ASSESSMENT OF THE CRITICAL SUCCESS FACTORS OF IRRIGATION PROJECTS IN TANZANIA

A Case of Morogoro Region

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By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirement for the Degree of Master of Science in Construction Economics and Management of Ardhi University

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CERTIFICATION

The undersigned certifies that she has read and hereby recommends for acceptance by Ardhi University a dissertation titled: **Assessment of the Critical Success Factors of Irrigation Projects in Tanzania - A Case of Morogoro Region,** in partial fulfillment of the requirement for the degree of Master of Science in Construction Economics and Management.

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Dr. Rehema Monko

(Supervisor)

Date: _____

DECLARATION AND COPYRIGHT

I, **Mtili Mansour Abdallah**, hereby declare that the contents of this dissertation are the results of my own findings and to the best of my knowledge they have never been presented to any university for any other degree award. I present this report as a partial fulfillment of the requirements for the award of MSc. Degree in Construction Economics and Management of the Ardhi University.

Signature_____

Date _____

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DEDICATION

This dissertation is dedicated to my parents, brothers and sisters for their moral support and encouragement during my studies, and to my family, especially my beloved wife Amina and children Abdulkareem and Waseelah who remained patient during my absence while undertaking my studies. My success is yours as well.

ABSTRACT

Construction of irrigation projects in Tanzania is faced with some crucial constraints in which the Government is committed to address so as to release the predicted targets. To reach or attain the objective of irrigation projects in Tanzania, 19 Critical Success Factors were identified that must be considered in every stage of project cycle. This study sought to assess the Critical Success Factors that have significant influence on the success of irrigation projects in Tanzania through a survey. The target population of the study included all irrigation projects executed between July, 2012 and June 2017 under different programmes within Morogoro region. A sample of 20 projects was taken from different districts in the region. Data was collected through questionnaires, distributed to the 20 projects participants. An interview with Resident Engineer of Itete project was also conducted while studying Critical Success Factors to validate results obtained from the survey.

Survey results reveal that 'Project Manager Goal Commitment' tops the Critical Success Factors of these projects while those from specific project reveal that 'Employer Commitment to the Project' ranks the first important factor. The United Republic of Tanzania being the employer of this particular project has fully committed fund for the Itete Project. This is different from other projects whereby funds are set aside annually and the availability of funding depends on several other factors. Hence, construction of other projects is done in phases.

This study, therefore, recommends that consulting and contracting firms must employ competent and qualified experts on irrigation projects, who must be fully engaged with managing irrigation projects from inception to implementation phases. Such engagement has the potential to ensure that the 'Project Manager Goal Commitment' factor is observed.

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LIST OF ABBREVIATIONS

APM	-	Association for Project Management
ASDP	-	Agricultural Sector Development Programme
ASDS	-	Agriculture Sector Development Strategy
ASPS	-	Agricultural Sector Programme Support
BoQ	-	Bills of Quantities
CPSF	-	Critical Project Success Factor
CRB	-	Contractors' Registration Board
CSF	-	Critical Success Factor
DADG	-	District Agricultural Development Grant
DED	-	District Executive Director
DIDF	-	District Irrigation Development Fund
FAO	-	Food and Agriculture Organization
GDP	-	Gross Domestic Product
HRM	-	Human Resource Management
ICID	-	International Commission on Irrigation and Drainage
IO	-	Irrigators' Organization
JICA	-	Japan International Cooperation Agency
JPIM	-	Journal of Project Management Institute
KIUMAN	-	Kikundi cha Umwagiliaji Minazi, Alabama na Njiwa
LGA	-	Local Government Authority
LGCDG	-	Local Government Capital Development Grant
MAFSC	-	Ministry of Agriculture Food Security and Cooperatives
MoF	-	Ministry of Finance
MOWI	-	Ministry of Water and Irrigation
NCC	-	National Construction Council
NIDF	-	National Irrigation Development Fund
NIDSC	-	National Irrigation Development Sub Component
NIMP	-	National Irrigation Master Plan
NIRC	-	National Irrigation Commission

NSGRP	-	National Strategy for Growth and Reduction of Poverty
PIDP	-	Participatory Irrigation Development Program
PM	-	Project Manager
PMBOK	-	Project Management Book of Knowledge
PMI	-	Project Management Institute
PPP	-	Public Private Partnership
PPRA	-	Public Procurement Regulatory Authority
RBMSIIP	-	River Basin Management and Smallholder Irrigation
RII	-	Relative Importance Index
SDPMA	-	Smallholder Development Programme for Marginal Areas
SPSS	-	Statistical Package for the Social Science
TPC	-	Tanganyika Planting Company
URT	-	United Republic of Tanzania
VETA	-	Vocational Education Training Authority
WUA	-	Water User Association
ZIE	-	Zonal Irrigation Engineer
ZIO	-	Zonal Irrigation Office
ZITSU	-	Zonal Irrigation and Technical Service Unit

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The application of irrigation practices in Tanzania historically dates back from the Iron Age whereby traditional irrigation systems have been long considered important in various parts of Tanzania. Modern irrigation was introduced in 1930 for sugarcane plantation at the Tanganyika Planting Company (TPC) at Arusha Chini in Moshi.

Irrigation agriculture owes a vital role in both commercial and smallholder farmers. Agriculture contributes about 30 percent to the Tanzania gross domestic product (GDP) and accounts for 64 percent of all export earnings (MoF, 2012).

The National Irrigation Policy vision entails "A sustainable and dynamic irrigation sector that is a driving force in transforming agriculture into a stable, highly productive, modernized, commercial, competitive and diversified sector which generates higher incomes, increases food security and stimulates economic growth." The policy emphasizes on a mission to facilitate formulation and implementation of all types of smallholder irrigation development. Also, it emphasizes on participatory, demand - driven approaches and accelerated investment by the private sector in irrigated agriculture (MAFSC, 2013).

According to FAO (2011), irrigated agriculture contributes about 40 percent of the global food production from 260 million hectares. Of these, about two thirds operate under formal irrigation schemes. It is this realization that prompted the World Bank to initiate, among others, action on "Reforming Irrigation Institutions". The objective of this initiative is "to improve the performance of irrigation management in the

projects by increasing efficiency, transparency, and accountability of the organizations in charge of providing irrigation services and increase participation of users and the private sector".

The National Irrigation Master Plan (NIMP) 2002 was prepared by the Ministry of Agriculture, Food Security and Cooperatives in collaboration with the Government of Japan through Japan International Cooperation Agency (JICA). The plan has indicated that the total irrigation development potential in Tanzania mainland is 29.4 million hectares. Out of those, 2.3 million hectares are classified as high potential; 4.8 million hectares as medium potential; and 22.3 million hectares as low potential.

Despite the immense existing of potential irrigable land, only 381,000 hectares are under irrigation. Of these, 345,690 hectares are equipped with improved irrigation infrastructure whereas over 35,300 hectares are still under traditional irrigation schemes practice by smallholder farmers. Traditional irrigation schemes mainly associated with low water use efficiencies and low crop yields. Out of the total area with improved irrigation infrastructure, so far there are large scale commercial farms covering a total area of 55,229 Hectares - growing tea, coffee, sugarcane, paddy, vegetables, horticulture and floriculture under this farming category.

Generally, the irrigation practice in Tanzania is characterized by low irrigation water use efficiency. This is because irrigated agriculture is dominated by smallholder farmers whose knowledge in irrigation water management and capacity to afford efficient irrigation water use technologies is low. Also, irrigation practice is dependent on the run–off–river water abstractions for gravity-fed irrigation schemes, hence highly susceptible to climate change effects on rivers and stream flows which affects the optimal availability of water resource for crop production. Irrigation

practices in the country can be grouped into three main categories namely: Unimproved traditional irrigation schemes; Improved traditional irrigation schemes or newly developed with limitations in the improvement, and schemes comprising infrastructure with modern technologies.

In most cases the source of water for irrigation is rivers and in some areas underground water, harvested water, and water from the lakes is used. As far as agriculture development is concerned, irrigation development is faced with some crucial constraints in which the government is committed to address so as to realize the envisaged targets. The major focus and practice in irrigation development in Tanzania, especially for smallholder farmers, has been more on the development of surface irrigation systems.

The performance of some irrigation projects in Tanzania in most cases perform below clients' and users' expectations. Maeda (2012) clarify that the data taken from 16 public funded irrigation projects reveal that actual completion time varied from 1% to 158% of the original completion time. Also, those data on cost performance reveal that 75% of the investigated project had varied from 3% to 37% while 25 had cost less or to original contract price.

According to NIMP, 2002 Tanzania has 1,428 ongoing irrigation projects with a potential of 854,293 hectares. Small irrigation projects cover 1,111 hectares while 245 are medium projects and 72 termed as large projects. Morogoro region has 88 irrigation projects categorized as small (51), medium (22) and large irrigation projects (15) (Table 1.1). Morogoro region has the most irrigation potential in Tanzania, which is about 176,732 hectares. According to National Irrigation Master

Plan (NIMP, 2002) Morogoro region contributes about 21% of irrigation potential in the country.

Table 1.1: Showing Inventoried Schemes by Size of Irrigation

REGION	DESCRIPTION	TYPE OF IRRIGATION			
		SMALL	MEDIUM	LARGE	TOTAL
ARUSHA	No. of Schemes	180	35	8	223
	Potential Area	31,658	39,984	28,365	100,007
COAST	No. of Schemes	16	4	6	26
	Potential Area	4,005	6,250	48,500	58,755
DAR ES SALAAM	No. of Schemes	8	4		12
	Potential Area	525	5,000		5,525
DODOMA	No. of Schemes	32	11	8	51
	Potential Area	5,310	12,726	25,653	43,689
IRINGA	No. of Schemes	83	10	1	94
	Potential Area	9,609	10,478	3,248	23,335
KAGERA	No. of Schemes	14	2	2	18
	Potential Area	1,766	2,600	12,800	17,166
KIGOMA	No. of Schemes	15	9	3	27
	Potential Area	3,930	8,900	9,700	22,530
KILIMANJARO	No. of Schemes	384	49	6	439
	Potential Area	45,613	50,740	21,850	117,933
LINDI	No. of Schemes	8	7		15
	Potential Area	1,900	7,458		9,358
MARA	No. of Schemes	25	2	2	29
	Potential Area	3,376	3,100	11,000	17,476
MBEYA	No. of Schemes	64	31	8	103
	Potential Area	14,357	29,900	35,000	79,257
MOROGORO	No. of Schemes	51	22	15	88
	Potential Area	10,485	27,397	138,850	176,732
MTWARA	No. of Schemes	1	6	3	10
	Potential Area	300	6,446	8,575	15,321
MWANZA	No. of Schemes	44	10	2	56
	Potential Area	6,886	9,000	9,000	24,886
RUKWA	No. of Schemes	13	3	2	18
	Potential Area	2,272	3,400	4,200	47,672
RUVUMA	No. of Schemes	8	2	1	11
	Potential Area	1,150	2,700	4,000	7,850
SHINYANGA	No. of Schemes	30	12	1	43
	Potential Area	5,070	10,600	3,000	18,670
SINGIDA	No. of Schemes	12	6	1	19
	Potential Area	3,200	6,240	2,400	11,840
TABORA	No. of Schemes	49	10	3	62
	Potential Area	11,590	11,390	11,900	34,880
TANGA	No. of Schemes	74	10		84
	Potential Area	11,756	9,655		21,411
TOTAL	No. of Schemes	1,111	245	72	1,428
	Potential Area	174,758	263,964	415,571	854,293

Source; National Irrigation Master Plan (NIMP, 2002)

Morogoro region has a total of 172,899.5 hectares potential for irrigation. Only 21,988.3 hectares have been developed, which is 13 percent of the total irrigable area in the region (NIRC, 2016). It is for this reason that irrigation is considered necessary for providing protection against drought, a means of stabilizing crop production and assurance of household food security. Irrigation practice is one of the effective means in increasing and stabilizing food and cash crop production and productivity for curbing food shortages and increasing export of cash crop and its products.

Project Management has become increasingly important in the development of any nation. Various organizations have used project management techniques as means of bridging the gap between failure and success in the implementation of projects. Despite this increasing awareness of project management by organizations, projects still fail. The purpose of this dissertation is to systematically investigate the Critical Success Factors of irrigation projects in Morogoro region. However, in Morogoro region, there are 118 irrigation projects. Among them 58 schemes or projects have been fully or semi improved and 60 still operates under traditional schemes.

1.2 Statement of the Problem

Many projects in Tanzania keep on failing, resulting in the loss of millions of dollars of the government. This persisting challenge has led many project management professionals to attempt to identify the critical factors that need to be tackled head-on to produce a successful project management outcome. There exist literatures on Critical Success Factors for specific industry sectors, or specific country situations,

and very little empirical research on Critical Success Factors for specific organizational operational units.

In some instances, a few literatures exist on the Critical Success Factors of a project management on a particular part of the project life cycle, like risk management, procurement and planning, but rarely on the all knowledge areas of the project management.

Some projects, including irrigation projects, face different challenges in terms of management and cost effectiveness. However, some projects are not prepared properly according to the project phases and the project managers and stakeholders of those projects have no enough knowledge for the management of knowledge areas. This has inspired this research to find out the Critical Success Factors for irrigation projects in Tanzania, particularly Morogoro region. The case study was used due to limitation of time and resources. Morogoro was pointed to be a study area because the researcher works in the study in the same field of research.

Construction projects are naturally associated with a lot of challenges during implementation. All construction projects, including irrigation projects, are frequently affected by various factors. Success factors mainly help project stakeholders like consultants, clients and contractors reach their expectation or goals as planned while delay factors suppress or postpone project completion.

Due to projects constraints, it is always important to both parties, either public or private sector involved with the project, to see their projects completed within scheduled time, planned budget, with high quality and safety. Furthermore, many

researchers in different parts of the world have agreed that the irrigation projects perform below project objectives or clients' expectations. Price (1999) argued that irrigation projects in most parts of the world perform below expectations. Likewise, The International Commission on Irrigation and Drainage (ICID) President gave a clear comment that canal irrigation systems in numerous parts of the world are known to be performing below their potential (Sultan, *et al*, 2011). Poor constructed irrigation infrastructure, poor water management, and low yields in Traditional irrigation schemes, seem to be dominant character in the irrigation sector.

National Construction Council (2006) of Tanzania, between 2001 and 2006, conducted technical audit in 29 construction projects including three irrigation projects. The audit findings revealed several problems including progress delays, poor supervision, poor quality of works, and nonconformance to the public Act, low contractors' capacity, inadequate designs, inappropriate as well as inadequate contract document, poor site organization and payment delays. In this audit, irrigation projects experienced underperformance in completion time by delaying 10 months, 13 months and 11 months (Kasuwi and Mamiro, 2005). According to Lema (2008), cost overrun in construction projects was over 100 percent of original project cost estimates.

In 2012, the Public Procurement Regulatory Authority (PPRA) of Tanzania conducted Value for Money audits for financial year 2011/12 to137 construction projects, including seven (7) irrigation projects. The analysis of the audit results indicated that seven (7) contracts had unsatisfactory performance (i.e. scored below 50 percent). According to this report, factors that affect performance were identified

as follows; contract signed by person having no power of attorney; shortcoming in the signed contract document; non submission of performance bond; non submission of program of works; lack of site meetings; unapproved variations; abortive excavations done at original location of works; reduction of scope of works; extension of time granted by wrong authority; missing measurement sheets; lack of records for testing of materials; lack of site instructions; inadequate appreciation of site conditions at design stage; supervision costs not planned; shortfalls in technical specifications; Bills of Quantities (BoQ) items having no specification references; delayed appointment of project manager; unsatisfactory workmanship of concrete; unlined main canal, the main canal design drawing shows a trapezoidal cross-section and with masonry lining (PPRA, 2012).

To deal with this problem, Tanzania Government and different Development partners have invested a great deal in irrigation schemes throughout the country. The aim of such investment is to improve irrigation infrastructure, water management and increase agricultural productivity.

Researchers have assessed the factors affecting performance of irrigation systems in other parts of the world. For example, Hamdy (2007) carried out a study in the Mediterranean area on the water use efficiency in irrigated agriculture and Kanber et al. (2005) conducted a research on irrigation systems performance. Maeda (2012) studied on the analysis of local contractors' performance in irrigation infrastructure construction projects in Tanzania. Matekere and Lema (2012) clarify that the performance of irrigation projects in Tanzania is affected by 19 factors. However, little is known on contributing, understanding and developing useful information on

Critical Success Factors of irrigation projects in the study area. This study therefore aims at providing insight into the area as an attempt to assess the process of irrigation projects formulation in Tanzania. In particular, the study intends to identify and assess the Critical Success Factors in the construction of irrigation projects in Tanzania from inception to the implementation phase. Lastly, this study recommends to the stakeholders and decision makers on improvement strategies in dealing with management challenges in irrigation projects in the study area.

1.3 Main Objective

The main objective of this study is to determine the Critical Success Factors of managing irrigation projects in Tanzania from inception to the implementation phase.

1.3.1 Specific Objectives

- To identify extant factors that influence success of irrigation projects
- To determine the Critical Success Factors that influence management of irrigation projects in Tanzania from inception to the implementation phase.
- To recommend improvement strategies in management of irrigation projects in Tanzania

1.3.2 Research Questions

- What factors have been identified that influence the success of irrigation projects?
- What are the Critical Success Factors that influence construction of irrigation projects in Tanzania from inception to the implementation phase?

- What strategy can be recommended to influence of construction irrigation projects in Tanzania?

1.3.3 Significance of the Study

This study is significant in the way that will widen and deepen theoretical understanding and developing useful information on the Critical Success Factors for irrigation projects in Tanzania. The practical significance is based on the facts that performance measurement is very important in judging the performance of any system or organization or project. Identification of set of the success factors associated with management of irrigation projects in achieving project objectives will help stakeholders in irrigation industry to widen their knowledge and hence decision making.

Academically, this study is significant in such ways that it will contribute knowledge and act as a source of information as far as irrigation in Tanzania is concerned. It looks on the success factors associated with the construction of irrigation projects from inception to the implementation phase. It establishes the list of Critical Success Factors associated with construction of irrigation projects in Tanzania. Findings of the study revealed the challenges affecting irrigation projects towards achieving the objectives and consequently identify the strategy or measures to improve the situation.

The results of the study provided useful information for irrigation industry stakeholders like, Local Government Authorities (LGAs), National Irrigation Commission (NIRC), Water User Associations (WUAs), Ministry of Water and Irrigation (MOWI) policy makers and researchers when planning ways to improving

performance in irrigation projects. This study also benefits individual professionals working in the irrigation industry like consultants, designers, clients and farmers in both the public and private irrigation sectors.

1.4 Scope of the Study

This research is focused on the assessment of Critical Success Factors of irrigation projects in Tanzania. National Irrigation Commission is responsible for providing consultancy and development of the irrigation sector in Tanzania Mainland. The selected study area is Morogoro Region, representing other regions in the country. Due to limitations in time and cost, the researcher selected Morogoro because the region is within researchers' working area.

1.5 Structure of Dissertation

This dissertation consists of five chapters. Chapter one provides general introduction, chapter two presents the literature review, chapter three discusses research methodology and chapter four deals with the analysis and discussion of findings. Chapter five provides conclusions and recommendations of the study.

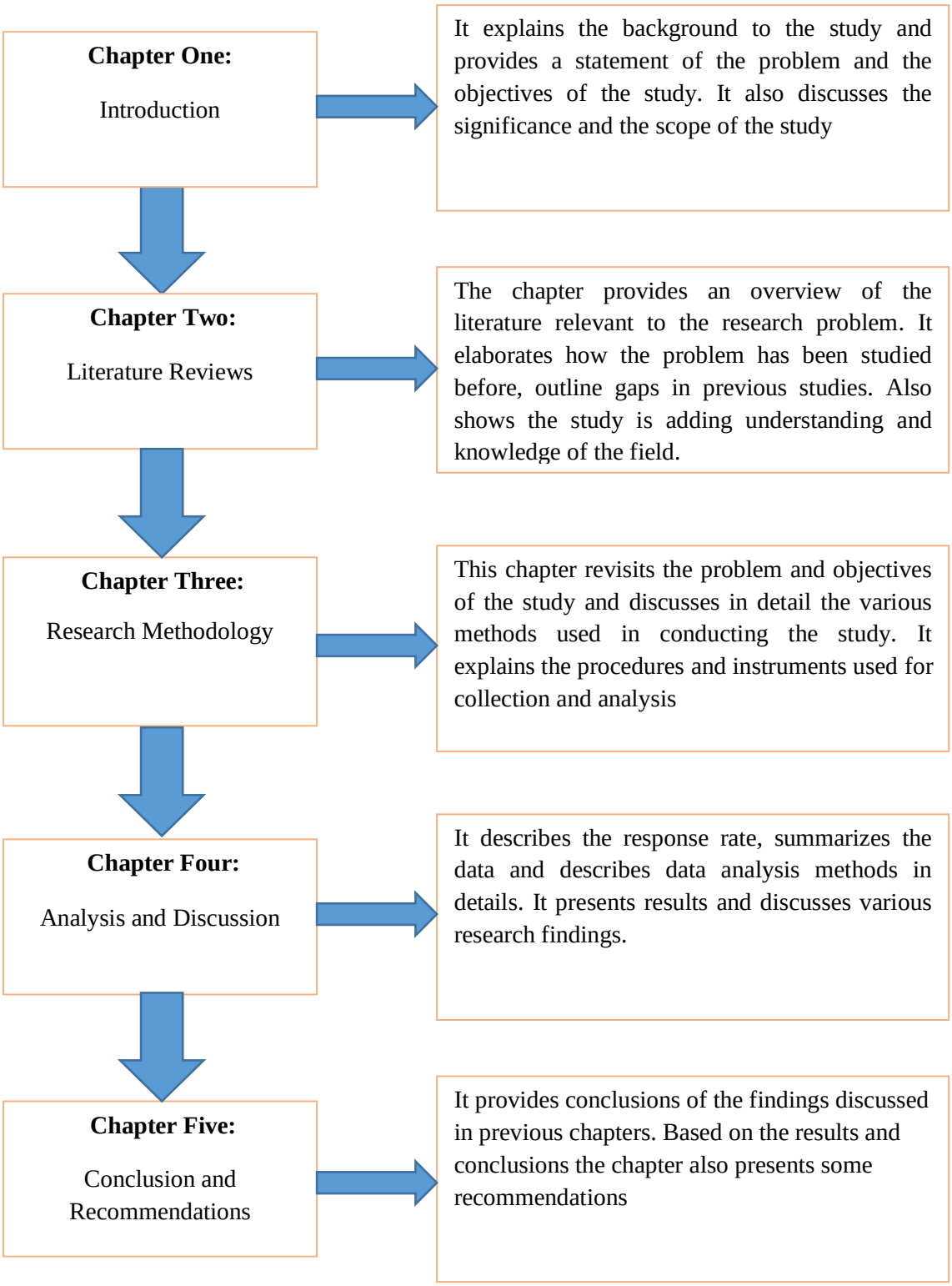

Figure 1.1: Organization of the Dissertation

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter describes extant literature that supports the research topic. The chapter is divided into two sections. Section one gives clarifications on theories and concepts of other researchers that are related with the study; the theoretical literature review. Meanwhile, section two gives clarification on ideas of other people presented in the research report, called empirical literature review.

The review covers the irrigation development and management of irrigation projects, as well as the performance of constructed infrastructures in irrigation projects including assessment of the process of irrigation projects formulation. The chapter identifies the Critical Success Factors of irrigation projects. Further, the concepts of performance improvement strategies in irrigation systems or projects are explored, followed by a summary of the chapter.

2.2 Definition of Key Terms

2.2.1 Success

The literature on Critical Success Factors reveals several somewhat conflicting various proposals, discussions, and definitions. Some define it as results much better than expected or normally observed in terms of cost, schedule, quality, safety and participant satisfaction (Ashley**,** 1987). Other researchers define success as having everything turn out as hoped or anticipating all project requirements and have sufficient resources to meet needs in a timely manner (Tuman, 1986).

2.2.2 Quality

The term Quality is defined as the totality of features, attributes, and characteristics of a facility, product, process, component, service, or workmanship that bear on its ability to satisfy a given need: fitness for purpose. According to ASCE, 1988 quality is typically referenced to and measured by the degree of conformance to a preset standard of performance.

Any project is considered an overall success if the project meets the technical performance specifications, mission to be performed and if there is a high level of satisfaction concerning the project outcome among key people in the parent organization. In most construction projects these are key people in the project team, key users or clients of the project effort (de Wit, 1986). Ashley (1987) refers to project success as having much better results than expected by stakeholders and other researchers seem to restrict their expectations to adhere to technical specifications and mission. In this situation, it remains unclear which of these standpoints represent the expectations of the projects stakeholders or projects objectives. Morris (1983) and de Wit (1986) clarified that success and failure in projects may have different criteria as what constitutes project success or failure depends on stakeholders' needs.

The literature has given several definitions of success, each of which specify to a particular project. Definitely, each project participants will have their own viewpoint and definition of success. In this study, success of a given project stakeholders is defined as the degree to which project goals and expectations are met. These goals and expectations may include social, economic or financial, technical educational, social, and etc.

2.2.3 Critical Success Factors (CSFs)

The concept of Critical Success Factors is defined as those factors that predict success on projects. In the literature, several authors identified, explained, and discussed the factors that are critical to the success of a project. These are few things that must go well to ensure success for a manager or organization, and therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance. Critical Success Factors include issues vital to an organization's current operating activities and its future success (Boynton et al, 1984). They are events or circumstances that require the special attention of management because of their significance to the corporation. They may be internal or external and be positive or negative in their impact. Their essential character is the presence of a need from special aware-ness or attention to avoid unpleasant surprises or missed opportunities or objectives. They may be identified by evaluating corporate strategy, environment, resources, operations (Ferguson et al, 1982).

Those few key areas of activities in which favorable results are absolutely necessary for a particular manager to reach his or her goals (Rockart, 1982). The manuals, articles, and papers describing previous work in critical project success factors (CPSFs) vary in content and quality, and indicate differences in focus of the studies.

Significant contribution in understanding the concept of project success factors and criteria is still needed. However, much uncertainty remains in need of clarification. Examples of issues are: Which CPSFs are valid for building, irrigation, roads and water projects? Are they the same factors for different types of construction projects? In reports that included successful-unsuccessful project pair studies, the judgment

whether the project was successful or unsuccessful was based on one participant only. Also it is unclear that, other project participants would necessarily have the same judgment of the project (Sanvido, 1992).

2.2.4 Theoretical Literature Review

According to Salleh (2009), the study of project success and Critical Success Factors is a means of understanding and improving the project management process. This section reviews literatures that will provide the understanding and explanation of Critical Success Factors in project management. The literature review includes project and success, project success, project management and success, project management success, project success criteria and project success factors and the importance of the Critical Success Factors for projects.

2.2.5 Project and Success

Gary and Larson (2008) defined project as a complex, non-routine, one-time effort limited by time, budget, resource and performance specifications designed to meet clients or customer objectives. This is in contrast to how an organization generally works on a permanent basis to produce their goods and services. A project can be defined as having constraints usually centered on time and resources, but also including all aspects of the process and the outcome, projects are processes that in many circumstances are core business for organization.

A project as defined by Project Management Body of Knowledge (PMBOK) fifth edition, “it is a temporary endeavor undertaken to create a unique product, service, or result.” Projects are generally started with an objective or a particular result in mind. It always has a fixed time period and can have one or many people working on a

project. “A project is a sequence of unique, complex and connected activities having one goal or purpose and that must be completed by a specific time, within budget, and according to specification” (Wysockiet al, 2003).

Success really does not have a specific definition, but in case of a project’s success can be defined as completing a project on time, within budget with a good level of quality. A project can have a lasting social and environmental effect, far beyond the life of the project itself. So it is very important to ensure that the project is completed successfully as it could affect many people in their day to day life.

2.2.6 Project Success

Project success could have many definitions. It is an insubstantial on the whole. The success of a project could be creating a product or service within the budget available. For another team, it could be finishing something in a specific time frame. But in general, one can define project success as completing a given project on time, within the given budget and reasonably good quality.

Lewis (2005) states that project success can be defined as meeting the required expectation of the stakeholders and achieving its intended purpose. This can be attained by understanding what the end result would be, and then stating the deliverables of the project. Shenhar et al. (2001) state the opposite: that project success is commonly judged by time and budget goals criteria, whereas in some cases this does not apply to any projects. Thiry (2006) argues that project success can only be defined if executives are able to consider the contribution of benefits and if the project is able to achieve these measures in relation to resources, competencies and complexity within the project parameters.

Project success is a subject matter that is commonly talked about and yet very hardly settled upon (Baccarini, 1999). Commonly, the attitudes on project success have developed gradually over the years from simple explanations that were restricted to the implementation phase of the project life cycle to explanations that reflect the gratitude of success over the whole project and product life cycle (Jugdevet al, 2005).

On the other hand, Cleland (1986) suggested that "project success is significant only if measured from two vantage points: the extent to which the project's technical performance objective was accomplished on time and within budget; the contribution that the project made to the strategic mission of the organization.

According to Pinto & Slevin (1988), "Project Success" is something more difficult than just meeting cost, time, and performance specifications. As a matter of fact, client's contentment with the final result has a great deal to do with the perceived success or collapse of projects".

Baccarini (1999) discovered two different components of project success: these are as follows: Project management success, which concentrates with the project process and especially the successful achievement of cost, time, and quality. Also the way in which the project management process was performed will be considered and product success which deals with the effects of the project's final product. A clear difference should be made between product success and project management success, in order to properly identify and evaluate project management success and product success, as they differ from each other.

According to Baccarini (1999), Project success can be summarized as:

Project success = project management success + project product success

The successful project management will include two components. The first component is the project management process such as a project initiating process, project planning process, project executing process, project monitoring process and project closing process. The second component is project knowledge areas management, such project integration management, project scope management, project time management, project quality management, project cost management, project communication management, project risk management, project procurement management and project stakeholder management. Therefore, the successful project management will support to ensure the project product success and then it definitely ensures the project success.

2.2.7 Project Management and Success

According to Gray and Larson (2006), project management is a task derived from an organization that enables professional project managers to use their skills, tools and knowledge to plan, execute and control a unique project within a limited lifespan by meeting the specification requirements of the organization.

Munns and Bjeirmi (1996) also defined project management as a process used as a control to achieve the project objectives by utilizing the organizational structure and resources to manage a project with the application of tools and techniques, without disrupting the routine operation of the company.

‘Project management is the discipline of managing all the different resources and aspects of the project in such a way that the resources will deliver all the output that

is required to complete the project within the defined scope, time, and cost constraints. These are agreed upon the project initiation stage and by the time the project begins all stakeholders and team members will have a clear understanding and acceptance of the process, methodology and expected outcome'.

Project Management has been defined as “the process by which projects (unique, complex, non- routine, one-time effort limited by time, budget, and resources) are defined, planned, monitored, controlled and delivered such that the agreed benefits are realized” (APM, 2006). Despite all the suggestions about what is project management, the criteria for success, namely, cost, time, and quality remain unchanged.

In 2008, a survey undertaken by Booz Allen Hamilton (project management consultant) which comprises of 20 companies in engineering, procurement and construction; shows that 40 percent of all projects executed were faced with cost overruns and being completed behind schedule. This overrun in cost and schedule has led to client's dissatisfaction on project performance. These views also agree with the research of M J Lang (1990). Therefore, effective project management is vital in such a volatile business environment.

2.2.8 Sustainable Projects

Khan (2000) states that sustainable projects are those project which maintain its operations, services and benefits from conceptual phase to operational phase during its projected life time. Also the issue of sustainability should be seen within time and changing social, environmental, and economic and political contexts, therefore being deemed viable.

2.2.9 Project Management Success

Traditionally, project management success focused on the dimensions of ‘within the time’, ‘within the budget’ and ‘according to the requirements’ (quality and functional specifications) of a project.

The three dimensions of time, budget and specifications feature in many definitions of project management success (e.g. Blaney 1989; Duncan 1987; Redmill, 1997, Globerson & Zwikael, 2002 Thomsett, 2003). However, time, budget and specifications are not sufficient to measure project management success as dimensions such as the quality of the project management process and the satisfaction of the project stakeholder’s expectations also need to be considered (Schwalbe, 2004).

Therefore, extending the traditional triangle to include the quality of the management process, the integration, the scope, the communication, the procurement, the communication, the risk and stakeholder management process will be able to provide a more complete view of project management success.

2.2.10 Effect of Quality on Success

Quality is an important attribute when it comes to a product or service. Generally, if the quality of the product or service is not good, then the customer will not be interested in it and so a wasted resources. Also quality can be described as a means of competitive advantage. Quality improvement and techniques have been used extensively for solving problems in organization. As far as success of the project is concerned, the methods used to solve problem can also be used to analyze success

process and hence helping management team to decide on how to quality (Moran et al, 1995).

2.2.11 Effect of Cost on Success

For any project to be successful, money is required either for buying raw materials, or using a particular machine or even just outsourcing certain sub tasks. It is important to have a good estimate of how much is really required to make a good product/service.

2.2.12 Effect of Project Time Management on Success

Time is one of the most important factors in project success. It is the only factor on which the other attributes depend on. Socrates said “time once gone will never come” and also lord Chesterfield insisted on knowing the true value of time; snatch, seize and enjoy every moment of it. Cash and quality can be grossly affected if the time scales of the project are not accurate.

Definitely, time is one of the main attributes which the project manager has to handle on his own. Quality and cash to a certain extent are not in the project manger's hand.

2.2.13 Effect of Project Integration Management on Success

According to the PMBOK, the project integration management is necessary in situations where individual processes interact. For example, a cost estimate needed for a contingency plan involves integrating the processes in the Project Cost, Time, and Risk Management Knowledge Areas. When additional risks associated with various staffing alternatives are identified, then one or more of those processes may be revisited. The project deliverables may also need integrating with ongoing

operations of the performing organization, the requesting organization, and with the long-term strategic planning that takes future problems and opportunities into consideration.

The experienced project management practitioners know there is no single way to manage a project. If a project has more than one phase, the level of accuracy applied within each of the project phases should be appropriate for each phase. This determination is also addressed by the project manager and project team. The integrative nature of projects and project management can be understood by thinking about other types of activities performed while completing a project. Therefore, the effective project integration management can ensure the successful project management.

2.2.14 Effect of Project Scope Management on Success

The project scope management is a difficult task, but it really helps the organization to have successful projects. Project scope management includes the processes that are involved in defining and directing what to include and exclude in a project. It is very essential that the project team and the stakeholders have the same understanding of what product will be produced and the processes that the project team will be using to produce them.

Schwalbe (2007) states that the first step in project scope management is scope planning. The project's size, complexity, importance, and other factors will affect how much effort is spent on scope planning and the main output is a project scope management plan and the tools and techniques are template forms, standards as well as expert judgment.

According to Schwalbe (2007) the next step in project scope management is to define the work required for the project further. Good scope definition is very important to project success because it helps to improve the accuracy of time, cost and resource estimates. It defines a baseline for performance measurement and project control, and aides in communicating clear work responsibilities.

2.2.15 Effect of Project Human Resource Management on Success

According to HR management expert, John M. Ivancevic (2010), "Human resource management is the process of linking the human resource function with the strategic objectives of the organization in order to improve performance."

Ivancevic, 2010, clarify that, human resource management (HRM) as an effective management of people at work. HRM studies what should be done to make resource available more productive and satisfied. The effective human resource management can be the difference between success and failure for the projects.

2.2.16 Human Resource and Information

Alakoc, (2014) clarify the importance of human resource as the most importance in an organization. Human resource development is extremely important because organization recognize that any value added to personnel will value to the organization.

Also Adekeye, (1997) reveals that information is the among important resource after human resource. Furthermore, information is a basic resource like materials, money and information is has become a critical resource just like energy.

2.2.17 Effect of Project Communication Management on Success

Communication is a process in which information is transmitted from a source to a receiver through various channels (JPIM, 2000). Communication means act of transferring information, exchange of information, message which is either written or verbal, and an idea of conveying thoughts effectively (Kerzner, 2009).

A good definition of project communication is the process required to ensure timely and appropriate generation, collection, distribution, storage and ultimate disposition of project information (PMI, 2008).

Communication is an important skill for project managers to accomplish effective project management (Analoui, 1993). This skill is vital because part of management is motivating people to perform their assigned duties to the best of their ability (Perret, 1982; Scott, 1989). "Effective communication is the key to success for the individual as well as for the project" (Verma, 1996). By using communication skills, the project manager helps to plan, direct, control and coordinates their operations throughout the project life cycle (Verma, 1996). The effective project communication management can determine the extent of the project's success or failure.

2.2.18 Effect of Project Procurement Management on Success

Procurement refers to the aspects of project management related to obtaining goods and services from external sources. It does not refer to other internal organizations within your own company. The definition of project procurement management from the PMBOK is “the processes necessary to purchase or acquire the products, services, or results needed from outside the project team”.

The effective procurement process will aid in saving time, maintaining a sound budget and event saving money while managing and lowering risk.

2.2.19 Effect of Project Risk Management on Success

Risk management is a management system that is used to identify and quantify all the inherent risks that influence the business or project performances, so a decision maker can make a suitable decision on how to manage risks (Flanagan et al, 1993).

According to the PMBOK (2002), the risk management can be defined as "the systematic process of identifying, analyzing and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives"

Harwood (2004) defines risk management as the process in which we select from possible choices to decrease the effects of the risk. It involves the assessment of compromise between changes in risk, anticipated returns and progressive freedom. The general aim of risk management in a project is to recognize, evaluate, think and manage probable issues with it, as a result of which, removing or lessening any damaging effect on its objectives.

Risk Management is defined or called as an art and science of analyzing, identifying, and responding to risk throughout the life of the project and for the best interest of meeting project objectives (Schwalbe, 2006). According to Project Management Institute defined Project risk management as the systematic process of identifying and analyzing risks events related to the project or managerial behavior that is not known at the beginning of the projects and has potential for adverse consequences on a project goals.

Project Risk Management, as one of the branch of Project Management and defined as the process involved with of identifying, analyzing and responding to risk as project-related events. This process aiming to minimizing the impact and consequences of those risk events (PMI, 2004).

The best practices in project risk management provide companies with an organized risk management approaches, tools, techniques and processes integrated to the project management processes within the organization. The practices are in place to assist organizations in achieving their objectives.

The effective project risk management can contribute to the overall success of the project because it points out the threats and opportunities which are either eliminated or utilized. It results in better business outcomes through more informed decision making activities achieved from corrections made after the risk management activities. It can also recognize and forecast the uncertainties and possible occurrences are provided. The best project risk management can influence innovation and positive thinking for the organization.

2.2.20 Effect of Project Stakeholder Management on Success

According to Singleton, 2007 stakeholders can shortly defined as persons or groups of individuals who are actively involved in projects and whose interests may be negatively or positively affected in the courses of completion or execution of these particular projects. Also Singleton, 2007 described Stakeholder Management as the process of identifying and engaging with all parties who have a stake in a project or firm's success. The management of challenging stakeholders has emerged as an important weapon in the successful implementation of projects. Stakeholders often

view and measure projects as either a complete success without recognizing that projects may not be successful from their perspective but a success from another perspective. Stakeholder influential attributes, understanding and their effective utilization are among the key reason which affects project success.

2.2.21 Project Success Criteria and Project Success Factors

Muller and Turner (2007) defined the two components of project success in relation to the use of project management as follows; Project success factors are the elements of a project that can have impact on increasing the likehood of success, while project success criteria are the measures which can be used to judge the successful outcome of a project.

Description of project success criteria may vary from one project to another and every organization has its own way to identify project success and project success criteria. This means that what is perceived to be success in one project is horrible failure in another project. One of the unclear concepts of project management is project success. Since each stakeholder who is involved in a project have different needs and expectations, it is very unsurprising that they interpret project success in their own way of understanding (Cleland et al, 2004).

"For those involved with a project, project success is normally thought of as the achievement of some pre-determined project goals" (Lim et al, 1999) while the general public has different views, commonly based on user satisfaction. A classic example of different perspective of a successful project is the Sydney Opera House project (Thomsett, 2003), which went 16 times over budget and took 4 times more to finish than originally planned.

Definitely, quality requires conforming on both standard specifications and fitness for use while project success requires a combination of product success and project management success (Duncan, 2004).

The difference between criteria and factors is unclear for many people. The Cambridge Advanced Learner's Dictionary describes a criterion as "a standard by which you judge, decide about or deal with something" while a factor is explained as "a fact or situation which influences the result of something".

Lim & Mohamed (1999) applied those definitions to project success and illustrated the difference. It is clear now that critical factors can lead to a series of events which ultimately meet the overall success criteria of the project. So the two should not be used as synonymous terms. Project success can be seen from two different perceptive: the micro and macro viewpoint (Lim & Mohamed, 1999). This can help in better understanding of what project success means to different people.

2.2.22 Project Success Criteria

According to Crawford (2002) project success is an important project management issue. It is one of the most frequently discussed topics and there is a lack of agreement concerning the criteria by which success is judged (Pinto and Slevin 1988; Freeman and Beale 1992; Shenhar, Levy and Dvir 1997; Baccarini 1999).

A review of the literature further reveals that there is, in fact, a high level of agreement with the concept provided by Baker, Murphy, and Fisher (1988). The agreed conception is that, project success is a matter of perception and that a project

will be most likely to be perceived to be an “overall success” if the project meets the technical performance specifications and/or mission to be performed.

There is also a general agreement that although the schedule and budget performance alone are considered inadequate as measures of project success, they are still important components of the overall construct. Quality is tangled with issues of technical performance, specifications, and achievement of functional objectives. Quality is the achievement against these criteria that will be most subject to variation in perception by multiple project stakeholders.

2.3 Irrigation Development and Management of Projects in Tanzania

The set up for irrigation development in Tanzania was established as a division in 1975 but changed to a department in 1985. The Zonal Irrigation Units were established in the early 1980s as technical wings of the department of irrigation**.** In 2005, the Division of Irrigation and Technical Services was formed again in the Ministry of Agriculture, Food Security and Cooperatives (MAFSC) by the Fourth Phase Government, which comprises of three sections, namely Irrigation Planning and Design section, Irrigation Infrastructure Construction and Supervision section, and Irrigation Research and Technology Promotion Section.

The Government has implemented various irrigation schemes in attempting to ensure increase in crop production and alleviate poverty for the farmers through different programmes and projects. These include the River Basin Management and Smallholder Irrigation Improvement Project (RBMSIIP), the Participatory Irrigation Development Programme (PIDP), the Agricultural Sector Programme Support (ASPS), National Irrigation Development Sub Component (NIDSC), Smallholder

Development Programme for Marginal Areas (SDPMA). Others include the Agricultural Sector Development Programme (URT-ASDP, 2006), Tanzanian National Strategy for Growth and Reduction of Poverty (URT-NSGRP, 2005) and the Agriculture Sector Development Strategy (URT-ASDS, 2002).

Irrigation infrastructure projects are funded under the ASDP, the District Irrigation Development Fund (DIDF) and the National Irrigation Development Fund (NIDF). The District Irrigation Development Fund (DIDF) finances smallholder irrigation investments (improvement of existing and building new ones) at District level, which are beyond the Local Government Capital Development Grant (LGCDG) and the District Agricultural Development Grant (DADG). The budget ceilings of limit of funding level from DIDF is Tanzania shillings 500,000,000 (five hundred million) per irrigation scheme while funds required by the National Irrigation Development Fund (NIDF) for irrigation intervention are more than what the district can provide.

According to URT-ASDP (2006) guidelines, 75 percent of the public investment funds are provided by DIDF while 20 percent are by the sector ministries and public agencies and 5 percent for cross-cutting and cross-sectorial issues at national level.

Under the reforms which the government has gone through, the private sector is seen to have a vital role in contributing to the national development. So it is in irrigation agriculture where the private sector through the Public Private Partnership (PPP) can get involved in providing support services and direct investment (URT-ASDP, 2006). These could include (i) cost-sharing of the development costs of primary and secondary irrigation infrastructure between public and private sector respectively; (ii) support to the emergence of private irrigation service or equipment providers;

(iii)performance based management contracts between public and private sector for large-scale irrigation; and (iv) any other form of PPP relevant to irrigation development.

2.4 Status of Irrigation Infrastructure

The adopted irrigation investment strategy starting from 1970s through 1980s, the investment involve full rehabilitation of the scheme or partial rehabilitation of traditional schemes and construction of new schemes and most of these projects were funded by Government. (Kalinga et al, 2001). Table 2.1 shows the number of irrigation projects in Tanzania Mainland developed by 2001.

Table 2.1: Scheme Developed by 2001: Classification of Schemes by Management Type

SN	Type Of Irrigation	Management Type						Total	
		Smallholder		Private		Others			
		No.	Irrig. area (ha)	No.	Irrig. area (ha)	No.	Irrig. area (ha)	No.	Irrig. area (ha)
1	Traditional	924		52		6		982	518,745
2	Water Harvesting	204		1		0		205	150,720
3	Modern Irrigation	95		25		8		128	134,582
4	Improved Traditional Irrigation	105		7		1		113	50,246
	TOTAL	**1328**	**790,962**	**85**	**38,910**	**15**	**24,421**	**1428**	**854,293**

Source: (Kalinga et al, 2001)

2.5 Performance of Irrigation Projects

Most research studies on performance of irrigation projects have aimed at monitoring the performance over time. For example, to determine the impact of a management change, or to analyse the performance of comparable projects (Maeda 2012).

The World Bank, as other donor agencies, evaluates the performance of all its operations at the end of the implementation phase, shortly after final disbursements. About 35 percent of the irrigation projects were rated sustainable and about 35 percent would have a satisfactory institutional development impact (World Bank; Jones, 1995 and Rice, 1997). These results cast serious doubts about the long-term performance of irrigation projects (Maeda, S., 2012, FAO, 2002).

The review by Plusquellec et al., (1990, 2002) showed that the performance of irrigation projects in economic terms had been less than satisfactory at full development than at either appraisal or completion of their investment phase. The main cause for the lower-than-expected performance in economic terms was related to the frequent overoptimistic assumptions regarding efficiency, and the often overlooked impact of poor physical performance in terms of water distribution and concurrent poor construction standards on agricultural productivity.

From the above view, it can be commented that although transferring of technology from country to country is highly needed, transferring any technology from one environment to another should be approached with caution. Nijman (1993) argued that many transfer-of-technology experiments have failed because of inadequate attention to all the key factors that determine the selection of an appropriate irrigation strategy.

FAO (1998) established six areas of performance indicators for irrigation schemes, which are; Technical performance indicators; financial performance indicators; Socio-economic performance indicators; Environmental and health performance indicators; Managerial performance indicators and Agronomic performance indicators. The researcher modified these indicators and used them to evaluate performance of constructed irrigation infrastructure projects in Tanzania.

2.6 Factors Affecting Performance of Irrigation Projects

Many researches have been conducted all over the world on determining factors affecting the performance of irrigation projects. In Tanzania also research has been conducted in this area. Results show that 19 factors seemed to affect this performance and effects of the eight (8) factors are rated as serious;- Inadequate irrigation budgets; Lack/inadequate maintenance; Inadequate capability of local contractors; Weak legal and institutional frameworks; Inadequate policies; Deficiencies/Weaknesses in project management; Poor irrigation service; Time overrun in implementation; Poor planning of the project; Cost overrun in implementation; Deficiencies in technical design; Poor relationships among stakeholders; Lack of equity in water charges; Lack of farmer involvement; Lack/poor feasibility study; Environmental factors; Poor quality of constructed facilities; Inappropriate technology; Reduction in cropped area (Matekere, E. et al 2012).

Irrigation systems in many parts of the world are known to be performing well below their potential (Price, 1999). Next is the observation that the overall performance of

irrigation and drainage investments has too often fallen short of the expectations of planners, governments and financing institutions alike (FAO, 1997).

2.7 Success Factors in Construction Projects and Irrigation Projects

In examination of success factors of irrigation in Sub-Saharan African the following factors seemed to have influence on irrigation: secure access to land and water; efficient technologies; stable input/out market; favorable policies; effective institutions; reliable farmers support environment (Ofosu et al, 2014).

In other parts of the world, researchers listed approximate 2000 success factors from previous studies that influence construction projects effectiveness. After the analysis of those factors were reduced to 46 success factor and finally grouped into 5 major categories: - management, communication and organization; scope and planning; control; environmental, economic, political and social; technical (Salleh, 2009).

Salleh (2009) explains that in order to identify which of these factors had most significant influence on construction project success input or opinions from experts of these projects were taken into account. Each of the factors was rated using a range from no influence to major influence. From this analysis the top 15 factors were group by their respective categories.

In the analysis the success criteria were comparatively rated from average to outstanding. The criteria for success were as follows: - budget; schedule; client satisfaction; functionality; project manager/team satisfaction; contractor satisfaction. Finally analysis of the correlation between particular factors and their influence on the project success were done, the result show that the Critical Success Factors on construction projects were as follows: - construction and design planning effort;

scope and work definition; project manager goal commitment; project team motivation goal orientation; project manager capabilities and experience; safety; control systems. The result showed that all Critical Success Factors for construction projects are human related factors (Salleh, 2009).

In a comparative study between successful and unsuccessful schemes conducted in Benin, the following success factors in construction and management of irrigation projects:- operation and maintenance (O & M) budgets or costs associated with irrigation infrastructures were lower in the successful schemes compared to other ones, where irrigation was under gravity compared to unsuccessful ones where irrigation was under motor pump; external technical support; effective farmer organization; reliable access to credit; a favorable land tenure policy (Djagba et al 2014).

In 1987 Ashley identified seven success factors and also described their success criteria in construction projects. The seven success factors were: - construction activities programming; design planning; project manager commitment to the goals; definition of the work and its field; control systems; project manager technical capabilities; and project team motivation. The six success criteria were as follows: - budget performance; schedule performance; employer satisfaction; project manager satisfaction; contractor satisfaction; task orientation (Pakseresht et al, 2012).

Therefore, through this literature review, the research identified nineteen (19) success factors which have influence in construction process of the irrigation projects in Tanzania, and those success factors are as follows:- secure access to land and water; effective technologies; stable input/out market; favourable policies; effective institutions; reliable farmer support environment; construction and design planning

effort; scope and work definition; project manager goal commitment; project team motivation goal orientation; project manager capabilities and experience; safety; control systems; operation and maintenance costs effectiveness; external technical support; effective farmers organisation; reliable access to credit; construction activities programming; capability of local contractors; lack of famers involvement; environmental factors (e.g. Siltation); poor feasibility study; reduction in cropped area.

2.8 Critical Success Factors of Construction Projects in the Project Life Cycle

Salleh, 2009 identified seven critical factor related to the implementation success. The seven factor are: - construction and design planning effort; scope and work definition; project manager goal commitment; safety; control system; project manager experience and capability; project team motivation task orientation. Also Slevin and Pinto (1986, 1987) identified ten critical success in project implementation as: - project mission; top management support; project plan/schedule; communication; technical task: personnel; client consultation and trouble-shooting. The results from a stepwise regression on the mentioned Critical Success Factors at each stage of the project life cycle. It demonstrated that, the relative importance of various Critical Success Factors is subjected to change at different stage of the project life cycle during implementation process (Pinto et al, 1988).

2.9 Summary

This chapter has presented different literature, theories and practices from different researchers whose ideas and solutions may enhance this study. The various Critical

Success Factors in different construction field described in the literature may occur at different stages of the planning and implementation process. Therefore, the proposed study was being based on an identification of Critical Success Factors of Irrigation projects in the study areas thought out project life cycle, and on the determination of those Critical Success Factors that influence construction of irrigation projects in Tanzania from inception to the implementation phase. The next chapter focuses on research methodology.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the theories of the research methodology and justifies the choice of the methodology used in the study. It discusses the research design, population, sampling procedures and techniques and sample size. It further discusses the methods for data collection, processing and analysis, and final presentation.

For the success of this study, various research methods were adopted that include questionnaire, interviews and physical observation as primary data collection methods. Also, various documents relevant to this study such as books, dissertations, journals, reports, and websites as secondary data were reviewed so as to provide enough and relevant information to the study.

3.2 Research Approach

In this research study, both quantitative and qualitative research approaches were used. Under qualitative approach non-quantitative form of data were collected that include views, opinions and suggestions given by technical staffs from zone irrigation office in Morogoro (consultants), Technical Staffs from District Executive offices (clients) in the region who engage in irrigation projects in either stage of the implementation, and technical staffs from contractors engaged in construction of these projects. This aimed at gathering an in-depth understanding on how respondents' perceptions, their opinions and views can be used to understand those Critical Success Factors of irrigation projects in Tanzania. These stakeholders gave

their opinions on strategies to improve project management of irrigation projects in Tanzania.

The quantitative research approach determines the relationships between one thing (independent variable) and another (dependent or outcome variable) in a population. Under the quantitative research approach, a survey approach was used to study the sample population through questionnaire data collection tool.

3.3 Research Design

Research design is the conceptual structure within which research is conducted. It includes the blueprint for conducting a study, collection, measurement and analysis of the data. Different research designs can be conveniently categorized depending on the nature of the study. These can be exploratory research studies, descriptive and diagnostic research studies or hypothesis testing research studies (Kothari, 2004).

This study is descriptive and diagnostic research that is designed to provide a picture of the situation as naturally happens. It can be used to justify current practice or situation and make judgment.

3.4 Descriptive and Diagnostic Design

Descriptive research, those which concern with describing the characteristics of a particular individual or group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else (Kothari, 2004). Descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individual (Maeda, 2012, Orodho and Kombo, 2002).

As a descriptive/diagnostic study this research involves specification of the objectives of the study, selecting the methods of data collection, sample section on the basis of which a general statement about the population was made, data collection and analyzing the results.

This is a descriptive study because it surveys the success factors which have positive impact on performance of the surface irrigation systems/projects in Tanzania. The data was collected, processed analyzed through coding, tabulating and performing statistical computations. As a diagnostic study, this study shows critical factors of the performance of the surface irrigation systems/projects, performance of surface irrigation systems and further uses the data to develop a framework as guidance in construction of these irrigation projects.

In this descriptive research study, data collected through questionnaires from 20 projects funded by USAID, JICA and WORLD BANK from 2012-2017 were used to determine Critical Success Factors that influence construction of irrigation projects in Tanzania. Then Itete irrigation project was taken as a case study to validate the Critical Success Factors obtained from stakeholders through questionnaires. Also methods for data collection includes questionnaire, face to face interview, observation and written document that are relevant to this study such as reports, books, journals, dissertation as well as internet sources will be used to collect relevant data so as to keep the view of the objectives.

3.5 Selection of the Area of Study

The scope covers all constructed public irrigation projects in Morogoro region funded by the government of the United Republic of Tanzania and/or Development

Partners like USAID, JICA, WORLD BANK etc. To reflect current situation, all projects which were implemented by Local Government under supervision of zone irrigation offices and engaged in construction of the irrigation infrastructure from 2012-2017 were selected in study area. Specific criteria for selecting that Morogoro region as area of study were research time limitation, budget or cost and availability. This is because the research is an employee of NIRC in zonal irrigation office in Morogoro, Data collection was easy task for researcher because no extra costs or time needed to accomplish this task. Due to limitation of time for this research, then researcher decided to select Morogoro region as the study area to save time for data collection and processing.

3.6 Sampling Technique/Sampling Procedure

A population is a group of individuals, objects or terms from which samples are taken for measurement (Kombo and Tromp 2006). At the time of this study, the Study area had a population of 168 irrigation (NIRC, 2016). A sample of 20 irrigation projects from a population of 168 irrigation projects in the region under USAID, JICA, DIDF and WORLD BANK from 2012-2017 were considered. The research was confined to data from 2012-2017 because of the cost and time implications covering the entire or wide range of projects. The results for this period taken as representative of the entire projects. This study adopted simple random and purposive sampling in which specific or targeted groups were selected because they were among the projects implemented during this specific period of this research.

Sample size is important for economic reasons. An under-sized study can be a waste of resources for not having the capability to produce useful results, while an

oversized one uses more resources than are necessary (Taylor et al., 2005). In descriptive research, a sample of 10% to 20% of the population is often used (Ako et al., 1999). In this study, a sample of 12% (that is, at least 20 projects out of 168 public funded irrigation projects was selected.

The questionnaire was administered to contractors, consultants, and clients personnel who were dealing with irrigation projects. As earlier noted in this section, the target population contained 20 irrigation projects distributed as shown in Table 3.1. The questionnaire was sent to 75 stakeholders including clients, contractors and consultants in irrigation projects as shown in Appendix 1

Table 3.1: Survey Population

S.N	Type of Population	Size of	Target	% of the
1	Kilosa	61	7	11
2	Mvomero	29	4	14
3	Kilombero	24	3	13
4	Morogoro Rural	31	3	10
5	Ulanga	21	3	14
6	Morogoro	2	-	-
	TOTAL	**168**	**20**	**12**

Research Data (2017)

3.7 Data Collection Methods

Data collection method refers to the process used in capturing of specific information that will be used to as solution of the research questions. In this study a combination of various data collection methods were used in which interviews, questionnaire, and documents observation were used. Thus both primary and secondary data were collected.

3.7.1 Primary Data Collection Methods

Primary data are those data collected by the researcher directly from the field. The following are the primary data collection tools that will be used during the research: interviews, under which face to face interview technique will be used, and questionnaires under which semi-structured questions will be prepared.

3.7.1.1 Questionnaire

In this study, questionnaires were utilized for data collection, under which both open and closed ended questions were asked. Thus there were questionnaires for client, and technical staffs from ZITSU who are designers and supervisors of these projects. Technical staffs from DEDs Office, Technical staffs from NIRC headquarter staffs were involved in projects within the selected period.

3.7.1.2 Interview

Face to face interview governed by structured questions for guidance was conducted. The interview involved various stakeholders that include technical staffs from ZITSU who are designers and supervisors of these projects, technical staffs from DEDs Office, Technical staffs from NIRC headquarter staffs. The questions asked during the interview aimed at gathering an in-depth understanding on how respondents perceive their opinions and views which were used to find out how that success factors impact project management of irrigation projects in Tanzania.

3.7.2 Secondary Data Collection Methods

Secondary data are data collected from books, reports, journal, magazine, internet sources, and dissertations. Generally, these are the data that are relevant to the study and are already collected and analyzed by other researchers.

3.7.3 Documents Review

With regard to this study, different documents related to success factors or factors affecting irrigation projects in Tanzania specifically in construction were reviewed so as to grasp important materials which were of great importance to this work. These documents include written reports, presentations papers, books, journals and magazine which provided the lessons about the Critical Success Factors in construction of irrigation projects in in Tanzania

3.8 Confidence in Data Collected

The researcher is confident with the data collected because of familiarity with the field. Moreover, the researcher is an employee of the National Irrigation Commission; hence no barrier to NIRC and stakeholders office was experienced during the data collection. The researcher participated in some stages of the design and supervision of construction works as technical staff from ZITSU in Morogoro region. With this regard, there is high confidence in the data collected and analysis of the assessment of the success factors of irrigation projects in Tanzania.

3.9 Data Analysis

Under qualitative approach data was analyzed by using content analysis. This involved the identification of the main themes arising from the respondents. Furthermore, the following steps were followed in qualitative data analysis: identification of the main themes, assigning codes to the main theme, classifying responses under the main themes, and integrate themes and responses into the text of the study. Furthermore, in quantitative data analysis, data were analyzed by using Statistical Package for the Social Sciences (SPSS V16).

The mean score was obtained by dividing weighted score by total number of respondents who attended that subsection of the question and weighted score = (*rank x frequency*)

i.e. (1 x freq1 + 2 x freq2 +3 x freq3 + 4 x freq4 +5 x freq5).

Mean rating scores were used to rank the factors.

Mean scores were calculated using the following equation (3.1)

Mean Score = Total weight given to success factors (Wi) /(Number of Respondent-(N)……..Equation 3.1

Where: Wi = Total weight given to the factor on the rating scale

and is given by equation 3.2

Wi =∑ RiFi..... (Equation 3.2)

Where:

Ri = Weight associated with rating i (i = 1… k);

and *Fi = is the number of respondents who rate that factor into ith rate.*

Also, the Relative Importance Index (RII) was employed to determine stakeholders' opinions of the relative importance of the identified success factors prior to ranking. RII was used for the analysis because it best fits the purpose of this study. The RII was used to evaluate clients', contractors' and consultants' opinions of the relative importance of the identified success factors (Adnan et al, 2009). Appendices 8, 9 and 10 show perceptions of individual stake holders of the irrigation projects. In the calculation of the Relative Importance Index (RII), the formula below was used:

$$RII=\sum W / (A*N)$$

Where, W—weighting given to each factor by the respondents and ranges from 1 to 5; A—the highest response integer (5); and N—total number of respondents.

Relative Importance Index helps in finding the contribution a particular factor makes to the prediction of a criterion factor both by itself and in combination with other predictor factors. Therefore, the ranking of the success factors are demonstrated according to their importance level on success factors of those projects. Normally, RII ranges from 0 to 1 which implies from less to most important respectively.

A linear relationship (y=mx+c) was established using Microsoft excel between RII values and mean values from (SPSS 16.0) was used to determine limit value (boundary) that distinguish the CSFs with other factors. Therefore, the equation 4.1 was established.

3.11 Data Presentation

After data analysis process, data was presented in words, tables and graphics. Furthermore, descriptions are made in oral presentations and in written report according to the department requirements.

3.12 Summary

The chapter has discussed the methodologies employed in this research. The methodology was selected in view of the research problem and objectives which have been briefly discussed in this chapter. Several data collection methods have been discussed in this chapter including questionnaires, interviews and documentary method. The sampling procedure, data collection techniques and data analysis tools used in this research has been elaborated. These methods were adopted based on how commonly they are applied in different types of researches and their relation to this study. Chapter four summarized and analyses the findings of the study in relation to the research objectives.

CHAPTER FOUR

ANALYSIS AND DISCUSSION

4.1 Introduction

This Chapter presents the analysis and discussion of the data collected for the study through questionnaires and also interview from project Manager of the specific project in the study area. The purpose is to examine the collected data and experience of the field in relation to the research objectives, and present the results of the analysis in a systematic way, giving all evidence relevant to the research objectives. The chapter is organized into three sections and subsections: The first section deals with the findings relating to the extant factors identified that influence success of irrigation projects. The second section discusses the Critical Success Factors that influence construction of irrigation projects in Tanzania from inception to the implementation phase. The last section analyses the recommended improvement strategies in management of irrigation projects in Tanzania.

4.2 Findings Related to Extant Factors Influencing Success of Irrigation Projects

This section reviews the various existing factor identified having influence on success of the irrigation projects as suggested by project management professionals over decades.

Experience of respondents in the construction of irrigation projects was also requested in order to capture the differences in ranking among respondents who have had varying experience in construction industry. Experience is important in any construction work. Experience can assist consultants to design and supervise projects

well. Furthermore, experience can help the contractors' staffs to solve daily problems in the project. For the client, experience is vital because it helps them to know the real situation apart from ideas. The ranges of years of experience of respondents were arbitrarily grouped into four categories, namely experience of less than two years, from two to five years, from five to ten years and more than ten years (Table 4.3 and 4.4).

To determine the extant factors that influence success of irrigation projects, a broad list of success factors established from literature review was sent to respondents for their opinion through questionnaires (Appendix 7).The respondents were asked to evaluate or rate the success factors of irrigation projects in the study area on scales according to their experience of construction management of the irrigation projects. From the literature reviewed factors that having influence on success of irrigation project were identified as follows:-project manager's goal commitment, well defined scope and work, project manager capability and experience , construction and design planning effort, construction activities programming, capability of local contractors, secure access to land and water, project team motivation goal orientation , effective institutions, effective technologies, external technical support, operation and maintenance costs effectiveness, reliable farmer, support environment, effective control systems, effective farmers organization, stable input/out market, safety precautions and applied procedures, favorable policies and reliable access to credit (Table 4.8)

4.2.1 Analysis of Responses

The target population of the study consisted of all public irrigation projects executed between July 2012 and June 2017. This study tries to find views from individual technical staff working with, consultants, clients and contractors in public irrigation sector by filling out a structured questionnaire. Sixty percent (60%) of the questionnaires were sent out electronically through respondents email while the remaining forty percent (40%) were physically distributed.

A summary of information about the filled questionnaires and the responses the researcher managed to collect was 56 out 70 questionnaires. Responses from the clients, contractors and consultants form 80 % of the distributed questionnaires. Table 4.2 shows summary of the responses rate. The target sample was 20 out 168 projects which is 12% of the total population. After cross-checking and sorting the questionnaires, there were 21 out of 25 questionnaires returned from the consultants, 17 out 25 questionnaires from the contractors and 18 out of 20 questionnaires from clients.

Table 4.1: Analysis of the Respondents

Stakeholders	Frequency	Percent	Actual Sample	% Response
Client	18	32.1	20	90
Contractor	17	30.4	25	68
Consultant	21	37.5	25	84
Total	**56**	**100.0**	**70**	**80**

Research Data (2017)

The result in Table 4.3 shows that about seven per cent (7.1%) of the respondents were directors or partners of their organization/firm/company. While about forty four per cent (44.6%) were seniors (project managers) and forty eighty per cent (48.2%)

juniors. In this study, Zonal Irrigation Engineer (ZIE) was considered as a director.. Therefore, senior officers and directors constituted about 52% of the study respondents. Findings reveal that the consultants of all irrigation projects from the study area have been assigned to zonal irrigation office in Morogoro (Table 4.2).

Table 4.2: Consultant of Irrigation Project

Consultant	Frequency	Percent	Cumulative Percent
ZIO	18	100.0	100.0
Total	**18**	**100.0**	

Research Data (2017)

Table 4.3: Position of Respondent in the Organization/Firm/Company

Respondent's Position	Frequency	Percent	Cumulative Percent
Junior staff	27	48.2	48.2
Senior staff	25	44.6	92.9
Director	4	7.1	100.0
Total	**56**	**100.0**	

Research Data (2017)

Furthermore, Table 4.4 and Table 4.5 shows that 55% of contractors and consultants have an experience of more than five years in the construction of irrigation projects and more than 64% of those contractors and consultants have an experience of more than five years in the construction industry.

Table 4.4: Experience in Irrigation Projects

Experience Of Respondents	Frequency	Percent	Cumulative Percent
Less than 2 years	3	5.4	5.4
2-5 years	22	39.3	44.6
5-10 years	25	44.6	89.3
More than 10 years	6	10.7	100.0
Total	**56**	**100.0**	

Research Data (2017)

Table 4.5: Experience in Construction Field

Experience Of Respondent	Frequency	Percent	Cumulative Percent
Less than 2 years	1	1.8	1.8
2-5 years	19	33.9	35.7
5-10 years	28	50.0	85.7
More than 10 years	8	14.3	100.0
Total	**56**	**100.0**	

Research Data (2017)

Furthermore, research findings also indicate that most local contractors who have worked with irrigation infrastructure projects are those registered civil contractors in class VII, and VI (35%); small firms and medium firms are class V, to III (53%), while big firm class I and II were only 12% as shown in Table 4.6.

Table 4.6: Class of Registration for Contractors

Class of Registration	Frequency	Percent	Cumulative Percent
Class 1	2	11.8	11.8
Class 2	0	0	11.8
Class 3	3	17.6	29.4
Class 4	0	0	29.4
Class 5	6	35.3	64.7
Class 6	5	29.4	94.1
Class 7	1	5.9	100
Total	**17**	**100.0**	

Research Data (2017)

4.2.2 Mode of Execution and Funding

The findings showed that 89% of irrigation projects are executed by Contractors registered by Contractors Registration Board (CRB) while the remaining 11% of projects are executed by Procuring Entities by the use of force account as illustrated in Table 4.7. The irrigation funds originated mainly from two sources either Central Government or Development partners like WORLD BANK, USAID, and JICA. Findings reveals Central Government financed about 39% of the Project in the study area while Development partners financed 69% of the projects as shown in Table 4.8.

Table 4.7: Mode of Execution

Mode Of Execution	Frequency	Percent
Registered contractors	16	89
Force Account	2	11
Total	**18**	**100.0**

Research Data (2017)

Table 4.8: Main Source of Funds for Irrigation Projects

Source of Fund	Frequency	Percent
Central Government	7	39.0
Development Partners	11	61.0
Total	**18**	**100.0**

Research Data (2017)

4.2.3 Critical Success Factors of Irrigation Projects

To determine which factor among the 19 listed factors which have influence on the success of irrigation projects. The mean score methods and Relative Importance Index methods were deployed.

For this study, 19 different factors were identified from literature review. Then during survey, the respondents were requested, using their own experiences to mention and rank additional factors. The responses were assigned with values basing on which the mean scores were calculated.

In this study RII produces a value ranging from 0.5 to 0.83 which gives clear meaning of the importance of those factors in the success of the irrigation projects. All factors were accepted since were above 0.5. These findings justify that respondents agreed with all factors as success factors of the irrigation projects in the study area. The values of 0.829, 0.818, 0.807, 0.786, 0.743, 0.743, 0.743, 0.718, 0.711and 0.700 indicate respectively the value of project managers' goal commitment, well defined scope and work, project manager capabilities and experience, construction and design planning effort, construction activities programming, capability of local contractors, secure access to land and water, project team motivation goal orientation and effective institutions as shown in the Table 4.9. Likewise, the RII values indicate that, primarily these 9 Critical Success Factors

influence success of the irrigation projects in the study area. Similarly, it suggests that, project manager goal commitment ranked the first significantly influential factor that account for the success of irrigation projects in Tanzania. This was followed by well-defined scope and work. Then project manager capability and experience followed by construction and design planning effort ranked third and fourth respectively. Construction activities programming and capability of local contractors ranked fifth and sixth respectively, followed by secure access to land and water that ranked seventh. Project team motivation goal orientation and effective institution were ranked eighth and ninth respectively.

According to this study, the factors contributing the most to success (Critical Success Factors) were highlighted. Using the values of mean and RII from the Table 4.9, the linear relationship was established using Microsoft Excel (Figure 4.2).

The linear equation derived from the data from Table 4.8 was expressed as:

Y= 5.0098X – 0.0085, ……**Equation 4.1**

Y Value represents Mean score and X represent RII value

Put mean score 3.43 obtained from SPSS to the **equation 4.1** to obtain value of RII (Limit value)

X = 0.68

Therefore, the limit value of RII (0.68) or boundary between Critical Success Factors from identified success factors was established. Those Success factors scores above (RII=0.68) or average mean score (mean=3.43) were taken as CSF and the rest were termed as fair and poor (Table 4.9 and Figure 4.1). Lastly, these CSF were discussed and some recommendations were made to improve management of those projects.

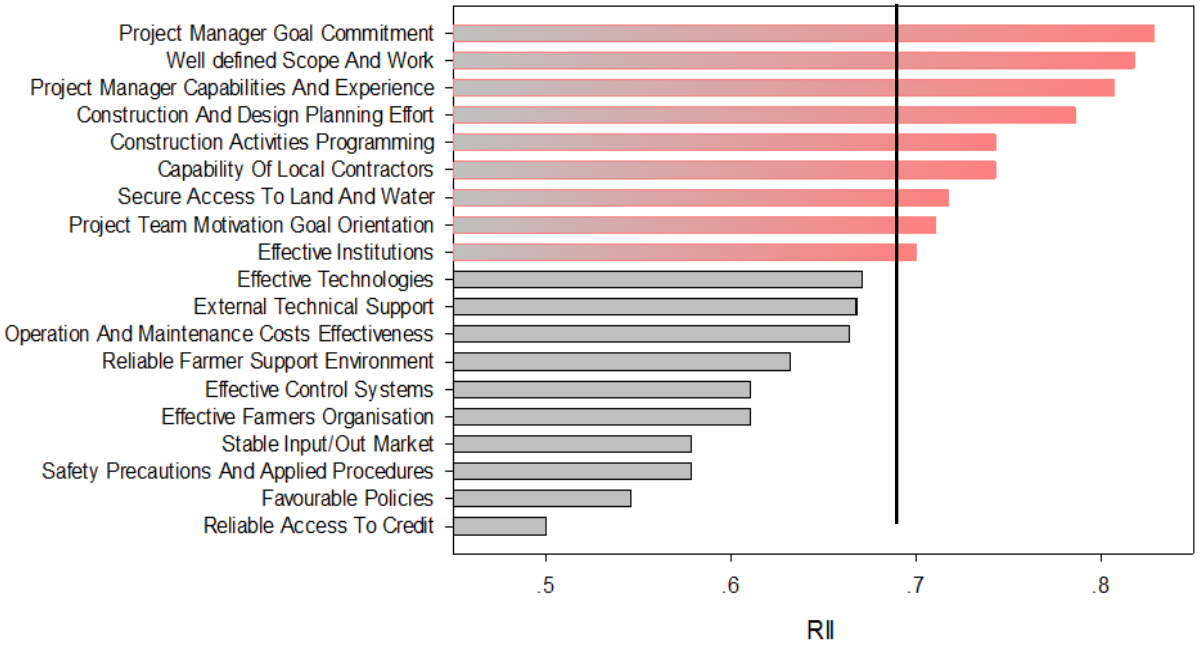

Figure 4.1: Graph Showing Critical Success Factors

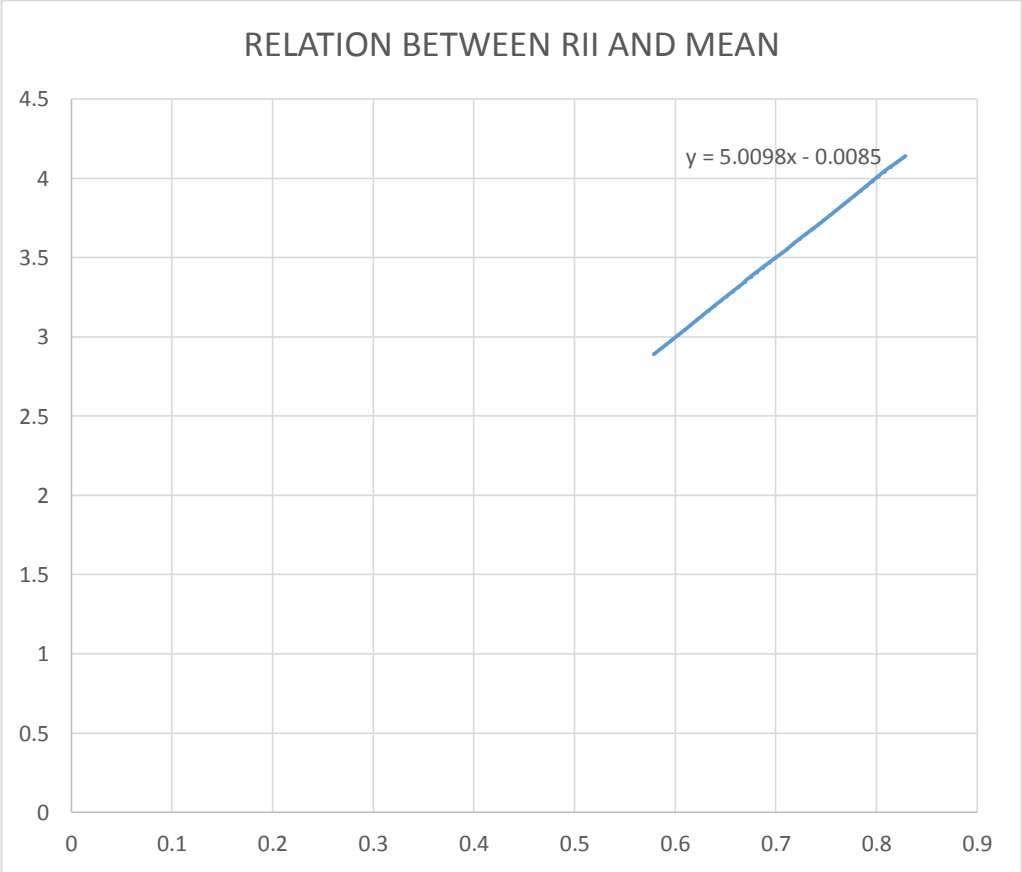

Figure 4.2: Graph Showing Relationship Between RII and Mean Scores

Table 4.9: Ranking of Success Factors According To RII Scores

Rank 5= Excellent , 4= Good, 3= Fair, 2= Poor And 1= Very Poor									
Success Factors	Level Of Existence					ΣW	RII	Mean	Remarks
	5	4	3	2	1				
Project Manager Goal Commitment	21	24	10	0	1	232	0.829	4.14	Critical
Well Defined Scope And Work	13	35	8	0	0	229	0.818	4.09	Critical
Project Manager Capabilities And Experience	14	32	9	0	1	226	0.807	4.04	Critical
Construction And Design Planning Effort	8	36	12	0	0	220	0.786	3.93	Critical
Construction Activities Programming	6	33	12	5	0	208	0.743	3.71	Critical
Capability Of Local Contractors	13	18	21	4	0	208	0.743	3.71	Critical
Secure Access To Land And Water	11	18	20	7	0	201	0.718	3.59	Critical
Project Team Motivation Goal Orientation	4	24	27	1	0	199	0.711	3.55	Critical
Effective Institutions	4	27	18	7	0	196	0.700	3.50	Critical
Effective Technologies	2	23	24	7	0	188	0.671	3.36	Fair
External Technical Support	5	16	28	7	0	187	0.668	3.34	Fair
Operation And Maintenance Costs Effectiveness	4	20	23	8	1	186	0.664	3.32	Fair
Reliable Farmer Support Environment	1	22	20	11	2	177	0.632	3.16	Fair
Effective Control Systems	2	14	28	9	3	171	0.611	3.05	Fair
Effective Farmers Organisation	4	12	24	15	1	171	0.611	3.05	Fair
Stable Input/Out Market	1	10	28	16	1	162	0.579	2.89	Fair
Safety Precautions And Applied Procedures	4	10	24	12	6	162	0.579	2.89	Fair
Favourable Policies	2	11	18	20	5	153	0.546	3.27	Fair
Reliable Access To Credit	1	6	23	16	10	140	0.500	2.50	Fair
Overall Average Of Success Factors Of Irrigation Project								3.43	

4.3 CASE STUDY: Construction of Itete Irrigation Scheme at Alabama Village

4.3.1 Introduction

The aim of this part of the study involved in detail study of the Critical Success Factors of specific project in the study area. In this part Itete irrigation scheme was selected. Itete irrigation scheme was among of the irrigation in the study that seems to be successful and well managed from inception phase to implementation phase. Interview with project manager or resident engineer of this project was conducted in zonal irrigation office in Morogoro, followed by documentary review. The purpose

of the interview was to identify Critical Success Factors and success criteria of this real project.

4.3.2 Project Location and Description

Itete irrigation project is located in Ulanga District in the study area Figure 4.3 this project seemed to be among the successful project in the area in the eyes of key stakeholders or participants of the project. Design team of this project comprises of irrigation and agricultural engineers, sociologists, agronomists, surveyors and economists. Design of the scheme was started in 2009 and completed in 2011.

Irrigators Organization (IO) named KIUMAN (Kikundi cha umwagiliaji Minazi, Alabama na Njiwa) from three villages (Njiwa, Minazi and Alabama) are main beneficiaries of this project.

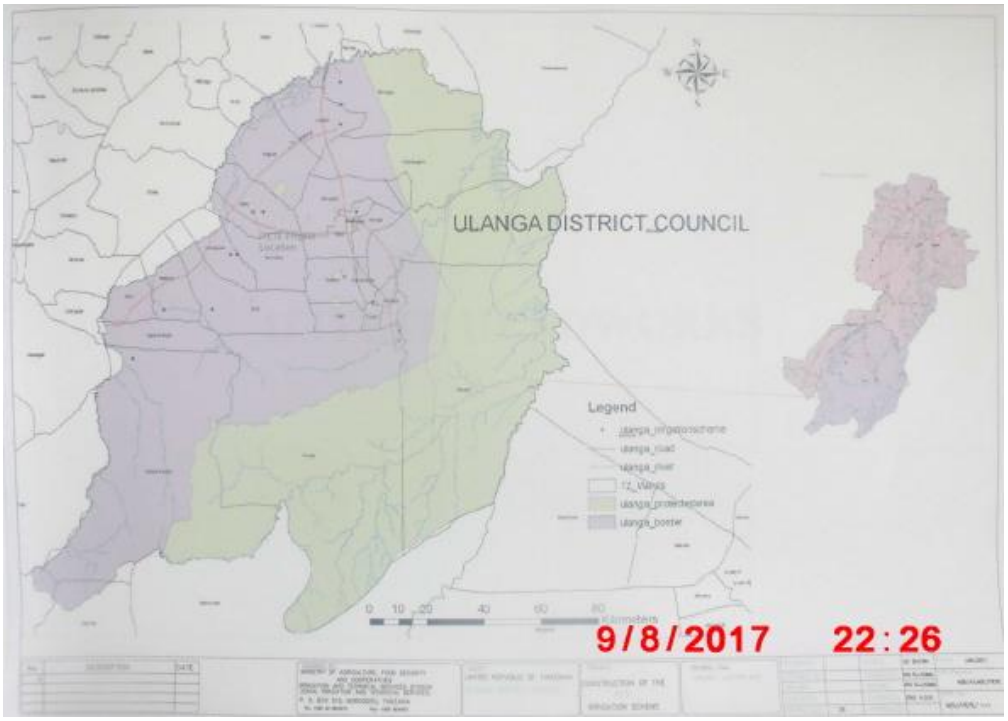

Figure 4.3: Map Showing Location of Itete Irrigation Scheme

The scope of the Project includes:-

- Construction of the intake structure (headwork)
- Construction of main canal (left main canal =4170m,) including associated structures and drains (600ha)
- Construction of 16 secondary canals with associated structures and drains (left secondary canal)
- Construction of 48 tertiary canals including its structure along left secondary canal I
- Construction of main canal (right main canal =3000m,) including associated structures and drains (400ha)
- Construction of 5 secondary canals with associated structures and drains (right secondary canal)
- Construction of 32 tertiary canal including its structure along right secondary canal I

Before this rehabilitation this project was operating in a very bad condition since most of irrigations were deteriorated beyond repair. The Financier of the project was The Government of Tanzania through NIDF (National Irrigation Development Fund). In March, 2013 the m/s Ravji Construction Ltd (Registered with CRB Class I) was appointed as contractor of the project. Original contract period was 6.09billion for a period of 18 months. Zonal irrigation office was appointed as consultant of the project.

Therefore**, w**ith reference to the research objectives and questions outlined in chapter one, the following 8 (eight) factors were identified as Critical Success Factor of Itete

Irrigation scheme: commitment of the employer, commitment and experience of project manager, commitment of the contractor, communication among project stakeholders, competence/experience/financial and technical capabilities of the contractor, awareness and involvement of local people (beneficiaries), availability of construction materials and availability of labor force

The Critical Success Factors of Itete project are elements or activities required for ensuring the success criteria of the project. The following criteria were highlighted to be success criteria with respect to Itete irrigation scheme, and were as follows; meeting end user's or beneficiaries expectations, meeting clients' expectation, budget performance schedule performance and project managers' expectations.

4.3.3 Critical Success Factors of the Scheme

4.3.3.1 Commitment of the Employer

The United Republic of Tanzania (URT) is the employer of the selected project. The Government committed Tshs. 6,091,334,392.20 for the construction starting from headwork construction, construction of secondary canal, tertiary canal and drains. Commitment of the Government made this project a success since the construction work did not stop due to lack of funds like other schemes. This amount was committed prior to the contract signing. In other scheme construction was done in phases depending on the availability of fund, either from the government or development partners.

Commitment of the Government to allocate construction and design fund for full construction played an important role as success factor of the project. According to the resident engineer and other technical staff in zonal irrigation office in Morogoro

agreed this commitment was the most important factor made this project to successful completion. According to the data from survey the commitment of the employer was not listed among the Critical Success Factors of irrigation project. But from the experience in these fields of irrigation this factor has shown great impact. Usually the Government sets aside funds annually and availability of those funds depends on several factors. Hence, construction of irrigation projects is done in phases. The result no significance impact can be seen to the field because fund available annually cannot complete the scheme and work as expected, which causes irrigation projects to underperform or work bellow clients expectation. But if the Government can commit construction funds from inception to construction phase, definitely irrigation can prosper and meet project objectives.

4.3.3.2 Commitment and Experience of the Project Manager

Zonal irrigation office assigns one of the experienced engineers to be Project Manager (PM) of this project with experience of more than ten years in construction works and supervision. Commitment and experience of the PM was among important factors which made this project successfully completed. To ensure project succeed and completed in time, PM forced to applied design and build techniques in site so that work will not stop and avoiding delay of the project. Also the Project Manager ensures the project to be completed within estimated budget, timely and in safe manner. Data collected from survey ranked this factor as second in importance of the irrigation project. Also experience of the project manager and other experts involved in the construction of Itete irrigation scheme agreed with the importance of this factor in successful completion of the project.

4.3.3.3 Commitment of the Contractor

Ravji Construction Limited was awarded a contract to construct the selected project starting from April 01, 2013 to September 23, 2014. Due to unavoidable circumstance during construction, this contract extended its duration to March 31, 2015. Ravji Construction Ltd is a local construction company registered with contractors registration board (CRB) –Class I. This contractor was fully commitment to this project and performed contractual obligation in a very professional way. Commitment of the contractor in the project played a vital role in the construction of this project. According to the project manager, commitment of the company to the project termed to be among the Critical Success Factors of the project delivery. Effective planning and scheduling of construction activities, modernized equipment, plants and tools for the works, efficiency and effective use of labor force resulted into quality of work and success project completion. The combination of construction methods and involvement of Project Manager and designer enable contractor to overcome their challenges. Data from survey showed that capability of local contractor as a vital important factor with (RII=0.743) in the success of these project. Likewise experience of the experts interviewed agrees with this fact. In addition to this, some contractors on other irrigation schemes fail this aspect of commitment to the contract or project and cause unnecessary delays which turn into conflict and disputes with client.

4.3.3.4 Communication among Project Stakeholders

Communication is so important on project success that is an integral part of a successful completion. Communication among project stakeholders in the project

agreed to be among the success factors. In order for the project to run smoothly effective communication link was created among stakeholders. Among the communication link was between designers and project manager, project manager and contractor and client and project manager. Project Manager and all stakeholders have the spirit that communication creates strong force that holds a project team together. Without clear and timely communication Itete project would not be a success as it is seen today. Itete project status was tracked and monitored effectively through different tracking tools like daily report, monthly site meetings, technical meetings and progress reports on agreed formats capturing key information provided to the stakeholder as per agreed schedule. Project manager managed and ensured timely and effective and appropriate and collect information was shared among the project stakeholders.

Communication process is a set of steps that needs to be adopted for every project in an organization and helps to ensure that the project stakeholders are regularly informed. If this habit will be adopted in other irrigation schemes it will help right people be informed with the right information at the right time. Definitely, success of these projects will originate from effective link of communication among project stakeholders. Data collected from survey did not spot this as critical factor but through experience, researchers and other experts in the field of construction agree this is an important factor in success of any project as described above. Failure to disseminate information will cause failure or delay in any project

4.3.3.5 Experience, Financial and Technical Competence of Contractor

Being class I registered company, RAVJI construction limited managed to prove the capability of class I contractor. RAVJI managed to control costs, workforce skills and capabilities. To ensure work of good quality, the company deploys quality machine, equipment, plants and tool for the construction works. Also, the company employs technical staffs to supervise their work and ensure quality works and mismanagement of the resource of their company. RAVJI construction has a good experience in this type of work as appeared in the list of executed projects for more than 20 years. From the Project Manager's perspective, experience, financial capability and technical competence of contractor help much this project to be successful in safely and within estimated budget. Apart from experience of the expert interviewed, data collected also showed the importance of capability and experience of contractors in the project success.

4.3.3.6 Awareness and Involvement of Local People (Beneficiaries)

Awareness of beneficiaries, their need of the project and their involvement in the project development from inception to construction phase made this project succeed. Beneficiaries from both villages forming KIUMAN were involved and participated well in the development of the scheme. IO recognized the value and importance of the project and creates awareness to stakeholders (beneficiaries). Awareness and involvement of beneficiaries was not spotted in during survey as the important factor in irrigation projects. But through experience achieved in Itete it was agreed that creating awareness and involvement of beneficiaries will assist these irrigation project in to be completed in successful manner.

4.3.3.7 Availability of Construction Materials

Irrigation canals of this scheme were designed with stone masonry wall while remaining structures were reinforced concrete. Availability of these construction materials and other like sand and aggregates are readily available nearby site played important role in the success of the project. Location of construction site was favored by the availability of these materials; which influenced the project to complete timely. As the key factor in the success of the project, the availability of construction material had the effect on the construction schedule. In this project, timely availability of material and savings in transportation time influenced successful completion of the project. Availability of construction materials was not spotted also in survey during data collection as the key factor of the irrigation projects in the study area. Geographical features of the construction sites of irrigation scheme apart from Ulanga and Kilombero are situated in low land area, whereby construction materials were taken far away from site and availability of those materials was very difficult. Therefore, it was agreed and accepted this was success factors of Itete Irrigation Scheme and other schemes in Ulanga and Kilombero Districts.

4.3.3.8 Availability of Labor Force

The community around the construction area was eager to participate to the daily activity in the construction site. Labor force was enough to accelerate the pace of the scheduled activities. Economic factors could be the reason to motivate these labors to engage in construction activity.

4.4. Success Criteria of the Project

As described in chapter two, success can be measured in different ways. Success can be measured through technical performance specification. If the project meets standard specifications or mission to be performed then that project can be termed to be successful. Also level of satisfaction of the project stakeholder can be used to measured success of the project. Therefore, in this project the success criteria were described as; project met the beneficiaries or end users' expectations, project met employers' expectations, budget performance and project manager's satisfaction.

4.5 Summary

The chapter has established the opinion of respondents with relation to identification and determination of the Critical Success Factors that influence construction of irrigation projects implemented in Tanzania between July 2012 and June 2017. The chapter has also discussed the case study of Itete Irrigation schemes able to identify specific Critical Success Factors of this project. The following chapter presents conclusions and recommendations of the study.

CHAPTER FIVE

CONCLUSION AND RECCOMENDATIONS

5.1 Introduction

This chapter is dedicated to presenting major conclusions of the study and giving recommendations on what should be done so as to in improve management of irrigation projects in Tanzania. Finally recommendations for further study are spotted.

5.2 Conclusion

5.2.1 Factors Influencing Success of Irrigation Projects

The irrigation industry in Tanzania should start to assess success factors in managing irrigation projects in view of success of these projects. In this research, assessment was done of nineteen (19) factors having influence in success of irrigation project in the study area based on respondents' perception and literature. According to this research project manager's goal commitment, well defined scope and work, project manager capability and experience , construction and design planning effort, construction activities programming, capability of local contractors, secure access to land and water, project team motivation goal orientation , effective institutions, effective technologies, external technical support, operation and maintenance costs effectiveness, reliable farmer, support environment, effective control systems, effective farmers organization, stable input/out market, safety precautions and applied procedures, favorable policies and reliable access to credit were identified and assessed as factors having influence in success of the irrigation project in Tanzania.

5.2.2 Critical Success Factors of Irrigation Projects

A review of literature identified 19 success factors of irrigation projects. Nine(9) of the factors were identified as Critical Success Factors including:- project manager's goal commitment, well defined scope and work, project manager capability and experience, construction and design planning effort, construction activities programming, capability of local contractors, secure access to land and water, project team motivation goal orientation and effective institutions.

5.2.3 Improvement Strategies for Management of Irrigation Projects in Tanzania

The research found out that the proposed improvement strategies are interrelated and cut across several factors and they are as follows:-project managers/consultants and contractor to be capable to prepare good and workable work plans, capable to use and apply various planning and designing tools, properly plan project costs and time, experienced project managers/ consultant staffs should be involved in managing construction of irrigation projects in zone offices and council offices, on job training and more field works for upcoming consultant and project managers to create positive capabilities in project management skills, project designer be able to set clear and well defined scope and work before project execution. Irrigation projects be undertaken by experienced and capable contractors in every aspects financially and technically. Government has to establish policies that ensure secure land and water for farmers and their organizations. Government has to ensure effective institution to all stakeholders involved in irrigation projects.

5.3 Recommendations

The major concern of this study has been to determine the Critical Success Factors that influence improvement in management of irrigation projects in the study area and establishing improvement strategies of the existing situation.

Based on the conclusion drawn in the analysis and discussion section, several recommendations have been proposed in this study.

5.3.1 Recommendations to Contractors

Firms/Contractors must employ competent and qualified experts to manage these irrigation projects. These experts must be engaged in starting planning, during tendering and costing and also in supervising construction works during implementation phase. Definitely, competent staffs will make sure that projects are completed in successful way and safely within estimated budget and time. To ensure availability of required skills to their technical personnel, contractor and their associations or Contractors Registration Board may collaborate with Vocational Education Training Authority and other training institutions to organize training of the required or missing skills to their technical staffs and artisan skills in demand driven irrigation projects related fields. Consultants and contractors should work hand in hand until projects are completed. This will provide good opportunity for capacity building of contractors.

5.3.2 Recommendations to Consultants

Zonal Irrigation Offices under National Irrigation Commission (NIRC) must employ competent staff to deal with their designs and supervision of the irrigation projects because that is where success of these projects originates. Since these zonal offices

are consultants and engaged in procurement process, they must ensure that procurement best practices are utilized from preparation of tendering document to awarding stage.

As consultants of the project Zonal irrigation offices must ensure that their staffs have good quality in contract, construction and supervision of the works, project management capability and skills. Well define scope and work together with construction activities programmes. Zones office should ensure that suitability of design planning effort and choice of technology to the local situation; scale of project to local capacities and conditions; strategy for capacity building, awareness and widening the knowledge base including public education; professional services and construction; research and technology adaptation.

5.3.3 Recommendations to Clients

Clients should ensure that selected consultant who can deliver solution to their problems which can be successful in project implementation.

5.3.4 Recommendations to the Government

The government should create an independent agent or convert zonal irrigation offices to independent agencies especially dealing with construction of irrigation projects and development of irrigation industry in Tanzania. By doing so delay issues and bureaucracy, political and client interference will be diminished. The government should ensure there is existence of fair conditions to access land and water to farmers' organization. Also, the government should enhance those institutions dealing with capacity building of farmers engaged in irrigation projects and local contractors during construction. Lastly, the government should ensure

conducive environment to the institution supporting farmers and irrigation projects in Tanzania. Existence of strong and effective institutions dealing with construction or support irrigation will facilitate the success of the irrigation projects across the country.

REFERENCES

Adekeye, W. B 1997, 'The Importance of Management Information Systems' *Library Review*, Vol.46, pp. 318-327.

Adnan, E., Sharif M. & Saleh A. 2009, 'Factors Affecting the Performance of Construction Projects in the Gaza Strip', *Journal of Civil Engineering and Management*, vol. 15, no.3, pp. 269-280.

Ahmed, S. M., Azhar, S., Kappagntula, P. & Gollapudil, D. 2003, 'Delays in Construction: A Brief Study of Florida Construction Industry', *Proceedings of the 39th Annual ASCE Conference*, Clemson University, Clemson, SC, pp. 257-66.

Alakoc, Z. 2014, 'Human Resource Management and Its Importance for Today's Organization', *International Journal of Education and Science*, Vol.1, No.2+

Analoui, F. 1993, *Skills of Management in Managing Projects in Developing Countries*, Longman Scientific and Technical, UK.

Ashley, D.B., Lurie, C.S. & Jaselskis, E.J. 1987, 'Determinants of Construction Project Success*', Project Management Journal,* vol. 18, no.2, pp. 69-70.

Association for Project Management, 2006, *APM Body of Knowledge, 5th ed.,* APM Publishing. High Wycombe, England

American Society of Civil Engineers, 1988, *'Quality in the Constructed Projects: A Guideline for Owners, Designers and Constructors'* ASCE Publishing

Baccarini, D. 1999. 'The Logical Framework Method for Defining Project success', *Project Management Journal*, vol.30, no.4, pp. 25-32.

Baker, B. N., Murphy, C.D. & Fisher, D. 1988, *Factors Affecting Project Success*, McGraw Hill, New York

Blaney, J. 1989, 'Managing Software Development Projects', *PMI Seminar I*, October 7-11, p. 410-417.

Booz, A., Chivée, L., & Cowan, E. 2008, *'Networking the Way to Success Online Social Networks for Workplace and Competitive Advantage'* People and Strategy; New York, vol. 31, no.4, pp. 40-46.

Boynton, A.C. & Zmund, R.W. 1984, 'An Assessment of Critical Success Factors', *Sloan Management Review*, vol.25, no.4, pp. 17-2.

Chiza C.K, 2005, 'The Role of Irrigation In Agriculture, Food Security And Poverty Reduction', *Proceedings of the 3rd Annual Engineers' Day*, Karimjee Hall, Dar es Salaam:

Cleland, D.I. 1986, 'Measuring Success: The Owner's Viewpoint', *Proceedings of the 18th Annual Symposium*, Montreal, pp. 6-12.

Cleland, D. I. & King, W. R 1983, *Systems Analysis and Project Management*, McGraw Hill, New York, USA.

Crawford, L. 2002, 'Project Performance Assessment', *Masters in Project Management Course*, 10th-15th June, Paris, France.

De Wit, A. 1986, 'Measuring Project Success: An Illusion*', Proceedings of the 18th Annual Symposium*, Montreal, Upper Darby, PA, pp. 13-21.

Djagba J.F, Rodenburg J, Zwart J. S, Houndagba J.C. & Kiepe P. 2014, 'Failure And Success Factors Of Irrigation System Developments: A Case Study From the Oueme and Zou Valleys in Benin', *Irrigation and Drainage*, vol.63, pp. 328-339.

Duncan, 2004, 'Defining and Measuring Project Success', *Project Management Partners*, [Online], Available at: http://www.pmpartners.com/resources/defmeas_success.html

FAO, 1997, 'Modernization of Irrigation Schemes, Past Experiences and Future Options', *Proceedings of the Expert Consultation*, Bangkok, November 1996.

FAO, 1998, 'SEAGA Sector Guide Irrigation', *Socioeconomic and Gender Analysis Programme*, Rome, Italy

FAO, 2002, 'How Design, Management and Policy Affect the Performance of Irrigation Projects Emerging Modernization Procedures and Design Standards', *Proceedings of the Expert Consultation*, Bangkok, Thailand.

Ferguson, C. R. & Dickinson, R. 1982, 'Critical Success Factors for Directors in the Eighties', *Business* Horizons, (May-June), pp. 66.

Flanagan, R. & Norman, G. 1993, *Risk Management and Construction*, Wiley

Freeman, M. & Beale, P. 1992, 'Measuring Project Success', *Project Management Journal*, vol. 23, no.1, pp. 8-17. :

Globerson, S. & Zwikael, O. 2002, 'The Impact of the Project Manager on Project Management Planning Processes', *Project Management Journal*, vol. 33, no. 3, pp. 58-64.

Gray, C. F. & Larson, E. W. 2006, *Project Management: The Managerial Process*, McGraw-Hill, Irwin.

Gray, C. F. & Larson, E. W. 2008, *Project Management Techniques and Innovations in Information Technology*, McGraw-Hill, Irwin.

Hamdy, A. 2007, 'Water Use Efficiency in Irrigated Agriculture: *An Analytical Review*, CIHEM, 2007, pp. 9-19

Harwood, I.A. (2004). 'When Computer-Aided Assessments Go Wrong: Disaster Recovery After a Major Failure', British Journal of Educational Technology, vol. 36, no.4, pp. 587-597.

Jugdev, K. & Muller, R. 2005, 'A Retrospective Look At Our Evolving Understanding of Project Success', *Project Management Journal*, Vol.36, no.4, pp. 19–31.

Kalinga, G. M., Simba, A. H. & Temu, R. J. M. 2001, 'Irrigation Development Plan: Update*', The National Irrigation Conference on Irrigated Agriculture for Food Security and Poverty Eradication*. Morogoro, Tanzania

Kanber, R., Ünlü, M., Cakmak, E.H. & Tüzün M. 2005, 'Irrigation Systems Performance, *Turkey Country Report. In: Lamaddalena':* CIHEAM, pp. 205-226

Kasuwi, A. O. & Mamiro, J. G. 2005, 'Management of Public Funded Construction Projects', *Proceedings of Construction Industry (CI) Forum on Pre-requisites for Competitiveness of the Tanzania Construction Industry: Lessons from the South*, 25-27 August 2005, Dar es Salaam.

Kerzner, H. 2009, *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, John Wiley & Sons, Inc

Khan, A.M. 2000, 'Planning for Monitoring of Project Sustainability': *A Guideline on Concepts, Issues and Tools*

Kothari, C. R. 2004, *Research Methodology: Methods and Techniques,* New Age International (P) Ltd.

Lang, M. 1990, 'Project Management in the Oil Industry', *Journal of Project Management,* Vol.8, pp. 159-162.

Lema, N. M. 2009, 'Project Management', *Established lecture notes, Department of Construction Management and Technology, Collage of Engineering and Technology*: UDSM, Dar es Salaam, Tanzania.

Lewis, R. R. 2005, 'Ecological engineering for successful management and restoration of mangrove forests', *Ecological Engineering,* vol.24, no.4, pp. 403–418.

Lim, C. S. & Mohamed, Z. M. 1999, 'Criteria of project success: an exploratory re-examination', *International Journal of Project Management,* vol.17, no. 4, pp. 243–248.

Maeda, S. (2012). 'Analysis of Local Contractors' Performance in Irrigation Infrastructure Construction Analysis of Local Contractors in Tanzania', *Dissertation,* University of Dar es salaam

Matekere, C. E. & Lema N. M. 2012, 'Performance Analysis of Public Funded Irrigation Projects in Tanzania', Irrigation and drainage systems, vol.25, no.4, pp. 237-253.

Ministry of Agriculture and Food Security (2002). *'National Irrigation Master Plan',* Dar es Salaam, Tanzania

Muller, R. & Turner, R. 2007, *'The* Influence of Project Managers on Project Success Criteria and Project Success by Type of Project', *European Management Journal,* vol. 25, no. 4, pp. 298–309.

Munns, A. K. & Bjeirmi B. F. 1996, 'The Role Of Project Management In Achieving Project Success', *International Journal of Project Management,* vol. 14, no. 2, pp. 81-87.

Moran, J. W & Grace, L. D 1995, 'The Public Health Quality Improvement Handbook', ASQ Quality Press, pp.199-201

Morris, P. W. G. 1983, 'Managing Project Interfaces: Key Points for Project Success', *Project Management Handbook*: vol.3, pp. 36.

National Construction Council, 2006, 'Construction Contract Administration: Lessons from Experience". *A Paper Presented to the 3rd Annual Meeting Between PORALG and RS and Council Engineers,* Mkonge Hotel, Tanga, 16th – 20th October 2006.

Nijman, D. J. J. M., Nijhof, W. J., Wognum, A. A. M. & Veldkamp, B. P 1993, 'Exploring Differential Effects of Supervisor Support on Transfer of Training', *Journal of European Industrial Training*, vol.30, pp. 529–549.

Ofosu, E. A., Van der Zaag, P., Van de Giesen , N. & Odai, N. 2014, 'Success Factors For Sustainable Irrigation Development In Sub-Sahara African', *African Journal of Agricultural Research,* vol.9, no.51, pp.3720-3728.

Orodho, A. J. & Kombo, D. K. 2002, *Research Methods,* Institute of Open Learning Kenyatta University, Nairobi, Kenya.

Pakseresht, A. & Dr. Asgari, G. 2012, 'Determining the Critical Success Factors in Construction Projects: AHP Approach', *Interdisciplinary Journal of Contemporary Research in Business*, vol. 4, no 8, pp.383-393.

Perrett, D. I., Edmund, T. R. & Caan, W. 1982, 'Visual Neurones Responsive to Faces in the Monkey Temporal Cortex', *Experimental Brain Research*, vol.47, no.3, pp. 329-342.

Pinto, J. K. & Slevin, D. P. 1988, 'Critical Success Factors in Effective Project Implementation', *IEEE Transactions on Engineering Management*, vol. 1, pp. 22-27.

Plusquellec, H. 2002, 'How Design, Management and Policy Affect the Performance Of Irrigation Projects', *FAO Regional Office for Asia and the Pacific*, Bangkok, Thailand

Plusquellec, H., McPhail. K. and Polti, C. 1990, 'Review of Irrigation System Performance With Respect to Initial Objectives', *Irrigation and Drainage Systems, vol.4, no.4, pp.313-327.*

PMBOK 2004, *A Guide to the Project Management Body of Knowledge*, Project Management Institute, Four Campus Boulevard, USA

PMBOK 2002, *A Guide to the Project Management Body of Knowledge.'* Project Management Institute, Four Campus Boulevard, USA

PMI, 2004, *A guide to Project Management Body Of knowledge*, Project Management Institute, NEWTON SQUARE, USA

Price, W., Field, W. & Goussard , J. 1999, 'Guidelines for Rehabilitation and Modernization of Irrigation Projects', *International Commission on Irrigation and Drainage (ICID)*, No 2.

Redmill, F. 1997, *Software Projects: Evolutionary Vs. Big-Bang Delivery*, Wiley, Chichester.

Rockart, J. F. 1982, 'The Changing Role of the Information Systems Executive: A Critical Success Factors Perspective', *Sloan Management Review*, vol. 24, no.1, pp.3

Salleh, R. (2009). 'Critical Success Factors of Project Management for Brunei Construction Projects: Improving Project Performance', *dissertation* Queensland University of Technology

Sanvido, V. & Kevin, F. G. 1992, 'Critical Success Factors for Construction Projects', *Journal of Construction Engineering Management, vol.118, no.1, pp. 94-111.*

Schwalbe, C.S. 2007, 'Risk Assessment for Juvenile Offenders: A Meta-Analysis', Law *and Human Behavior*, vol.31, no.5, pp. 449-462.

Schwalbe, C.S. 2006, *Introduction to Project Management,* Boston, Thomson Course Technology.

Schwalbe, K. 2004, *Information Technology Project Management, Course* Technology, *Boston.*

Shenhar, A., Dvir, D., Levy, O. & Maltz, A 2001, 'Project Success: A Multidimensional Strategic Concept', *Long Range Planning*, vol. 34, no.6, pp. 699–725.

Shrnhur, A., Dvir, D. & Levy, O (1997). *'Mapping The Dimensions Of Project Successes, Project Management Journal*, vol.28, no.2, and pp.5-13.

The Cambridge Advanced Learner's Dictionary. 2013, *Cambridge* University Press, UK

Thiry, M. 2006, *'Managing Portfolios of Projects: Gower Handbook of Project Management',* Gower Publishing, Aldershot, UK.

Thomsett, R. 2003, *'Project Pathology. Causes, Patterns and Symptoms of Project Failure',* The Thomsett Company

Tuman, J. 1986, 'Success Modeling: A Technique For Building A Winning Project Team', *Proceedings of Project Management Institute*, pp. 29-34.

URT, Agricultural Sector Development Strategy (ASDS), (2006). *'National Strategy for Growth and Reduction of Poverty (NSGRP)'*, Government of Tanzania.

URT, National Irrigation Commission (NIRC), (2016). *'National Irrigation Master Plan (NIMP)'*, Government of Tanzania.

URT, The Public Procurement Regulatory Authority (PPRA), 2012, *'Executive Summary on Value for Money Audits of 137 Construction Contracts.'* Government of Tanzania.

URT, The Public Procurement Regulatory Authority (PPRA), 2008, *'2007/08 Annual Report'; Government* of Tanzania.

Verma, V. K. 1996, *Human Resource Skills for The Project Manager*, Project Management Institute. Newtown Square, PA.

Wysocki R. K. & McGary R. 2003, *'Effective Project Management: Traditional',* Adaptive, Extrem (in Polish),' Wiley Publishing Inc. Helion, Gliwice

APPENDICES

Appendix 1: Survey of Respondents

Sample Project	**Clients**	**Consultants**	**Contractors**	**Total**
1.Lumuma	1	1	1	3
2.Mwega	1	1	1	3
3.Mvumi	1	1	-	2
4.Rudewa	1	1	1	3
5.Ulaya	1	1	1	3
6.Madinizini	-	1	1	2
7.Kilangali seed farm	1	2	1	4
8.Dakawa rice farm	1	1	1	3
9.Wami Luhindo	1	1	1	3
10.Mkindo	1	1	1	3
11.Msufini	1	1	1	3
12.Mkula	1	1	1	3
13.Msolwa	1	1	1	3
14.Njage	1	1	1	3
15.Kiroka	1	1	1	3
16.Tulokongwa	-	1	1	2
17Kisaki	1	1	1	3
18.Minepa	1	1	1	3
19.Euga	1	1	-	2
20.Itete	1	1	1	3
Total	**18**	**21**	**17**	**56**

Appendix 2: List of Irrigation Projects in Kilosa District (NIRC, 2016)

Scheme	**Potential**	**Scheme**	**Potential**
1.Ilonga	640	32.Rudewa	3000
2.Lengewaha	58	33.Chogwe	35
3.Chanjale	250	34.Mlunga	80
4.Lumuma	988	35.Ulaya	450
5.Kilangali smallholder	1580	36.Madizini	245
6.Mwega	1700	37.Kiberenge	3000
7.Mvumi	1350	38.Nguzo mbili	200
8.Mwasa	800	39.Makwambe	200
9.Chanzuru	680	40.Ihombwe	120
10.Alqadiriya salama	2400	41.Manyenyere	1800
11.Kisanga	80	42.Iyogwe	120
12.Msagani	1200	43.Magunguli	150
13.Msolwa	130	44.Madamu	850
14.Mati Ilonga	25.2	45.Kikalo	230
15.Kilangali seed farm	1216	46.Chabi - Itipi	1605
16.Msimba seed farm	600	47.Vikweme	20
17.Kitete msindazi	380	48.Mamboya	10
18.Zombo	400	49.Makabaga	20
19.Mzaganza	1550	50.Ibingu	110
20.Msowero A&B	460	51.Kidogobasi/Kimamba	1400
21.Kivungu	1200	52.Kihondo	500
22.Masenge	50	53.Kisitwi	100
23.Vidunda	120	54.Kitange	70
24.Mfilisi sugar farm	160	55.Kitete Msindazi	500
25.Ihombwe	120	56.Lukondo-Bogomo	40000
26.Madiani	40	57.Masenge	51
27.Malolo	300	58.Mgogozi - Kikalo	20
28.Mangomboli	200	59.Ruhembe	200
29.Manyenyere	200	60.Sonjo	200
30.Wami (Mkata Plains)	200	61.Ukwamani	300
31.Yovi	250		

Appendix 3: List of Irrigation Projects in Mvomero District (NIRC, 2016)

Scheme	**Potential Area**	**Scheme**	**Potential Area**
1.Dakawa rice farm	3000	16.Vikenge	250
2.Wami Luhindo	710	17.Mtibwa Dakawa	10,000
3.Mkindo	2720	18.Msufini	1459
4.Mlali	400	19.Mgongola	620
5.Ndole	240	20.Bunduki	560
6.Kigugu	1000	21.Ichezema	350
7.Dihombo	640	22.Langali	300
8.Mbogo	1800	23.Luale	128
9.Komtonga	400	24.Masalawe	40
10.Hembeti	3600	25.Lukenge	1292
11.Digoma	100	26.Difinga	400
12.Bwage	120	27.Kanga	228
13.Tangeni	200	28.Doma	200
14.Kwadoli	100	29.Mgeta	110
15.Wami Coastal	140		

Appendix 4: List of Irrigation Projects in Kilombero District (NIRC, 2016)

Scheme	**Potential Area**	**Scheme**	**Potential Area**
1.Mkula	254	13.Sonjo	1727
2.Msolwa	670	14.Mang'ula Youth	260
3.Njage	371	15.Mgungwe	2270
4.Kisawasawa	500	16.Udagaji	1950
5.Maki	294	17.Kisegese	7200
6.Zignali	200	18.Mpanga Ngalamila	31500
7.Kilama	200	19.Mkangawalo	200
8.Ikule	700	20.Sanje	200
9.Chita JKT	12000	21.Idete prison	1000
10.Kiberege	500	22.Kihansi	10
11.Kilombero Valley	230	23.Machipi	120
12.Lumemo	80	24.Matete	150

Appendix 5: List of Irrigation Projects in Morogoro District (NIRC, 2016)

Scheme	**Potential Area**	**Scheme**	**Potential Area**
1.Kiroka	147	17.Rice Basin-	200
2.Mbalangwe	230	18.Rice Basin-	30
3.Bonye - Labwa five	120	19.Bunduki	10
4.Tulo/Kongwa	5000	20.Bwage	15
5.Lubasazi	200	21.Dihinda	55
6.Kisaki	7000	22.Duthumi	10
7.Magogoni	1000	23.Lubwa - Five	10
8.Bonye	5000	24.Luhokole	10
9.Mbwade	1000	25.Magogoni	75
10.Matuli	800	26.Manza	500
11.Mlilingwa(stake	200	27.Mkulazi	1000
12.Mkuyuni	150	28.Mzinga Rice	2000
13.Mngazi	30	29.Pinde	1200
14.Msonge	150	30.Tangeni	50
15.Mvuha	1200	31.Usungura	500
16.Vikenge	30		

Appendix 6: List of Irrigation Projects in Ulanga District and Morogoro Municipal (NIRC, 2016)

Scheme	**Potential**	**Scheme**	**Potential Area**
1.Minepa	1800	12.Ihowanja	120
2.Lupiro	7000	13.Ilonga-Ulanga	120
3.Euga	400	14.Iputi	66
4.Itete	1000	15.Kichangani A –	160
5.Ruaha	100	16.Kichangani B -	20
6.Likeya	200	17.Malinyi	48
7.Sofi mission	45	18.Mavimba	28
8.Sofi majiji	102	19.Minazini	200
9.Misegese	1500	20.Nakafulu	200
10.Tanga-Vegetable	12	21.RUBADA Farm	16
11. Usangule	600	22.Mzinga rice farm	12
		23.Lukurunge farm	0.3

Appendix 7: Questionnaire

PART A: IDENTIFICATION (General Information about Correspondent)						
A1. Type of Stakeholder:			Client ☐	Contractor* ☐	Consultant ☐	
**If contractor, please go to A2, others skip A2*						
A2. Class of Registration: (*Contractors only*)						
Contract Number/Project Name: _____. Location of the Project District: ……						
A3: What is your position in the Organisation:			Junior staff ☐	Senior staff ☐	Director ☐	
A4: Year of experience in Construction field (*Contractors and Consultants*)		0-2 ☐	2-5 ☐	5-10 ☐	>10 ☐	
A5:Years of Experience in Construction of Irrigation projects (*Contractors and Consultants*)		0-2 ☐	2-5 ☐	5-10 ☐	>10 ☐	
A6:Qualifications	PhD	MSc	PGD	BSc	Diploma	Others*
Check ☒	☐	☐	☐	☐	☐	☐
** If others, please specify:*						
PART B: Based on Experience on Construction of Irrigation Projects in Tanzania (*This part should be responded by clients only*)						
B1: What is the mode of execution of the projects in Consideration: Check ☒		Registered contractors ☐		Force Account ☐		
B2: What is the main source of Funds irrigation projects implemented? :Check ☒		Central Government ☐	Development partners ☐	District ☐	Other* ☐	
** If others, please specify:*						
B3: Who is the Consultant of the Project?			ZIO ☐	Private ☐	Other* ☐	

PART C: Based on your general experience in construction of irrigation project in Tanzania, please Evaluate the quality of the following project success factors. Please you may add and evaluate any addition factors that you have experienced in your work in the space provided. Rank the Factor on a 5 point scale by Ticking (Rank 5= Excellent , 4= Good, 3= Fair, 2= Poor and 1= Very poor) **Check ☒**

Success Factors	**RANK**					**Remarks**
	5	**4**	**3**	**2**	**1**	
1.Secure Access to Land and Water	☐	☐	☐	☐	☐	
2.Effective Technologies	☐	☐	☐	☐	☐	
3.Stable Input/Out Market	☐	☐	☐	☐	☐	
4.Favourable Policies	☐	☐	☐	☐	☐	
5.Effective Institutions	☐	☐	☐	☐	☐	
6.Reliable Farmer Support Environment	☐	☐	☐	☐	☐	
7.Construction and Design Planning Effort	☐	☐	☐	☐	☐	
8.Well Defined Scope and Work	☐	☐	☐	☐	☐	
9.Project Manager Goal Commitment	☐	☐	☐	☐	☐	
10.Project Team Motivation Goal	☐	☐	☐	☐	☐	
11.Project Manager Capabilities and	☐	☐	☐	☐	☐	
12.Safety Precautions and Applied	☐	☐	☐	☐	☐	
13.Effective Control Systems	☐	☐	☐	☐	☐	
14.Operation and Maintenance Costs	☐	☐	☐	☐	☐	
15.External Technical Support	☐	☐	☐	☐	☐	
16.Effective Farmers Organisation	☐	☐	☐	☐	☐	
17.Reliable Access to Credit	☐	☐	☐	☐	☐	
18.Construction Activities Programming	☐	☐	☐	☐	☐	
19.Capability of Local Contractors	☐	☐	☐	☐	☐	
20.:_____.						
21.						
22.						
23.						
24.						

Thanks for your time and contributions

For the purpose of enhancement and clarification of the information provided. These details will be treated as highly confidential and will NOT be part of the research.

S/N	Detail Information	
1.	Your Name:	
2.	Your Position:	
3.	Your years of Experience:	
4.	Your Contact Address:	
5.	Your Email:	

Appendix 8: Clients' Perception

Success Factors	Rank					ΣW	RII	Rank
	5	4	3	2	1			
1.Secure Access to Land and Water	5	4	7	2	0	66	0.733	5
2.Effective Technologies	1	7	6	4	0	59	0.656	13
3.Stable Input/Out Market	0	4	6	7	1	49	0.544	18
4.Favourable Policies	3	4	3	6	2	54	0.600	15
5.Effective Institutions	3	9	3	3	0	66	0.733	6
6.Reliable Farmer Support Environment	1	7	7	3	0	60	0.667	10
7.Construction and Design Planning Effort	2	10	6	0	0	68	0.756	4
8.Well Defined Scope and Work	7	10	1	0	0	78	0.867	1
9.Project Manager Goal Commitment	7	8	3	0	0	76	0.844	2
10.Project Team Motivation Goal Orientation	2	6	9	1	0	63	0.700	8
11.Project Manager Capabilities and Experience	4	10	4	0	0	72	0.800	3
12.Safety Precautions and Applied Procedures	2	3	8	4	1	55	0.611	14
13.Effective Control Systems	1	3	9	2	3	51	0.567	17
14.Operation and Maintenance Costs Effectiveness	2	7	7	2	0	63	0.700	9
15.External Technical Support	2	6	6	4	0	60	0.667	11
16.Effective Farmers Organisation	1	2	10	5	0	53	0.589	16
17.Reliable Access to Credit	0	2	7	4	5	42	0.467	19
18.Construction Activities Programming	0	10	4	4	0	60	0.667	12
19.Capability of Local Contractors	6	2	8	2	0	66	0.733	7

Appendix 9: Contractors' Perception

Success Factors	Rank					ΣW	RII	Rank
	5	4	3	2	1			
1.Secure Access to Land and Water	4	5	7	1	0	63	0.741	7
2.Effective Technologies	1	7	7	2	0	58	0.682	12
3.Stable Input/Out Market	1	3	8	5	0	51	0.600	16
4.Favourable Policies	2	7	6	2	0	60	0.706	11
5.Effective Institutions	1	9	7	0	0	62	0.729	8
6.Reliable Farmer Support Environment	0	10	3	3	1	56	0.659	13
7.Construction and Design Planning Effort	5	9	3	0	0	70	0.824	4
8.Well Defined Scope and Work	6	9	2	0	0	72	0.847	3
9.Project Manager Goal Commitment	8	6	3	0	0	73	0.859	2
10.Project Team Motivation Goal Orientation	2	7	8	0	0	62	0.729	9
11.Project Manager Capabilities and Experience	6	11	0	0	0	74	0.871	1
12.Safety Precautions and Applied Procedures	0	3	7	5	2	45	0.529	18
13.Effective Control Systems	0	3	8	6	0	48	0.565	17
14.Operation and Maintenance Costs Effectiveness	0	6	9	2	0	55	0.647	15
15.External Technical Support	1	4	11	1	0	56	0.659	14
16.Effective Farmers Organisation	0	7	6	7	1	61	0.718	10
17.Reliable Access to Credit	0	1	9	4	3	42	0.494	19
18.Construction Activities Programming	1	15	1	0	0	68	0.800	5
19.Capability of Local Contractors	2	10	5	0	0	65	0.765	6

Appendix 10: Consultants' Perception

Success Factors	Rank					Σ W	RII	Rank
	5	4	3	2	1			
1.Secure Access to Land and Water	2	9	6	4	0	72	0.686	8
2.Effective Technologies	0	9	11	1	0	71	0.676	10
3.Stable Input/Out Market	0	3	14	4	0	62	0.590	15
4.Favourable Policies	0	9	9	3	0	69	0.657	12
5.Effective Institutions	0	9	8	4	0	68	0.648	13
6.Reliable Farmer Support Environment	0	5	10	5	1	61	0.581	17
7.Construction and Design Planning Effort	1	17	3	0	0	82	0.781	2
8.Well Defined Scope and Work	0	16	5	0	0	79	0.752	5
9.Project Manager Goal Commitment	6	10	4	0	1	83	0.790	1
10.Project Team Motivation Goal Orientation	0	11	10	0	0	74	0.705	7
11.Project Manager Capabilities and Experience	4	11	5	0	1	80	0.762	3
12.Safety Precautions and Applied Procedures	2	4	9	3	3	62	0.590	16
13.Effective Control Systems	1	8	11	1	0	72	0.686	9
14.Operation and Maintenance Costs Effectiveness	2	7	7	4	1	68	0.648	14
15.External Technical Support	2	6	11	2	0	71	0.676	11
16.Effective Farmers Organisation	3	3	8	3	0	57	0.543	18
17.Reliable Access to Credit	1	3	7	8	2	56	0.533	19
18.Construction Activities Programming	5	8	7	1	0	80	0.762	4
19.Capability of Local Contractors	5	6	8	2	0	77	0.733	6

Appendix 11: Summary of the Perceptions

Success Factors	Client			Contractor			Consultant		
	Σw	RII	Rank	Σw	RII	Rank	Σw	RII	Rank
1.Secure Access to Land and Water	66	0.733	5	63	0.741	7	72	0.686	8
2.Effective Technologies	59	0.656	13	58	0.682	12	71	0.676	10
3.Stable Input/Out Market	49	0.544	18	51	0.600	16	62	0.590	15
4.Favourable Policies	54	0.600	15	60	0.706	11	69	0.657	12
5.Effective Institutions	66	0.733	6	62	0.729	8	68	0.648	13
6.Reliable Farmer Support Environment	60	0.667	10	56	0.659	13	61	0.581	17
7.Construction and Design Planning Effort	68	0.756	4	70	0.824	4	82	0.781	2
8.Well Defined Scope and Work	78	0.867	1	72	0.847	3	79	0.752	5
9.Project Manager Goal Commitment	76	0.844	2	73	0.859	2	83	0.790	1
10.Project Team Motivation Goal Orientation	63	0.700	8	62	0.729	9	74	0.705	7
11.Project Manager Capabilities and Experience	72	0.800	3	74	0.871	1	80	0.762	3
12.Safety Precautions and Applied Procedures	55	0.611	14	45	0.529	18	62	0.590	16
13.Effective Control Systems	51	0.567	17	48	0.565	17	72	0.686	9
14.Operation and Maintenance Costs Effectiveness	63	0.700	9	55	0.647	15	68	0.648	14
15.External Technical Support	60	0.667	11	56	0.659	14	71	0.676	11
16.Effective Farmers Organisation	53	0.589	16	61	0.718	10	57	0.543	18
17.Reliable Access to Credit	42	0.467	19	42	0.494	19	56	0.533	19
18.Construction Activities Programming	60	0.667	12	68	0.800	5	80	0.762	4
19.Capability of Local Contractors	66	0.733	7	65	0.765	6	77	0.733	6