variation in **Per Donor Specification** project performance can be explaind by the aspects of **ICT use** for manging project phases; the R-square in the Model Summary is .207. This shows that ICT use for managing project phases can explain 20.7% of the variation in project scope performance. From the analysis of the ANOVA above, the researcher has determined whether the model is a good fit for the data. The model is significant since $p = .043 < 0.05$ (2-tailed). The model is statistically significant to establish the influence of ICT use for managing project phases on the project per donor performance. All the aspects of ICT use for managing project phases have positive relationship (t-coefficients are positive) with the model except project initiation as shown in Table 4.33.

Table 4. 33: Effect of ICT use on Per Donor Specification

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.455	.207	.124	.798	.207	2.507	5	48	.043

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.981	5	1.596	2.507	.043
	Residual	30.556	48	.637		
	Total	38.537	53			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.498	.511		4.892	.000
	ICT use for Project Initiating	-.071	.155	-.099	-.454	.652
	ICT use for Project Planning	.224	.206	.275	1.088	.282
	ICT use for Project Execution	.152	.240	.175	.634	.529
	ICT use for Project Monitoring and Evaluation	.061	.173	.081	.354	.725
	ICT use for Project Closure	.025	.151	.038	.164	.870

4.4 Results of Interview Questions

The researcher invited six key informants from different projects to interview, and four of them made it possible; however, two staff were not able to make it due to a busy schedule. Thus, the researcher interviewed four project staff and their responses were summarized and presented as follows.

Interview results

The researcher summarized the interview results into mainly three categories: ICT use, positive influences, and negative influences. The categories were not practically different ideas, and instead, they were interconnected with the technologies that were being in use to manage the project. The negative influences categories constrain the use of technologies, while the positive influences enhance technology use. Thus, both are interconnected with technology, either pushing or pulling each other.

Discussions

Assessment of ICT use (ICT use category) - Project staff uses various ICT solutions to manage the various aspects of projects. The followings are the main summary of project aspects and the use of ICT:

ICT solutions were highly used for project communications and data collection during planning.

Online dashboards were made accessible to stakeholders for accountability and implementation data collection and verification, and team management during execution.

ICT solutions were made available to facilitate survey and progress data collection and quality assurance through verification, data analysis, visualization, and reporting during monitoring and evaluation.

ICT solutions helped projects in maintaining project completion report and experience learned for future reference during the closure.

Generally, the organization uses technology for the project or program quality data, real-time management decisions, dashboards for visibility to stakeholders, and learning and knowledge management. Some staff is highly aware of the pros and cons of technology.

Positive influences - Some donors require to use specific ICT solutions, and the agency also encourages technology use. The availability of ICT-related support professionals and its structure promotes the use of technology for project management. Most staff are given training opportunities. Some staff's involvement in telling the pros and cons of many applications indicates a tendency to apply more technology in the management of the project, thus influencing the adoption and use of technology. Some technologies have a shallow learning curve, thus promising to use at ease.

Negative influences – Some donors do not encourage technology by not making sufficient funds for their project. Others, though, allocate funds and impose compliance issues using only recommended make or brand or versions. The gap between CRS and its partners at the down level in using ICT and supporting professionals influences the effective use of technology for project management. Technology has also imposed restrictions on the use of technology by lacking completeness to use it for all or most features required for project

management. Lack of refreshment training influences the use of technology. Some ICT solutions have steep learning curves; thus, it takes longer to learn the knowledge, thus not encouraging users to learn and use it.

4.5. Interpretation of Findings

In this section the finding of the study would be discussed as per the objective.

Findings of Descriptive Analysis

From the total respondents, 66.7% of staff reported that they use different ICT solutions for planning projects, of which 47.2% uses MS Planner for scheduling project tasks, 33.3% uses MS Project for resource allocation, and 27.8% uses accounting SW for budgeting project costs. The respondents reported using the solutions for at least one week in a month during project planning.

From the total respondent, 77.8% of staff reported that they use different ICT solutions for executing projects, of which 61% uses simple Excel sheets for project procurement tasks, and more than 90% uses Email or MS Teams for collaboration, communications, and stakeholder management. The respondents use the solutions for at least three weeks in a month during the project execution.

Among the respondents, greater than 80% use ICT solutions for project monitoring and evaluation. 76.7% use ComCare for Baseline and Implementation data collection, and greater than 61% use SPSS for data analysis. 68.2% use Power BI for data visualization greater than 36% use SMS or SMS Interactive voice recording for social accountability. Regarding the frequency of use, the respondents reported using the solution for at least three weeks a month during project monitoring and evaluation.

Among the respondents, 50.9% reported they use ICT solutions during project closing, out of which 70.4% said that they use email during project closing and 63% use shared network folders to store and retrieve information, document, and record management. 59.3% reported using email to disseminate project closure information, and 51.9% use MS Teams to conduct a post-implementation review (project completion review). Regarding the frequency of use, the respondents reported using the solutions for at least more than three weeks in a month during project closing.

Most of the respondents rate their schedule achievement as excellent and their budget and donor specification as Good. This indicates that the achievement of project performance is at least good.

In summary, respondents indicated they highly use applications like MS planner, Email (outlook), MS Excel, ComCare, and Power BI. However, the use of different applications for the same tasks was also observed, especially regarding the applications used for data collection.

Findings of Inferential Analysis

Before checking the influence that ICT use has on project performance, the researcher checked whether there is a relationship between each aspect of the variables of project performance, ICT use in each project phase, organizational process assets, and enterprise (CRS) environmental factors. The study identified the following relationships using correlation analysis.

The study showed that dependent variable Within Schedule project performance has a significant (.269) relationship with the independent variable ICT use for project planning at the $p = .049 < 0.05$ level (2-tailed). The independent variable explains the model by 7.9% compared to with no model and it has a positive relationship with the model. The model is a good fit for the data, and it is statistically significant since $p = .040 < 0.05$ level (2-tailed) to establish the influence of ICT use for project planning on project schedule performance.

The study showed that dependent variable Within Budget project performance has significant (.335, .385, .459, .534 and .385) relationships with each independent variable ICT use for project initiating, ICT use for project planning, ICT use for project executing, ICT use for project monitoring and evaluating, and ICT use for project closing at the $p = .013 < 0.05$, $p = .004 < 0.05$, $p = .000 < 0.05$, $p = .000 < 0.05$ and $p = .004 < 0.05$ level (2-tailed), respectively. The independent variables together explain the variation in Within Budget 30.5% compared to with no model and all have positive relationships with the model. The model is a good fit for the data, and it is statistically significant since $p = .0003 < 0.05$ level (2-tailed) to establish the influence of ICT use for managing project phases on project budget performance.

The study showed that dependent variable Per Donor Specification project performance has significant (.375, .437, .370, .346 and .335) relationships with each independent variable ICT use for project initiating, ICT use for project planning, ICT use for project executing, ICT use for project monitoring and evaluating, and ICT use for project closing at the $p = .005 < 0.05$, $p = .001 < 0.05$, $p = .006 < 0.05$, $p = .010 < 0.05$ and $p = .013 < 0.05$ level (2-tailed), respectively. The dependent variable Per Donor Specification has significant (.362, .464, .420, .350, .349 and .351) relationships with each independent variable ICT or ICT4D support staffing, ICT usage skill, ICT or ICT4D support structure, ICT use for acquiring team, ICT use for team development and ICT resource use authorization and replacement (aspects of EEFs) at the $p = .017 < 0.05$, $p = .002 < 0.05$, $p = .005 < 0.05$, $p = .022 < 0.05$, $p = .022 < 0.05$ and $p = .001 < 0.05$ level (2-tailed), respectively. Per Donor Specification has a significant (.349) relationship with an independent variable ICT use policy (aspect of OPA) at the $p = .032 < 0.05$ level (2-tailed). ICT use, EEFs and OPAs together explain the variation in Per Donor Specification 26.6%. The variables have positive relationship with the model. The model is a good fit for the data, and it is statistically significant since $p = .024 < 0.05$ to establish influence on Per donor Specification

Findings of the key interview with key informants

Interview findings

- Respondents have know-how on the benefit or use of technology to manage their projects at each phase.
- ICT uses such as data management, online reporting, online survey, smooth communication.
- CRS has good experience in using ICT for project management. The use of ICT enhances project performance.
- Donors have policies that influence ICT use. Some donors like USAID encourage the use of technology. Others have no supporting policy. Some restrict a project to use specific technologies (make and brand).
- Some donors do not allocate budgets for acquiring technology, thus brings overstretching to accommodate all projects with limited ICT resources.
- CRS policy has a positive influence on the use of ICT solutions; it encourages ICT use to improve the quality program and save time and cost.

- CRS policy restricts the type of technology for compliance issues. ICT should comply with the minimum requirements of the agency and should come from genuine/trusted suppliers.
- The acquisition process of a new ICT solution not quick as it should pass through rigorous evaluation processes and lengthy procurement and delivery procedures.
- The gap between CRS and partners in the use of technology (capacity) is more expansive than expected. Staffing and staff skill at different partner levels and Structuring ICT support down at lower level are current challenges and influences project management at different levels or phases.
- The requirement of light experts and the learning curves can affect ICT use for project management.
- Cost, easy usability, extendibility to partners, easy customizability, etc. affects the use of technology for project management.
- Required components should be complete

Summary of interview findings

1. The organization (CRS) encouraged the use of ICT; however, there was a gap between the organization and its partners in the use of ICT for project management. The enterprise environmental factors such as ICT usage skill, etc., may affect the facilitating effect of ICT use but, as such, has no direct influence or impact on the project achievement. Similarly, the organizational process assets may affect the facilitating effect of ICT use; however, it does not directly affect the project performance achievement.
2. Some donors encouraged the use of ICT; however, they may also restrict the type of solutions to use from its compliance requirement view. Some donors may not have encouraged policy to use ICT solution to allocate budgets, which may cause stretch (accommodating all project in the use of ICT HW and SW) in supporting such projects.
3. From the study, the participants' response to select from given ICT solutions and to list free by themselves varies widely; thus, this showed that there might be an awareness issue regarding SW use.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions drawn, and the recommendation is given based on the summary of the findings of the carried-out research.

5.2 Conclusions

Nearly all project management staff uses ICT solutions for managing identified aspects of their project management. However, the type of applications used for the same task of a project management dimension varies except for data collection and visualization, ICT for social responsibility, and collaboration and communication solutions. The variation indicates that the use of ICT for M&E is heading toward standardized solutions. Project execution was also heading toward standardized usage for its communication and collaboration and stakeholder management; however, respondents mainly use MS excel sheets for processing procurement aspects. The use of ICT for planning varies even though MS planning looks to gain used for short-term scheduling. Regarding the frequency of use, most staff use ICT solutions for each project phase management for at least three weeks in a month for that duration of the phases except planning for which they use for one week in a month during planning time.

The researcher also checked to what level ICT use explain project schedule, project budget, and project scope and found that ICT use could only explain 7.9% of project schedule, 30.5% of project budget performance. ICT use, EEFS and OPAs together explain 26.6% of Per Donor specification of project performance. The result implied that a unit enhancement in the ICT usage would enhance 7.9% of the variation in project schedule performance, 30.5% of project budget performance and 20.7% of project scope performance. ICT usage, EEFs and OPAs together explain 26.6% project scope. In general, the use of ICT for project initiating, planning, executing, monitoring & evaluation, and closing influences project schedule, budgeting and donor compliance.

From the interview or qualitative analysis, the study found that the organization and some donors encourage the use of ICT for project management while others not. But there is still a

difficulty (gap) to apply ICT support structure down at the partner level, which limited the use of ICT solutions. ICT solutions themselves are not complete (not have all features), and this also limited the use of specific ICT solutions for most tasks. ICT facilitated data collection and verification, online reporting, donor visibility (dashboards), virtual collaboration and communications with stakeholders, etc.; however, the standardized usage was still not fully achieved.

5.3 Recommendations

1. Technology is dynamic and requires users be updated continuously. The organization should give refreshment training on awareness to make staff on the same page in the use of technology (standardization). Specifically, the respondents did not list the SW used for project management as a standard, and this showed that there might be a need for refreshment training.

2. There are challenges in finding a full-fledged project management SW; considering customization of SW could be a solution for NGOs' environment.

3. Some respondents reported they use simple Excel sheet for project planning. The agency can measure MS Excels sufficiency for project planning against software made for project management.

4. Various ICT solutions were in use in the organization for managing different projects. This showed that there might be a chance of fragmented technology use if different technologies are used to work for the same purpose but in different projects. More encouraging standardized use of technology for similar application areas saves the support effort, reduces budget requirements, and enhances usage skill (improves learning curve).

5.4 Limitation and suggestion for further study

Limitation

1. Covid-19 has affected most businesses. This research is not exceptional; the limited availability of data (low response rate) had somehow affected this study. In addition, during data collection time, many staff were working in a tight schedule as a project with

big programmatic value was under rebidding process and that would have contributed to low response rate than the researcher expected.

2. The know-how of technology might have limited the response of participants.

3. The subject matter of technology is broad, and it was challenging to prepare a concise list of technologies and brief respondents as this required more time for the research.

Suggestion for further study

1. The study found that the use of ICT solutions was not uniform in different units. Further research can bridge the current segmented usage. The study also acknowledges using drone technology for mapping or supply chain or other project-related purposes only with making acceptable use policy. Therefore, adopting new technologies might be a research area, though the adoption or use of some technologies strictly requires following usage policy.

2. Respondents mentioned that the performance of their projects is also influenced by ICT use at partners' level. Thus, the researcher advises that conducting more research might establish the influence of information and communications at the partners level to enhance the agency's project performance achievement.

3. Currently, it is challenging to find a single solution that can fulfill the requirements of all users. However, this study proposes conducting further research to customize solutions for NGOs' project management purposes parallel to adoption.

REFERENCES

Alexandra-Mihaela, P. and Danut, D.D. (2013). The measurement and evaluation of the internal communication process in project management. *Annals of the University of Oradea, Economic Science Series,* Vol. 22, no. 1, accessed 20 December 2020,

https://www.researchgate.net/profile/Mark_Neal/publication/256432141_Can_Business_Education_Change_Management_Practices_in_Non-Western_Societies/links/02e7e522860eae971f000000/Can-Business-Education-Change-Management-Practices-in-Non-Western-Societies.pdf#page=1563

Andrade Rodriguez, P. (2017). Conceptual model of communication theories within project process. INNOVA Research Journal, Vol. 2, no. 3, 42-51, accessed 10 January 2020, https://doi.org/10.33890/innova.v2.n3.2017.131

Bannerman, Paul. (2008). Defining Project Success: A Multi-Level Framework. Accessed 10 January 2020,

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.449.8417&rep=rep1&type=pdf

Benfield, J. A., & Szlemko, W. J. (2006). Internet-based data collection: Promises and realities. *Journal of Research Practice,* Vol. 2, no. 2, accessed 14 November 2020, http://jrp.icaap.org/index.php/jrp/article/view/30/51

Berg, L. (2017). Communication tools' impact on project communication efficiency: An evaluation of traditional communication tools and social media.

https://www.diva-portal.org/smash/get/diva2:1115705/FULLTEXT02

Braglia, M. and Frosolini, M. (2014). An integrated approach to implement project management information systems within the extended enterprise. *International Journal of Project Management*, Vol. 32, no. 1, pp.18-29, accessed 10 January 2020,

https://www.sciencedirect.com/science/article/pii/S0263786312001792

Burt N. D., Petcavage, D. S. & Pinkerton, L. R. (2010). Supply chain management. McGraw-Hill/Irwin, a business unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY, 10020, 13 December 2020,

https://studydaddy.com/attachment/34724/20160719135653supply_management david_n_burt.pdf

Butina, M. (2015). A narrative approach to qualitative inquiry. Clinical Laboratory Science, Vol. 28, no. 3, pp.190-196, accessed 17 November 2020, http://clsjournal.ascls.org/content/ascls/28/3/190.full.pdf

Chua, Y.C. (2014). ICT application in achieving project success: A case study of a construction company in Malaysia (Doctoral dissertation, UMP), accessed 16 November 2020, https://core.ac.uk/download/pdf/159185438.pdf

Chen, X.H. & Snyman, Maritha & Sewdass, Nisha. (2005). Interrelationship between document management, information management and knowledge management. *South African Journal of Information Management.* Vol. 7, no. 3, accessed 19 December 2020,

https://www.researchgate.net/publication/228617437_Interrelationship_between_document_management_information_management_and_knowledge_management

Cooper, R., D., & Schindler, S., P. (2006). Business Research Methods (SIE), 6th edition. Tata McGraw-Hill Education Pvt. Ltd., 2006.

CRS, (2018a, b). Official website of Catholic Relief Services “About us” and "Our Work Overseas/Research & Publications". Accessed 22 November 2020, https://www.crs.org

CRS, (2017, 2020). Official website of Catholic Relief Services "Our Work Overseas". Accessed 22 November 2020, https://www.crs.org

Dadi Weyifen, (2018). Assessing the Importance of Project Planning, Monitoring and Evaluation on project success: A case study of Abune Gorgorios School Building Project. (Thesis, AAU).

De Araújo, M.C.B., Alencar, L.H. and de Miranda Mota, C.M. (2017). Project procurement management: A structured literature review. *International Journal of Project Management*, Vol. 35, no. 3, pp.353-377, 12 December 2020,

https://fardapaper.ir/mohavaha/uploads/2017/11/Project-procurement-management-A-structured-literature-review.pdf

De Boer, L., Harink, J. and Heijboer, G. (2002). A conceptual model for assessing the impact of electronic procurement. *European Journal of purchasing & supply management*, Vol. 8, no. 1, pp.25-33, 13 December 2020

https://www.sciencedirect.com/science/article/pii/S0969701201000156

De Wet, W. and Koekemoer, E. (2016). The increased use of information and communication technology (ICT) among employees: Implications for work-life interaction. *South African Journal of economic and management sciences*, Vol. 19, no. 2, pp.264-281, accessed 15 November 2020,

https://www.researchgate.net/publication/305144308_The_increased_use_of_information_and_communication_technology_ICT_among_employees_Implications_for_work-life_interaction

De Wet, W., Koekemoer, E. and Nel, J. A. (2016). Exploring the impact of information and communication technology on employees' work and personal lives. *SA Journal of Industrial Psychology*, Vol. 42, no. 1, pp.1-11, accessed 20 November 2020,

https://www.researchgate.net/publication/303977833_Exploring_the_impact_of_information_and_communication_technology_on_employees'_work_and_personal_lives

del Carmen Triana, M., Kirkman, B.L. and Wagstaff, M.F. (2012). Does the order of face-to-face and computer-mediated communication matter in diverse project teams? An investigation of communication order effects on minority inclusion and participation. *Journal of Business and Psychology*, Vol. 27, no. 1, pp.57-70, accessed 21 December 2020,

http://www.mtriana.com/mary/papers/Triana%20Kirkman%20Wagstaff_2012.pdf

Denscombe, M. (2010, 4th ed). The good research guide for small-scale social research projects. Buckingham, UK: Open University Press. Accessed 14 November 2020,

https://www.researchgate.net/file.PostFileLoader.html?id=582a0dbf217e20276533f5a5&assetKey=AS:428404664213506@1479151039119

Detelji, K. and Pihir, I. (2007). Influence of project management software tools usage on project success. Faculty of Organization and Informatics, Varazdin. Lecture, 18 December 2020,

https://www.researchgate.net/publication/259045660_Influence_of_Project_Management Software Tools Usage_on_Project_Success

Francis, L. (2015). The influence of project management office on information technology project success: case of national microfinance bank plc (Doctoral dissertation, The Open University of Tanzania). Accessed 27 January 2021,

http://repository.out.ac.tz/1367/1/francis_leonancy.pdf

Gachungi, R.W., 2017. Influence of Information and Communication Technology Application on Management of Road Projects in Kenya (Doctoral dissertation, University of Nairobi). accessed 19 November 2020,

http://erepository.uonbi.ac.ke/handle/11295/101542

Grudin, J. and Poltrock, S.E. (1989). User interface design in large corporations: coordination and communication across disciplines. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pp. 197-203, accessed 20 December 2020, https://dl.acm.org/doi/abs/10.1145/67449.67489

Harindranath, G. and Sein, M.K. (2007). Revisiting the role of ICT in development. In proceedings of the 9th international conference on social implications of computers in developing countries, São Paulo, Brazil. Accessed 15 November 2020,

https://www.academia.edu/download/33231520/r0094-1.pdf

Heale, R. and Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-based nursing*, Vol. 18, no. 3, pp.66-67, accessed 27 January 2020,

https://ebn.bmj.com/content/ebnurs/18/3/66.full.pdf

Hruska, N., 2003. Role of ICT in the NGO: The relevance factor. Accessed 20 November 2020,

https://www.academia.edu/29593952/Role_of_ICT_in_the_NGO_The_Relevance_Factor

Internet World Stats, (2020). Accessed 14 November 2020, https://www.internetworldstats.com/stats1.html

Jashapara, A. (2004). Knowledge Management: An Integrated Approach: Pearson Education. 1st ed., Publisher: *Financial Times/ Prentice Hall*. 19 December 2020,

Kombe, C. (2015). Impact of Project Management Information Systems on Project Success: A Case Study of World Vision Tanzania, (Doctoral dissertation, The Open University of Tanzania), accessed 27 November 2020,

http://repository.out.ac.tz/1534/1/Black_Book-Report.pdf

Kothari, C.R. (2004). Research methodology: Methods and techniques. New Age International. 2nd rev. ed., accessed 4 November 2020,

http://dl.saintgits.org/jspui/bitstream/123456789/1133/1/Research%20Methodology%20C%20R%20Kothari%20%28Eng%29%201.81%20MB.pdf

Landaeta, R.E. (2008). Evaluating benefits and challenges of knowledge transfer across projects. *Engineering management journal*, Vol. 20, no. 1, 29-38, accessed 12 December 2020,

https://www.researchgate.net/profile/Rafael_Landaeta/publication/276087228_Evaluating_Benefits_and_Challenges_of_Knowledge_Transfer_Across_Projects/links/5872bd9b08ae8fce49238850/Evaluating-Benefits-and-Challenges-of-Knowledge-Transfer-Across-Projects.pdf

Landreneau, K.J. and Creek, W. (2009). Sampling Strategies. Accessed 5 November 2020,

https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.628.7338&rep=rep1&type=pdf

Laudon, K. C. & Laudon, J. P. (2012). Management Information Systems. 7th ed., prentice hall, New Jersey, USA, accessed 12 December 2020,

https://repository.dinus.ac.id/docs/ajar/Kenneth_C._Laudon,Jane_P_._Laudon Management_Information_System_12th_Edition_.pdf.

Lawrence Neuman, W. (2014). Social Research Methods: Qualitative and Quantitative Approaches, 7th Edition, Pearson New International Edition, accessed 16 November 2020,
http://155.0.32.9:8080/jspui/bitstream/123456789/87/1/Social%20Research%20Methods_%20Qualitative%20and%20Quantitative%20Approaches.pdf

Lema A. M. (2013). Assessment of Factors Affecting Implementation of Annual Procurement Plan in Local Government Authorities: A Case study of Meru District Council, (Doctoral dissertation, Open University of Tanzania, Arusha), accessed 20 December 2020,

http://repository.out.ac.tz/1023/1/DISSERTATION-Amida_Lema-3.pdf

Mainga, W. and Yan, L. (2009). An Exploratory study of Interproject learning mechanisms and Project competencies of Consultancy firms in Sweden; perceptions of project management practitioners.

https://www.diva-portal.org/smash/get/diva2:145350/FULLTEXT01.pdf

Marshall, B., Mills, R. and Olsen, D. (2008). The Role of End-User Training in Technology Acceptance. *Review of Business Information Systems (RBIS)*, Vol. 12, no. 2, pp. 1-8, 28 November 2020,

https://www.clutejournals.com/index.php/RBIS/article/download/4384/4472

Mmbughu, A. E. (2015). Assessing the Influence of ICT on Project Management Team Performance: The Case of Selected Tanzania Federation of Cooperative Projects, (Doctoral dissertation, The Open University of Tanzania), accessed 19 November 2020,

http://repository.out.ac.tz/1220/1/AHADIEL_MMBUGHUPRINTS---LATEST.pdf

Mooz, H., Forsberg, K. and Cotterman, H., 2002. Communicating project management: the integrated vocabulary of project management and systems engineering. John Wiley & Sons.

Mwangi, E.N. (2015). Influence of ICT on Successful Project Completion in The Kenyan Banking Industry: Case of Five Largest Banks. *The Strategic Journal of Business and Change Management*, Vol. 2, no. 81, pp. 1011-1021, accessed 16 November 2020,

https://docplayer.net/54683130-Influence-of-ict-on-successful-project-completion-in-the-kenyan-banking-industry-case-of-five-largest-banks.html

Ngugi, J., K. and Mugo, H., W. (2012). Internal factors affecting procurement process of supplies in the public sector; A Survey of Kenya Government Ministries. *In 5th International Public Procurement Conference was held on August 17th,* accessed 1 December 2020,

http://chat.ku.ac.ke/schools/business/images/stories/research/dr_ngugi/internal_factors_affecting_procurement.pdf

Ohlsson, M.C., & Wohlin, C. (1999). An Empirical Study of Effort Estimation during Project Execution. *In Proceedings Sixth International Software Metrics Symposium (Cat No. PR00403)*, pp. 91-98, accessed 20 December 2020,

http://www.wohlin.eu/metrics99.pdf

OXFAM, (2017). Digital Development: What is the role of international NGOs? ICT for Development programmes and opportunities in the Horn, East and Central Africa. Discussion paper, 20 November 2020, https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620193/dp-digital-development-role-ingos-heca-230217-en.pdf;jsessionid=EDDE290CA0CDFFF5108AFF02FFE8CF36?sequence=4

PMBoK®Guide, (2017). A guide to the project management Body of Knowledge. 6thed. Project Management Institute Inc. (ePUP).

PMD Pro Guide, (2018). Program Management for Development Professionals Quick Guide *Ver. 1, March 2018,* accessed 31 January 2021, https://www.pm4ngos.org

Piabuo, S.M., Piendiah, N.E., Njamnshi, N.L. et al. (2017). The impact of ICT on the efficiency of HRM in Cameroonian enterprises: Case of the Mobile telephone

industry. *Journal of Global Entrepreneurship research*, Res. 7, no. 7, accessed 16 February 2020, https://doi.org/10.1186/s40497-017-0063-5

Pihir, I., Klačmer Čalopa, M. and Broder, K. (2008). Impact of project management education and ICT usage on project success. *Knowledge for sustainable development: book of abstracts of the 27th International C-onference on Organizational Science Development*/Rajkovič, Vladislav, pp.1-7, accessed 16 February 2021,

https://www.bib.irb.hr/326454/download/326454.Pihir_Klacmer-Calopa_Brodar_-_Portoro_2008.pdf

Rahimi, B., Nadri, H., Afshar, H.L. & Timpka, T. (2018). A Systematic Review of the Technology Acceptance Model in Health Informatics. *Applied clinical informatics*, Vol. 9, no. 3, pp. 604–634, accessed 27 November 2020,

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6094026/

Raspopovic, Miroslava & Vasić, Vuk. (2014). Challenges and Benefits of Incorporating ICT in NGO Initiatives and Activities. *Conference: ICT Forum* at Serbia, accessed 16 November 2020,

https://www.researchgate.net/publication/272108148_Challenges_and_Benefits_of_Incorporating_ICT_in_NGO_Initiatives_and_Activities

Rimmington, A., Dickens, G. & Pasqire, C. (2015). Impact of Information and Communication Technology (ICT) on construction projects. *Organization, technology & management in construction: an international journal*, Vol. 7, no. 3, pp.1367-1382, accessed 13 December 2020, https://hrcak.srce.hr/file/224208

Saeed, S., Rohde, M. and Wulf, V. (2008). A framework towards IT appropriation in voluntary organisations. *International journal of knowledge and learning*, Vol. 4, no. 5, pp.438-451, accessed 14 November 2020,

https://www.researchgate.net/profile/Markus_Rohde/publication/220428447_A_framework_towards_IT_appropriation_in_voluntary_organisations/links/02e7e51afb311057f9000000.pdf

Song, H. (2007). The Role of Information and Communication Technologies in Knowledge Management: From Enabler to Facilitator. *Melbourne, Australia: RMIT University* (Doctoral dissertation, RMIT University), accessed 12 December 2020,

https://core.ac.uk/download/pdf/15618119.pdf

Spekman, R. E., Kamauff, J. and Spear, J. (1999). Towards More Effective Sourcing and Supplier Management. *European Journal of Purchasing and Supply Management*, Vol. 5, no. 1999, pp. 103-116, accessed 18 December 2020,

https://www.sciencedirect.com/science/article/pii/S0969701299000155

Tesfaye Boru (2018). CHAPTER FIVE RESEARCH DESIGN AND METHODOLOGY. Introduction. University of South Africa. (Thesis, PhD), pp. 1-41, accessed 21 November 2020,

https://www.researchgate.net/publication/329715052_CHAPTER_FIVE_RESEARCH_DESIGN_AND_METHODOLOGY_51_Introduction_Citation_Lelissa_TB_2018_Research_Methodology_University_of_South_Africa_PHD_Thesis

Thomas, D.M., Bostrom, R.P. and Gouge, M. (2007). Making knowledge work in virtual teams. Communications of the ACM, Vol. 50, no. 11, pp.85-90, accessed 13 December 2020, https://dl.acm.org/doi/abs/10.1145/1297797.1297802

Xie, L. (2006). Evaluation of the Electronic Document and Record Management Program in a Canadian Municipality. (Doctoral dissertation, The University of British Columbia), accessed 12 December 2020,

https://open.library.ubc.ca/collections/ubctheses/831/items/1.0092752

Yang, L.R., Chen, J.H. and Wang, H.W. (2011). Assessing impacts of information technology on project success through knowledge management practice. *Automation in construction*, Vol. 22, pp.182-191, accessed 13 December 2020,

https://www.sciencedirect.com/science/article/pii/S0926580511001282

Ward, S.C. and Chapman, C.B. (1995). Risk-management perspective on the project lifecycle. *International Journal of Project Management*, Vol. 13, no. 3, pp.145-149, accessed 16 February 2021,

https://files.transtutors.com/cdn/uploadassignments/5432556_3_literature-review-1-data.pdf

Westland, J. (2006). The project management lifecycle. A complete step by step methodology for initiating, planning, executing, and closing a project successfully. Kogan Page Limited.

https://books.google.com.et/books?hl=en&lr=&id=Jb03AAAAQBAJ&oi=fnd&pg=PP1&dq=definitions+Project,+Project+Management,+Project+Life+Cycle,+Project+Phases+and+Project+Processes++&ots=669aJE4tbv&sig=TONdyVN1_n7ykxIAW_uwe5OebQo&redir_esc=y#v=onepage&q=definitions%20Project%2C%20Project%20Management%2C%20Project%20Life%20Cycle%2C%20Project%20Phases%20and%20Project%20Processes&f=false

World Bank, e-Agriculture community, and FAO, (2012). ICT for Data Collection and Monitoring and Evaluation: ICT in Agriculture, Connecting Small Holders to Knowledge, Networks and Institutions. e-SOURCEBOOK, accessed 14 November 2020, http://www.fao.org/3/aq003e/aq003e.pdf

Zulch, BG. (2014). Communication: The foundation of project management. *International Conference on Project Management, Procedia Technology*, Vol. 16, pp.1000-1009., accessed 20 December 2020,

https://www.sciencedirect.com/science/article/pii/S2212017314002813/pdf?md5=6f35de863a9cf0e216691d3284fd8e55&pid=1-s2.0-S2212017314002813-main.pdf&_valck=1

Appendices

Appendix 1: Questionnaire

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

GRADUATE PROGRAM IN PROJECT MANAGEMENT

QUATIONNAIRE

Dear Participant,

I would like to extend my thanks to you deep from the bottom of my heart for being willing and cooperative in undertaking this survey. I would like to ask your kind cooperation in answering the questions as truthfully and as completely as possible. I want to assure you that all answers you provide will be kept confidential and will be used only for this academic purpose. This is, therefore, to kindly request you to take 10-15 minutes to fill out the questionnaire as genuinely and completely as possible.

Once again, I thank you very much for your precious time.

PART ONE: General information.

Direction: Please indicate the sex, academic qualification and years of experience brackets you belong.

1. Gender

[ ] Male [ ] Female

2. Age

[ ] 18 - 20 Years [ ] 21 - 30 Years [ ] 31 - 40 Years

[ ] 41 - 50 Years [ ] 51 - 60 Years [ ] 61 + Years

3. Academic qualification

[ ] Diploma [ ] First degree [ ] Masters [ ] PhD

4. Years of work experience in CRS:

[ ] Below 1 Year [ ] 1-5 Years [ ] 6-10 Years [ ] 11-15 Years

[ ] 16-20 Years [ ] 21-25 Years [ ] 26- 30 Years [ ] 31-35 Years

[ ] 36 + Years

5. Your current position (Optional):

[ ] CoP, D/ CoP [ ] HoP, D/HoP[ ]Mid-level Mgmt [ ] Senior Mgmt

[ ] Project Manager [ ] S/Project Officer [ ] Project Officer

[ ] Data Management [ ] Project Assistant [ ] Technical Advisor

PART TWO: ICT use across project phases (Planning, execution, M&E and Closing)

Direction: This part of the questionnaire consists of questions intended to know whether you use **ICT solutions** such as **project management software, collaboration and communication platforms**, **ICT4D hardware and software platforms**, **HR acquisition/management system**, SCM (**supply chain management system)**, etc., in project management phases: **planning** (Developing Project Management Plan)**, executing** (Direct and Manage Project Work, Manage Project Knowledge) **, monitoring and evaluation** (Monitor and Control Project Work, Perform Integrated Change Control), and **closing** (Closing Project Phase or Contract)**.**

Section A. Project Planning

Q1. Do you use ICT solutions for project planning?

[ ] Yes [ ] No

Direction: If your answer to Q1 is "Yes", then proceed to Q2; If your answer to Q1 is "No" then jump to Q5 of Project Execution part.

Q2. If your answer to Q1 is "Yes", then please indicate the ICT solutions you use for each aspect of Project Planning given in the table below? Please indicate by putting a tick mark in the applicable box(es)/cell(s) and continue from Q3.

Aspects of ICT solutions use in Project Planning- Use of ICT in	**MS Project**	**MS Planner**	**Accounting software**	**Enterprise resource planning system**	**Adaptive planning SW**	**Others**
Project Scheduling						
Project Budgeting						
Project Resource Planning						

Q3. If your answer for Q2 is "Others", please mention the software (SW) you are using in the space provided below and proceed to Q4.

_____

_____

Q4. If your answer in Q1 is "Yes", please rate using scale below how often you use ICT solutions in a month for the following aspects of Project Planning. Please put a tick mark in the applicable box(es)/cell(s) and continue from Q5 of Project Execution part. (5=Four Weeks, 4=Three Weeks, 3= Two Weeks, 2=One Week, 1=I do not use)

Aspects of ICT solutions use in Project Planning- Use of ICT in	**I do not use**	**One week in a month**	**Two weeks in a month**	**Three weeks in a month**	**Four weeks in a month**
Project Scheduling					
Project Budgeting					
Project Resource Planning					

Section B. Project Execution

Q5. Do you use ICT solutions for project execution?

[ ] Yes [ ] No

Direction: If your answer to Q5 is "Yes", then proceed to Q6; If your answer to Q5 is "No" then jump to Q9.

Q6. If your answer for Q5 is "Yes", then please indicate the ICT solutions you use for each aspect of Project Execution given in the table below? Please indicate by putting a tick mark in the applicable box(es)/cell(s) and continue from Q7.

Aspects of Procurement Management- Use of ICT in	**MS Excel**	**Online Forms (OpEX)**	**Supply chain management SW**	**Enterprise Resource planning system**	**Others**
E-requisition					
E-evaluation					
E-shipment follow-up					
E-payment					
Aspects of E-Communication Management- Use of ICT in	**Email**	**MS Teams/ Office 365**	**Cisco Webex**	**Skype**	**Others**
Collaboration					
Stakeholder management (Reporting) or support					
Effectiveness of communication					
Verities of communication methods					

Source: **Aspects are adopted from Wambui (2019) and an aspect is added.** Measuring scale is own.

Q7. If your answer for Q6 is "Others", then please mention the software (SW) you are using in the space provided below and proceed to Q8.

_____

_____

Q8. If your answer in Q5 is "Yes", please rate using scale below how often you use ICT solutions in a month for the following aspects of Project Execution. Please put a tick mark in the applicable box(es)/cell(s) and continue from Q9 of Project Monitoring and Evaluation part. (5=Four Weeks, 4=Three Weeks, 3= Two Weeks, 2=One Week, 1=I do not use)

Aspects of Procurement Management- Use of ICT in	**I do not use**	**One week in a month**	**Two weeks in a month**	**Three weeks in a month**	**Four weeks in a month**
E-requisition					
E-evaluation					
E-shipment follow-up					
E-payment					
Aspects of E-Communication Management- Use of ICT in	**I do not use**	**One week in a month**	**Two weeks in a month**	**Three weeks in a month**	**Four weeks in a month**
Collaboration					
Stakeholder management (Reporting) or support					
Effectiveness of communication					
Verities of communication methods					

Source: **Aspects are adopted from Wambui (2017) and an aspect is added.** Measuring scale **is own.**

Section C. Project Monitoring and Evaluation

Q9. Do you use ICT solutions for Project Monitoring and Evaluating?

[ ] Yes [ ] No

Direction: If your answer to Q9 is "Yes", then proceed to Q10; If your answer to Q9 is "No" then jump to Q13.

Q10. If your answer for Q9 is "Yes", then please indicate the ICT solutions you use for each aspect of Project Monitoring and Evaluation given in the table below? Please indicate by putting a tick mark in the applicable box(es)/cell(s) and continue from Q11.

Aspects of ICT solutions use in Project M&E- Use of ICT in	**ComCare**	**SPSS**	**CsPRO**	**STATA**	**Power BI**	**GIS**	**Drone**	**SMS (short message) service)**	**Voice SMS/ Interactive voice recording**	**Portal**	**Others**
Baseline Data collection and bench marking											
Implementation Data Collection (Tracking -actual data)											
Data quality assurance											
Data analysis											
Data visualization and Reporting											
Data use/interpretation (Engaging stakeholder to give meaning, make project decision, answer learning question)											
Document Management											
Learning and knowledge management											
Social Accountability											

Q11. If your answer for Q9 is "Others", then please mention the software (SW) you are using in the space provided below and proceed to Q12

_____

_____

Q12. If your answer in Q10 is "Yes", please rate using scale below how often you use ICT solutions in a month for the following aspects of Project Monitoring and Evaluation. Please put a tick mark in the applicable box(es)/cell(s) and continue from Q13 of Project Closure part. (5=Four Weeks, 4=Three Weeks, 3= Two Weeks, 2=One Week, 1=Not at all)

Aspects of ICT solutions use in Project M&E- Use of ICT in	I do not use	One week in a month	Two weeks in a month	Three weeks in a month	Four weeks in a month
Baseline Data collection and bench marking					
Implementation Data Collection (Tracking -actual data)					
Data quality assurance					
Data analysis					
Data visualization and Reporting					
Data use/interpretation (Engaging stakeholder to give meaning, make project decision, answer learning question)					
Document Management					
Learning and knowledge management					
Social Accountability					

Section D Project Closure

Q13. Do you use ICT solutions for project closure?

[ ] Yes [ ] No

Direction: If your answer to Q13 is "Yes", then proceed to Q14; If your answer to Q13 is "No" then jump to Q17.

Q14. If your answer for Q13 is "Yes", then please indicate the ICT solutions you use for each aspect of Project Closing given in the table below? Please indicate by putting a tick mark in the applicable box(es)/cell(s) and continue from Q15.

Aspects of ICT solutions use in Project Closure - Use of ICT in	**Network Shared Folder**	**Cloud Storage OneDrive**	**MS Teams**	**Dropbox**	**Portal/ Intranet**	**Email**	**Others**
Project Documentation and Record Management (Create Close Out Report)							
Information storage, retrieval and Sharing							
Knowledge Management Capture Lessons Learned							
Knowledge Management Disseminate and Use Lessons Learned							
Project completion review (Post implementation review - Project performance and conformance - and Post-implementation support)							

Q15. If your answer for Q14 is "Others", please mention the software (SW) you are using in the space provided below and proceed to Q16.

_____

_____

Q16. If your answer in Q13 is "Yes", please rate using scale below how often you use ICT solutions in a month for the following aspects of Project Closing. Please put a tick mark in the applicable box(es)/cell(s) and continue from **PART THREE**. (5=Four Weeks, 4=Three Weeks, 3= Two Weeks, 2=One Week, 1=I do not use)

Aspects of ICT solutions use in Project Closure - Use of ICT in	**I do not use**	**One week in a month**	**Two weeks in a month**	**Three weeks in a month**	**Four weeks in a month**
Project Documentation and Record Management (Create Close Out Report)					
Information storage, retrieval and Sharing					
Knowledge Management Capture Lessons Learned					
Knowledge Management Disseminate and Use Lessons Learned					
Project completion review (Post implementation review - Project performance and conformance - and Post-implementation support)					

PART THREE: Factors affecting the use of ICT for Project Performance

Direction: This part of the questionnaire consists of questions intended to know whether **Organizational Process Assets** such as Processes, Policy and Procedures, and **Enterprise Environmental Factors** such as ICT skill, ICT support and ICT support structure influence your use of ICT for Project Performance.

Section E. Organizational Process Assets

Q17. Do ICT hardware and software acquisition processes and procedures; issuing procedures and access authorization request processes; and ICT use, and donor policies influence you in the use of ICT for project management or performance?

[ ] Yes [ ] No

Direction: If your answer to Q17 is "Yes", then proceed to Q18; If your answer to Q17 is "No" then jump to Q19 of **Section F**.

Q18. If your answer for Q17 is "Yes", then please rate the extent to which the following organizational process assets influence your effective use of ICT for project performance using the below scale. Please put a tick mark in the applicable box(es)/cell(s) and continue from Q19 of **Section F**. (5=very great extent, 4=great extent, 3= moderate extent, 2=small extent, 1=Not at all)

Measure of organization assets related to ICT solutions:	**Not at all**	**To a small extent**	**To a moderate extent**	**To a great extent**	**To a very great extent**
Hardware acquiring processes					
Software acquiring processes					
ICT use policy					
ICT related donor policy					
ICT resource use authorization and replacement procedures					

Section F. Enterprise Environmental Factors

Q19. Do ICT skill; ICT support staffing; ICT support structure; and project team acquisition, development and management influence you in the use of ICT for project management or performance?

[ ] Yes [ ] No

Direction: If your answer to Q19 is "Yes", then proceed to Q20; If your answer to Q19 is "No" then jump to Q21 of **PART FOUR**.

Q20. If your answer for Q19 is "Yes", then please rate the extent to which the following enterprise environmental factors influence your effective use of ICT for project performance using the below scale. Please put a tick mark in the applicable box(es)/cell(s) and continue from Q21 of **PART FOUR**. (5=very great extent, 4=great extent, 3= moderate extent, 2=small extent, 1=Not at all)

Measure of aspects of people-ICT factor	**Not at all**	**To a small extent**	**To a moderate extent**	**To a great extent**	**To a very great extent**
ICT/ICT4D support staffing					
ICT usage skill					
ICT/ICT4D support structure					
Aspects of Workforce and Talent Management - Use of ICT in	**Not at all**	**To a small extent**	**To a moderate extent**	**To a great extent**	**To a very great extent**
Acquiring Team					
Developing (Training) Team					
Managing Team (Performance of Team)					

PART FOUR: Project Performance

Direction: This part of the questionnaire consists of questions intended to know to what extent effective use of ICT contributes to your Project **Performance** and its effect on each Phase of **Project Life Cycle**.

Q21. Using the scale below, please rate the effective use of ICT in terms of the following measures of the management of your Project Performance. Please put a tick mark in the applicable box(es)/cell(s). (5=excellent, 4=Good, 3= moderate, 2=bad, 1=poor)

Measure of Project Management (performance)	**Excellent**	**Good**	**Moderate**	**Bad**	**Poor**
Within Schedule					
Within Budget					
Per donor specifications (scope and compliance)					

Q22. Using the scale below, please rate the extent to which the use of ICT solutions (both hardware and software) influences the management of each phase of the project across its life cycle. Please put a tick mark in the applicable box/cell. (5=To a very great extent,

4= To a great extent, 3= To a moderate extent, 2=To a small extent, 1=Not at all)

Aspects of Project Life Cycle Management	**Not at all**	**To a small extent**	**To a moderate extent**	**To a great extent**	**To a very great extent**
Initiating					
Planning					
Execution					
Monitoring and Evaluation					
Closure					

THANK YOU

Appendix 2: Interview Questions

Key Informants Interview (KII) Questions

Q1. How do ICT solutions for project planning (scheduling, budgeting, resource allocation) influence the management of your project?

Q2. How do ICT solutions for managing project execution (procurement, communication, etc.) influence the management of your project?

Q3. How do ICT solutions for managing project monitoring and evaluation (data management and knowledge management) influence the management of your project?

Q4. How do ICT solutions in managing project closure (document management, reporting, record management and lessons learned) influences the management of your project?

Q5. How do donor policies influence the use of ICT solutions to manage your project?

Q6. How do organization policies influence the use of ICT solutions to manage your project?

Q7. How do staffing, staff skill, and reporting structure influence the use of ICT for effective project performance?