THE UNITED REPUBLIC OF TANZANIA





NATIONAL AUDIT OFFICE

PERFORMANCE AUDIT ON MANAGEMENT OF CONSTRUCTION ACTIVITIES ON IRRIGATION PROJECTS



REPORT OF THE CONTROLLER AND AUDITOR GENERAL

MARCH 2019





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LIST OF ABBREVIATIONS

AAG	Assistant Auditor General
BoQ	Bill of Quantities
CAG	Controller and Auditor General
EMA	Environmental Management Act
ISSAIs	International Standards for Supreme Audit Institutions
LGAs	Local Government Authorities
МоА	Ministry of Agriculture
NGOs	Non-Government Organizations
PO-RALG	President's Office Regional Administration and Local
	Government
SAI	Supreme Audit Institution
ZIE	Zonal Irrigation Engineer
ZIO	Zonal Irrigation Office
CV	Curriculum Vitae
ASDP	Agricultural Sector Development Programme
NIRC	National Irrigation Commission
SSIDP	Small Scale Irrigation Development Project (SSIDP)
SAGCOT	Southern Agricultural Growth Corridor in Tanzania
	(SAGCOT)
DADP	District Agricultural Development Program

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PREFACE

The Public Audit Act No. 11 of 2008, Section 28 authorizes the Controller and Auditor General to carry out Performance Audit (Value-for-Money Audit) for the purposes of establishing the economy, efficiency and effectiveness of any expenditure or use of resources in the MDAs, LGAs and Public Authorities and other Bodies which involves enquiring, examining, investigating and reporting, as deemed necessary under the circumstances.

I have the honour to submit to His Excellency the President of the United Republic of Tanzania, Dr. John Pombe Magufuli and through him to the Parliament a Performance Audit Report on the Management of Construction Activities on Irrigation Projects.

The report contains findings, conclusions and recommendations that directly concern the Ministry of Agriculture and the National Irrigation Commission herein referred to as the audited entities. The audited entities have been given the opportunity to scrutinize the factual contents and comment on the draft report. I wish to acknowledge that the discussions with them have been very useful and constructive to our report.

My office intends to carry out a follow-up at an appropriate time regarding actions taken by the audited entities in relation to the recommendations in this report.

In completion of the assignment, the office subjected the report to the critical reviews of the subject matter experts Dr. Ramadhan Mlinga from The University of Dar-Es Salaam, who worked as Director General of Public Procurement Regulatory Authority (PPRA) and Professor Fredrick C. Kahimba who is an associate professor from Sokoine University of Agriculture who came up with useful inputs on improving the output of this report.

This report has been prepared by Mr. Ishengoma C. Rweyongeza (Team leader), and Mr. Staford A. Kazyoba (Team member) under the supervision and guidance of Mr. Michael Malabeja-Audit Supervisor, Mr. James Pilly - Assistant Auditor General and Mr. Benjamin Mashauri - Deputy Auditor General.

I would like to thank my staff for their devotion and commitment in the preparation of this report. My thanks should also be extended to the audited entities for their fruitful interaction with my office.

Prof. Mussa Jumá Assad Controller and Auditor General United Republic of Tanzania March, 2019

EXECUTIVE SUMMARY

Agricultural sector employs about 80% of the nation's work-force and continues to drive economic growth in the country. It contributes 45% of Tanzania's GDP and about 30% of its export earnings. Despite its importance, agriculture is still dominated by rain fed farming which is affected by inadequacy, seasonality and unreliability of rainfall and periodic droughts.

In Tanzania, irrigation development gives unprecedented opportunity to transform agriculture from subsistence to commercial orientation. The irrigated area is far below the potential. The total potential area for irrigation development is 29.4 million hectares. Despite all this potential, only 461,326 hectares (1.6%) of the total area have so far been developed under irrigation¹.

Ministry of Agriculture through National Irrigation Commission (NIRC) is committed to expanding the irrigation systems. However, mobilizing the financial, technical, and managerial resources is a serious challenge.

The objective of the audit was to assess whether the National Irrigation Commission effectively manages the pre-construction and construction works of irrigation projects to ensure sustainable availability of irrigation water.

The audit considered different activities done by the National Irrigation Commission in supervising the construction activities of irrigation projects in the aspect of feasibility study, designing, tender processing and construction. The audit covered five out of eight irrigation zones namely; Morogoro, Mbeya, Mtwara, Kilimanjaro and Mwanza. The Audit encompassed a period of four financial years from 2014/15 to 2017/18. Four-year time frame was selected since it is the duration within which batch one and batch two of SSIDP sub-projects were supposed to be completed.

¹ National Irrigation Master Plan (NIMP) 2002

Findings

Planning for feasibility studies was not sufficiently done. For the financial years of 2014/15, and 2015/16, the irrigation zones of Morogoro, Mwanza, and Mbeya did not plan for conducting feasibility studies. Meanwhile, Mtwara and Kilimanjaro irrigation zones planned to conduct 64 and 8 feasibility studies respectively but all these plans were not implemented.

Eleven (11) out of 360 planned studies which is equivalent to 3percent were conducted by five sampled irrigation zones. It was found that, during financial years of 2014/15, 2015/16 and 2017/18 irrigation zones of Morogoro and Mwanza, did not plan for conducting any feasibility study. Likewise, Kilimanjaro did not do so in 2016/17 and 2017/18. For the financial year 2016/17, Mtwara and Mwanza partially implemented their plans. Mtwara implemented 1 out of 65 studies, and Mwanza implemented 1 out of 13 studies.

Similar, there was inadequate implementation and use of the feasibility study's results in designing of irrigation schemes. This audit found that about 85% (17 out of 20) of reviewed irrigation work was done without or with partial feasibility. For example, at Morogoro zone, the construction team was forced to change the proposed location of the headwork of Minepa irrigation scheme to a new location after finding that the hard stratum was not found as it had been designed.

Further, there was inadequate mechanisms to monitor tender evaluation and awarding processes. This was highly attributed by inadequate coordination mechanisms between NIRC and LGAs when selecting contractors for constructing irrigation projects. This contributed to selection of contractors who could not implement their work accordingly.

Moreover, inadequate time and cost control in the execution of irrigation projects were noted. During the period under review 40 percent of constructed projects experienced cost overruns, while 76 percent experienced delays in completion.

Delayed completion of irrigation Projects varied from one project to another. 76 percent of all the reviewed irrigation projects were completed with delays. Delays noted was much contributed by many factors such as Contractor's problems; Unrealistic designs; improper construction schedule and delayed payments to contractors. For example, Idete Irrigation scheme which was implemented by Idete Prison in Morogoro Irrigation Zone delayed for 4.5 years at the time of this audit. Delay in completion of projects can lead to additional deterioration of infrastructure that could have been avoided by timely completion.

Conclusion

Ministry of Agriculture through National Irrigation Commission has not done much on effectively managing irrigation construction works across the country. This was because for the past four years, donor financing played a bigger role than government when funding irrigation projects as they contributed to 89.6 percent of the total funds disbursed to irrigation projects. This overdependence impaired the execution of irrigation projects as the approved funds to NIRC were not fully released by both government and development partners.

Generally, there were no any harmonized monitoring mechanism between NIRC and Local Government Authorities (LGAs) when procuring contractors for irrigation. The supervision role of NIRC on the construction of irrigation projects was not adequate. Most of the constructed irrigation works were found to deviate from the required specification, cost and completion time. Because of that, constructed irrigation schemes are not performing well. Most of these schemes are not feasible and pose a risk of collapsing because NIRC and other stakeholders conducted partial feasibility studies before designing the projects. Inadequate funding of NIRC to cater for supervision of irrigation activities contributed to inadequate performance of irrigation in the country. As a matter of fact, food security in the country is at risk as the existing irrigation infrastructure will not be able to meet the increasing demand for irrigation water to farmers, thus limiting the potential irrigation to improve food security.

There is also inadequate technical/supervisory capacity in the LGAs. For instances, some districts do not have professional irrigation or agricultural engineers to supervise the irrigation construction projects.

Audit recommendations

On the planning, execution, supervision and use of the outcome of the feasibility study when designing the irrigation project, the Auditors recommend that:

- 1. NIRC should develop a database for recording number of irrigation schemes present, physical and financial progress and the project status that will help in supervising such as planning, monitoring and follow up.
- 2. NIRC should develop a plan and liaise with the Ministry of Finance and donor partners so as to ensure sustainable funds are available for the approved projects.
- 3. NIRC should establish a mechanism of ensuring that it strengthens its capacity in terms of human resources, working equipment and financial resources of individual Irrigation Zonal Offices to better realize the intended results.

In the aspect of tendering processes, for the selection of contractors, it was recommended that:

1. NIRC being the National Overseer of all irrigation activities they should establish a coordination mechanism, that NIRC and LGA will

cooperate in all stages of irrigation projects construction, including evaluation process so as to get competent and capacitated contractors.

In order to adequately manage the construction of irrigation projects as per required specifications, cost and agreed period, NIRC should:

- 1. Ensure that the procurement activities are planned to be carried out during unfavourable seasons for construction. This is in order to allow the construction of activities to be carried out in dry season to reduce the delaying factors such as rainfall and cropping season.
- 2. Set a mechanism of ensuring project managers supervise construction activities as per agreed construction schedules.
- 3. Update its operational guidelines (Comprehensive Guideline 2010) so as it align its functionality with the National Irrigation Act of 2013.

CHAPTER ONE

INTRODUCTION

1.1 Background

The Agriculture sector contributes to 45% of Tanzania's GDP and about 30% of its export earnings. The sector employs about 80% of the nation's workforce and continues to drive economic growth in the country. Despite its importance, agriculture is still dominated by rain fed farming, which is easily affected by inadequacy, seasonality and unreliability of rainfall and periodic droughts.²

Development of irrigation gives unprecedented opportunity to transform agriculture from subsistence to commercial orientation. Tanzania's irrigated area is far below the potential, and the government is committed to expanding the irrigation systems. However, mobilizing the financial, technical, and managerial resources is a serious challenge. The government alone cannot provide all that is needed.

1.2 Irrigation Perspectives in Tanzania

Tanzania covers an area of 94.5 million hectares of which 44 million hectares are classified as suitable for agriculture. The total potential area for irrigation development is 29.4 million hectares with 2.3 million hectares being high potential, 4.8 million hectares as medium potential and 22.3 million hectares low potential. Despite all this potential, only 461,326 hectares (1.6%) of the total area have so far been developed under irrigation³.

Irrigation practices in Tanzania show low water use efficiency, low water productivity and over dependency on surface water as a major source for irrigation⁴. These types of irrigation systems practiced in Tanzania are as appended in **Appendix 1**.

1.3 Justification of the Audit Area

The audit was motivated by the frequent public outcry from the civil societies and the parliament discussions through different local media regarding low-performance of the irrigation sector. Further, different reports, debates in the parliament and scholars have been repeatedly

² National Irrigation Policy 2010

³ National Irrigation Master Plan (NIMP) 2002

⁴ National Investment Profile. Water for Agriculture and Energy: Tanzania

reporting on the shortfalls noted in the implementation and operation of irrigation projects in the country.

For example, Agricultural Sector Development Program (ASDP), reported the presence of irrigation schemes that were executed without having feasibility study in place.

On the other hand, delay in completion of irrigation projects languish most irrigation works in the country as it was reported in Tabora where Shitage Irrigation Scheme was delayed in completion.

The Controller and Auditor General (CAG) audit report (2011) on donor funded projects reported unfinished construction of irrigation dam of about TZS 31.6 million at Kinondoni Municipal Council.

Based on these inefficiencies, the CAG decided to undertake Performance Audit in the management of construction activities on irrigation projects to ensure that irrigation projects are executed in line with agreed timeframe and budget. This will address the inadequacies in the irrigation sector thus improving food productivity.

1.4 Design of the Audit

1.4.1 Audit Objective

The objective of the audit was to assess whether the National Irrigation Commission effectively manages the pre-construction and construction works of irrigation projects to ensure sustainable availability of irrigation water.

1.4.2 Specific Objectives

Three specific objectives of this audit were:

- To assess whether NIRC effectively planned and carried out feasibility studies and ensures its results are applied while designing irrigation projects.
- To assess whether NIRC applied the results of feasibility study and preliminary design in preparing specifications for tender documents and ensure the tendering procedure are done according to the set regulations.
- To assess whether construction of irrigation projects was done as per required specifications, cost and time.

1.5 Audit Scope

The audit considered different activities done by National Irrigation Commission in managing the construction activities of irrigation projects in the aspect of feasibility study, designing, tendering process and construction. The audit covered Tanzania Mainland whereby five out of eight irrigation zones namely; Morogoro, Mbeya, Mtwara, Kilimanjaro and Mwanza zones were randomly selected.

This audit focused only on the Small-Scale Irrigation Development Project (SSIDP) because during auditing period, SSIDP was the only project with subprojects (schemes) that operated country-wide. SSIDP was divided into batches one to three to accommodate implementation of loan agreement funds that were released in batches.

Further, the audit team reviewed a total number of 20 sub-projects files which were equally selected from batch one and batch two. Five out of eight irrigation zones were selected where four sub-projects from each zone were selected. Two projects were with contract amount of greater than or equal to TZS 400 million while other two projects were with contract amount of less than TZS 400 million. Refer **Table 1.1** for more clarification.

Selection of batch one considered sub-projects that were constructed at the earlier stages of NIRC formulation. Meanwhile selection of batch two considered sub-projects that were constructed after the commission was in full operation. Further it was when NIRC started to review all bid-drawings before tendering. Moreover, selection of projects was based on contractual amount which aimed at measuring the extent which NIRC put efforts in supervising those two kinds of batches. **Table 1.1** shows the details of the selected sub-projects.

Zone	Batch I		Batch II		
Kilimaniaro	≥400 (Million)	≤400(Million)	≥400 (Million)	≤400 (Million)	
Kitimanjaro	Irrigation schemes (Sub-Projects)				
	Mapama	Themi ya Simba	Kigongoni	Kivulini	
Morogoro	Mwega	Signali	Lumuma	Bagamoyo BDIP	
Mbeya	Mkungugu/Kigasi	Igiliganyi	Mgambalenga	Mshewe	
Mtwara	Chikwendu- chipamanda	kinyope	Mtawango	Hangagadinda	
Mwanza	Irienyi	Maliwanda	Mwasubuya	Kyota	

Table 1.1: List of sub-projects (irrigation schemes) Reviewed

Source: NIRC irrigation sub-project list

Audit encompassed four financial years from 2014/15 to 2017/18. This four years' time-frame was selected since it is the duration within which batch one and batch two of SSIDP sub-projects were supposed to be completed.

Large scales irrigation projects were not sampled as they were implemented in few areas of the country that could lead to insufficient project information and bias.

1.6 Assessment Criteria

In responding to the audit objective and specific audit objectives presented in section 1.4.2, the audit criteria in **Table 1.2** were used.

The criteria for the main audit question and sub questions are based on the role played by NIRC when carrying out activities regarding irrigation projects. These roles were derived from National Irrigation Act. 5 of 2013, National Irrigation Development Strategy (NIDS), approved NIRC Organization Structure, Comprehensive Guideline for Irrigation Construction, and Public Procurement Act of 2011, and its sub-sequent amendments.

Management of irrigation works from initiation to procurement including (feasibility study, designing, tendering process) for ensuring construction of irrigation works are carried out in accordance with the specificationsBefore any construction of irrigation activities is carried out it is required to submit, detailed feasibility study report, list of drawings, design report, and bill of quantity when submitting other irrigation works for approval. (National Irrigation Act 2013, 20 para 1 to 3)According to section 5(f), of the National Irrigation Commission Act, the Commission has been vested powers to plan, carry out studies, design, construct, supervise and administer implementation of the irrigation projectsNational Irrigation Commission (Irrigation Planning, Design and Private Sector Coordination Division) is mandated to:	Focus Area	Audit Criteria and Sources
 Provide advisory services on irrigation planning and designs 	Management of irrigation works from initiation to procurement including (feasibility study, designing, tendering process) for ensuring construction of irrigation works are carried out in accordance with the specifications	 Before any construction of irrigation activities is carried out it is required to submit, detailed feasibility study report, list of drawings, design report, and bill of quantity when submitting other irrigation works for approval. (National Irrigation Act 2013, 20 para 1 to 3) According to section 5(f), of the National Irrigation Commission Act, the Commission has been vested powers to plan, carry out studies, design, construct, supervise and administer implementation of the irrigation projects National Irrigation Commission (Irrigation Planning, Design and Private Sector Coordination Division) is mandated to: Provide advisory services on irrigation planning and designs

Table 1.2: Audit Criteria used in auditing Management of Construction
Activities on Irrigation Projects.

	Members of evaluation committee are expected to be of an appropriate level of expertise and experience, depending on the value and complexity of the procurement requirement (Section 40 (4) of Public Procurement Act 2011). The basis for tender evaluation and selection of the successful tenderer is supposed to be clearly specified in the tender document. (Section 72 (2) of Public Procurement Act 2011).
	Section 74(5) of the Procurement Management Act 2011 is supposed to review the evaluation report submitted pursuant to subsection (4) and submit the report and their recommendations to the Tender Board. (Section 74 (5) of Public Procurement Act 2011).
	Liquidated damages are supposed to be charged on the contractor, supplier or service provider for undelivered goods or delayed services or work in accordance with the procedures stipulated in the regulations (Section 77 (4) of Public Procurement Act 2011).
Management of irrigation projects by ensuring irrigation projects are constructed within contractual time, cost, and quality	NIRC officials are required to monitor the construction works progress as planned so that, works are completed within the required time, with acceptable quality as per specifications, and cost. (Site handbook for Construction Management and Supervision of Small-Scale Irrigation Scheme Development 2017(3)(1).
	Any irrigation works that has to be constructed must have an approval from National Irrigation Commission. (National Irrigation Act of 2013 Section 20(1)

National Irrigation Commission (Irrigation Infrastructure Inspection Services Section) is required to Inspect the quality of construction, rehabilitation and supervision of irrigation and drainage infrastructure to ensure compliance to standards and specifications. (National Irrigation Commission, Organization Structure).
Zonal Irrigation Officials (ZIOs) are required to monitor work progress as planned in time, cost effective and quality. (Site handbook for Construction Management and Supervision of Small-Scale Irrigation Scheme Development 2017 (3)(1)).

1.7 Methods Used for data collection

Three main methods for data collection namely interviews, documents review and Physical observations were used during the audit and they were analysed based on the nature of data available.

1.7.1 Document Review

The audit team reviewed documents to get the necessary information on how management of construction of irrigation projects was carried out by NIRC. Through document review, auditors were in a position to compare whether the project implementation activities from planning to completion were aligned to the required procedures and standards.

Document review was also used to verify information obtained through interviews and observations in the field. The documents reviewed fell within four financial year period of the audit (2014/2015-2017/2018), as most of relevant data and information were generated following establishment of the National Irrigation Commission. The list of key documents reviewed is as shown in **Appendix 2**

1.7.2 Interview

Interviews were conducted to confirm or clarify information from the documents reviewed and to collect relevant information in cases where

information in the formal documents were lacking or missing. Different Officials were interviewed according to their responsibilities (**Appendix 3**).

1.7.3 Physical Verification

Five Zonal Irrigation Offices namely: Morogoro, Mbeya, Mtwara, Kilimanjaro and Mwanza were visited. Zones were selected basing on geographical coverage which implies various landscapes, nature of water sources and social economic factors such as readiness and responsiveness of society regarding irrigation activities. Variation in land features and water sources have different impacts in designing and construction of irrigation projects in terms of time, cost and quality as per specifications.

1.8 Data Validation Process

The National Irrigation Commission was given the opportunity to go through the draft report and comment on the figures and information contained in it. They confirmed the accuracy of the data used and information presented in the audit report. Further, the draft report was crosschecked and discussed with experts in irrigation to confirm the information.

1.9 Standards used for the Audit

The audit was conducted in accordance with International Standards of Supreme Audit Institutions (ISSAIs). These standards require that, the audit is planned and performed to get enough and appropriate evidence to provide a reasonable basis for the findings and conclusions based on the audit objectives.

CHAPTER TWO

SYSTEM SET FOR THE MANAGEMENT OF CONSTRUCTION ACTIVITIES ON IRRIGATION PROJECTS

2.1 Introduction

This chapter provides an overview of the legal and administrative framework, key stakeholders involved and their main responsibilities, and key tasks performed while managing construction of irrigation projects in Tanzania.

2.2 Policy and Legal framework

In Tanzania, Management of Irrigation Projects is governed by National Irrigation Policy, laws and regulations used for administering and managing the sector.

2.2.1 National Irrigation Policy 2010

The National Irrigation Policy narrates several remedial actions that have to be taken to properly manage irrigation projects. The policy sets an objective which is, to ensure sustainable availability of irrigation water and its efficient use for improved crop production, productivity and profitability that will contribute to food security and poverty reduction.

2.2.2 National Irrigation Act 2013

The Act, among others, provides guidance on development, operations and maintenance of irrigation and drainage systems. It also provides direction on how to carry out irrigation Policy and its Strategy effectively⁵.

2.2.3 The Environmental Management Act, 2004

Section 84 (1) of the Environmental Management Act of 2004 requires that, before starting any project Environmental Impact Assessment (EIA) should be conducted to ensure that impacts are foreseen and addressed. Therefore, depending on project size/cost may determine the need for EIA. Very small/farmer managed irrigation projects may not need full EIA.

2.2.4 National Irrigation Master Plan 2002/03-2016/17

In the year 2002 the Government prepared the National Irrigation Master Plan (NIMP), which strongly emphasizes the need of having the Irrigation Policy, Legal and Regulatory Framework to oversee sustainable irrigation

⁵ National Irrigation Act of 2013 section 20 (1-3)

development. It was launched with the purpose to align the irrigation sector to contribute more effectively to agricultural productivity and profitability.

The Master Plan identifies a total irrigation development potential area of 29.4 million hectares, of which 2.3 million hectares (7.82%) are classified as high potential; 4.8 million hectares (16.33%) as medium potential; and 22.3 million hectares (75.85%) as low potential.

2.2.5 The Agriculture Sector Development Programme (ASDP)

The Agriculture Sector Development Programme (ASDP) is a 5-year rolling plan which was prepared in November 2002 to carry out the Agricultural Sector Development Strategy (ASDS). The ASDP presents a sector-wide framework for overseeing the institutional, expenditure and investment development of the agricultural sector. ASDP takes cue from (NIMP) which was launched in 2002 as part of the agricultural sector development strategy (ASDS) that aimed to increase agricultural productivity through sustainable irrigation development. The ASDP had set a target of irrigating about one million hectares by 2016.

2.3 Funding the irrigation Projects

The government of Tanzania with support from the Development Partners has been investing to improve agricultural productivity. In cooperation with Japan, Tanzania is conducting small scale irrigation through one project with many sub-projects. This project is known as Small Scale Development Projects (SSIDP). This project is funded by government of Japan through Agricultural Sector Development Program (ASDP).

The SSIDP sub-projects were set to be implemented in batches one to three. During the auditing period, the SSIDP was having 119 irrigation subprojects which were in different stages of implementation as shown in **Appendix 4**. Meanwhile, Sources of fund as were disbursed in four financial years, i.e. 2014/15-2017/18 is as shown in **Table 2.1**

Furthermore, at district level, Irrigation projects are financed by Local Government Capital Development Grant (LGCDG) and District Agricultural Development Grant (DADG). If funds are not enough, it is possible to apply for District Irrigation Development Fund (DIDF) financing. DIDF is a competitive fund established nationally to finance district level irrigation schemes. To apply for DIDF, districts must meet DADG access conditions

Financial Year	Approved Budget-Local	Disbursed Budget- Local	Percentage of Disbursement-
	(TZS in Billions)	(TZS in Billions)	Local (%)
2014/15	15	0	0
2015/16	6	0	0
2016/17	6	2.2	37
2017/18	5.6	0	0
Total	32.6	2.2	37
Funds	s budgeted against	disbursed on foreign	sources
Financial Year	Approved	Disbursed Budget-	Percentage of
	Budget-Foreign	Foreign	Disbursement-
			Foreign
2014/15	18.9	10.7	57
2015/16	47.4	5.1	11
2016-17	29.4	1.1	4
2017/18	14.5	2.5	17
Total	110.2	19.4	18

Table 2.1: Funds budgeted against disbursed on Local sources

Source: National Irrigation Commission's MTEF

2.4 Main Actors and their responsibilities

This section describes the responsibilities of the main Actors as well the roles of various stakeholders towards Management of Construction Contracts in Irrigation Infrastructure.

2.4.1 Ministry of Agriculture

The objectives of the Ministry of Agriculture in managing irrigation Projects is to provide guidance and support to the National Irrigation Commission. The Ministry of Agriculture in Tanzania is responsible for formulation and revision of Policies, Promoting the development, management and liaise the commission to development partners to fund irrigation activities through the Agricultural Sector development Program (ASDP) where irrigation is embedded.

2.4.2 National Irrigation Commission

With respect to managing construction on irrigation projects, the Commission is mandated to plan, carry out studies, design, construct, supervise and govern the implementations of the irrigation projects. Other functions of the Commission on irrigation activities are as stipulated hereunder:

Advise the government on carrying out and reviewing the National Irrigation Policy, Strategy and National Irrigation Master Plan and related legislation;

- Coordinate all interventions in irrigation sector conducted by development partners and other stakeholders;
- Establish and maintain the irrigation construction equipment centres and provide hiring services to support private sector in irrigation investments;
- > Register and maintain the register of all irrigators;
- Build capacity of irrigators for effective participation at all levels of irrigation planning, implementation, operation and management;
- Undertake and coordinate research, disseminate appropriate technologies emanating from research findings and provide technical support services on irrigation;
- Promote development of multipurpose water storage facilities for irrigation purposes and other social economic activities;
- Regulate all matters related to irrigation development and to oversee collaboration among different players in development of irrigation and drainage;
- Approve construction of irrigation works, standards and guidelines for development and management of irrigation and drainage;
- Promote efficient water use in irrigation systems and ensure compliance with Integrated Water Resources Management approach in irrigation development.

2.5 Administrative structure in Managing Construction of Small Scale Irrigation Projects

The overall administrative organization chart for implementation of Small-Scale Irrigation Development Project (SSIDP) in Tanzania is as presented in **Figure 1** below:

At national level:

NIRC works under the Ministry of Agriculture. On behalf of the Ministry, NIRC performs all matters pertaining to irrigation activities. When implementing irrigation projects in local government, NIRC coordinates with PO-RALG in all administrative aspects.

At zonal level:

NIRC extends its function through Zonal Irrigation offices (ZIOs) which are headed by Zonal Irrigation Engineers (ZIE). In this SSIDP sub-projects are managed in collaboration with Regional Secretariat (RS). The secretariat serves as a link between PO-RALG and Local Government where projects are executed.

At Local Government Authorities (LGAs):

In LGAs it is where SSIDP sub-projects are executed and supervised by District Executive Directors through their District Irrigation Teams (DIDT) in collaboration with Zonal Irrigation Officials. During implementation, project managers are the one who supervise the execution of the construction contracts on site. Depending on the available capacity in terms of skills and experience, a Project manager can be appointed from either LGA or ZIO.



Figure 1: Organization administrative chart for implementation of Small Scale Irrigation Project (SSIDP)

2.5.1 Process Description in Management of Irrigation Projects

The process description on Management of Construction Activities on Irrigation Projects starts from planning and ends by operation and maintenance of the constructed projects. The process is made of three main stages namely pre-construction, construction and post construction as described in **Figure 2**.

i. Pre-construction contract stage

The Local Government Authority introduces project in collaboration with the farmers by preparing a project proposal for the projects depending on the needs and the existing environment for investing in the infrastructure.

The Local Government Authority in collaboration with Zonal Irrigation Offices conduct detailed feasibility studies to see whether the project is feasible or not. See **Table 2.2** Despite Zonal Irrigation Officials being the one who prepare drawings, they are also approving the drawings through their internal sections reviews.

Zonal Irrigation Offices prepare tender documents which are composed of engineering drawings, Engineers estimates, and Bills of Quantities (BoQ) which also includes the specifications.

After formulation of contract documents and sending them to the LGA, Procurement procedures for acquiring the contractor start. The District Executive Director (DED) being the Accounting Officer formulates a Tender Evaluation Team to scrutinize tenders submitted by bidders.

After the Lowest evaluated bidder has been selected, and then the copy of contract document is sent to the Zonal Irrigation Office.

ii. Construction contract stage

After the tendering process is over and the construction contract of irrigation infrastructure has been awarded to the qualified contractor (lowest evaluated bidder), the construction work begins. At this stage the parties involved are the client (owner), Project manager (consultant), and the Contractor.

The owner hands-over the site to the accepted contractor and gives them some days of mobilization period so as to allow them to start construction works of the irrigation infrastructure and finish not later than the number of days specified in the contract.

PRE-CONSTRUCTION STAGE



Project (SSIDP)

 Table 2.2: Detailed components of feasibility study and their importance in irrigation project execution

S/No	Feasibility Study Component	Significance of component
1	Agronomical study	 Type of crop to be planted, crop water requirement and therefore quantity of water required for irrigation, Quality of water
2	Soil study	Bearing capacity of soilAppropriate type of crops to be planted
3	Hydrological/Water study	 Quantity of water available, Quality of water Sustainability of irrigation water
4	Geotechnical investigation	 Location of hard stratum layer Nature of structure (headwork) to be built
5	Topographical survey	 upstream and downstream identification, irrigable farm plots area ground terrain and key features preliminary design to produce map
6	Social economical study	 Participation when proposing project, Project feasibility (market, return) etc.
7	Environmental Impact study (EIAA)	 Significant environmental impacts of the project can be considered in the design (flow, flora & fauna etc). Impact to the surrounding community
8	Engineering and preliminary design	 Produces drawings, specifications and BOQ

Source: auditor's analysis based on Site handbook

The construction work is supposed to be executed according to the drawings, technical specifications, terms and conditions of contract, which are aimed at managing the contractor's performance in terms of timing, quality and cost control. The drawings, technical specifications are prepared by Zonal Irrigation Engineer, while conditions of the contract and the contract are prepared by the responsible Local Government Authority and signed by both parties which are the Client (Local Government Authority) and the awarded Contractor.

iii. Post construction contract stage

After the construction of irrigation project is practically completed, then the project is handed-over to the client by the Contractor in the presence of the Project Manager. Thereafter, the project is subjected to the defects liability period according to the General Contract Condition of Contract and Specific Conditions of Contract Conditions (GCC and SCC). If there will be any defects within the stated defect liability period due to materials quality or poor workmanship, then the contractor will be obliged to rectify the works accordingly.

a) Operation of the irrigation infrastructure

Once the project is completed and handed over to the LGA, the LGA hands it over to the community (irrigator's organization) to operate and maintain the built infrastructure. The handed-over work is operated by the community who in this regard is the irrigators' organization who operates the project under supervision and management of the Local Government Authority (Regional/District Irrigation Engineer, in collaboration with the District Irrigation Development Team (DIDT).

b) Maintenance of the irrigation infrastructure

Preparing and implementing Maintenance schedule of the infrastructure is a very important role for project sustainability. This role aims not only to keep the infrastructure in order but also make its life span of giving service longer without losing its design (irrigation water conveyance) capacity. Conveying of irrigation water to the intended farm plots according to the design standard is the main objective for which the infrastructure is built. It is irrigators' organization's role under guidance of Regional/District irrigation Engineer to prepare and implement a plan for operation and maintenance (O&M) of their irrigation systems at the end of each cropping season.

CHAPTER THREE

AUDIT FINDINGS

3.1 Introduction

This chapter presents the audit findings. It provides answers to the audit questions presented in Chapter One of this report. The findings are related to the planning and carrying out feasibility studies; application of results of the feasibility study in the preparation of projects specifications and procurement process; and implementation of construction activities with due regard to timeliness, cost consciousness and compliance with agreed specifications. The observed results are presented in the subsequent sections.

3.2 Feasibility Studies, Design and Tendering Activities not adequately conducted

This part provides findings regarding weaknesses found at feasibility studies, design and tendering stage. This includes formulation of contract, start-up activities and their respective consequences on cost of the projects, completion time and quality of works. The following were found:

3.2.1 Inadequate Plan for Feasibility Study

To determine the viability of irrigation projects, National Irrigation Act⁶ requires all irrigation works to be done after a detailed feasibility study. These studies are expected to show if the project is technically feasible and economically justifiable. From the feasibility study report, it can be concluded as to whether the project is worth the investment or not. Review of annual plans and budgets found out that, for financial years 2014/15, 2015/16 and 2017/18 the irrigation zones of Morogoro and, Mwanza, did not plan for conducting any feasibility study.

Likewise, Kilimanjaro did not do so in 2016/17 and 2017/18. For the remaining periods, a total of 360 feasibility studies were planned; for 46 in Morogoro, 28 in Mbeya, 257 in Mtwara, 16 in Kilimanjaro, and 13 in Mwanza.

The big number of planned feasibility studies in Mtwara (257) is attributed to the fact that the government has identified agriculture potential in Mtwara. Because of that, Mtwara and other southern regions are currently intensifying in irrigated agriculture. As a result, there are activities in this zone which are related to improving the traditional schemes.

Mtwara and Kilimanjaro Irrigation Zones planned to conduct 64 and 8 feasibility studies respectively as referred in **Appendix 5**. But, all these plans were not implemented.

⁶ Section 20 (1) (g) of the National Irrigation Act deficiencies

The five irrigation zones managed to carry out a total of 11 feasibility studies out of 360 planned studies, which is about 3 percent.

For the financial year 2016/17, Mtwara and Mwanza partially implemented their plans. Mtwara implemented 1 out of 65 studies, and Mwanza implemented 1 out of 13 studies as shown in **Appendix 5**. Mtwara Irrigation Zone managed to implement only one feasibility study because government released about TZS 60 million for this assignment which was released for Lundo irrigation scheme.

Table 3.1 and **3.2** present the summarized performance related to planned and implemented feasibility studies plans in relation to its funding performance.

Table 3.1: Variation between Pla	anned Feasibility	Studies vers	us Studies
implemented for th	e Financial Year	2014/15 to 2	017/18

Irrigation Zone	Total planned feasibility study	Total implemented feasibility study	Variation (%)
Morogoro	46	0	100
Mbeya	28	9	68
Mtwara	257	1	99.6
Kilimanjaro	16	0	100
Mwanza	13	1	92

Source: Analysis from Feasibility Studies Reports

From **Table 3.1**, Morogoro and Kilimanjaro Irrigation zones did not implement any of the planned feasibility studies while Mbeya Irrigation Zone managed to implement its plan by 32%. The remaining Irrigation Zones of Mtwara and Mwanza implemented less than 8 percent of their planned number of feasibility studies

Table 3.2:	Financing status for feasibility Studies for the Financial
	Years 2014/15 to 2017/18

Irrigation Zone	Amount planned for Feasibility Studies (in TZS Millions)	Amount disbursed for feasibility studies (in TZS Millions)	Percentage (%)Financing
Morogoro	3,600	0	0
Mbeya	1,100	172	15.7
Mtwara	57,000	60	0.1
Kilimanjaro	1,400	0	0
Mwanza	890	40	4.5

Source: Budget plan from visited irrigation zones

Based on **Table 3.2**, at Morogoro, Mbeya, and Kilimanjaro Irrigation Zones had no funds disbursed to carter for feasibility studies in the financial years under review. Mtwara received only TZS 60 million out of TZS 57,000 million planned, the amount is about 0.1 percent of the planned funding. Mwanza Irrigation Zone received TZS 40 million which was about 4.5 percent of the planned amount of TZS 890 million

According to the review of budget and interviews conducted with Zonal Irrigation Officials, in all five visited zones, there are two main factors that contributed to failure in planning and implementing the feasibility studies. These include:

- i) Zonal Irrigation Offices did not have enough technical personnel and working facilities to conduct feasibility studies; and
- ii) Over dependency on funding from Development Partners to support irrigation activities.

The following section presents explanation for each factor in detail

i) Inadequate technical personnel and facilities to Conduct Feasibility Studies

The Zonal Irrigation Offices are supposed to plan and conduct feasibility studies for each new irrigation project. Weaknesses in planning and conducting feasibility studies are reflected in all zones as presented in **Table 3.3.** The Table gives the picture of staff available and the actual number required in visited irrigation zones

Irrigation Zones	Number of district served	Number of staff required	Number of staff available	(Deficiency)	Percentage deficiency of staff
Morogoro	19	69	32	37	54
Mbeya	16	42	27	15	36
Mtwara	15	31	16	15	48
Kilimanjaro	22	53	30	23	43
Mwanza	27	50	20	30	60

Table 3.3: Relationship between Areas of Covera	ge (Districts) Versus
Number of Staff Available in Visited	Irrigation Zones

Country wide, NIRC had only 222 staff out of 789 required. Therefore, it had a shortage of 567 staff which was about 72 percent deficit.⁷ In the zones, the irrigation works were widely distributed, on average each irrigation

Source: IKAMA and need assessment from ZIEs

⁷Approved budget for Vote No.5 of National Irrigation Commission

zone serves about 20 districts. The audit found that there was inadequate staff in the zonal offices to manage irrigation activities in all districts.

Further it was found that, the existing 222 staff lacked adequate skills and working tools to conduct feasibility studies. This affected the work from planning, and implementation of feasibility studies and construction of irrigation works. Because of that, the viability of most of the irrigation works was not ascertained. In general, this posed the risk that a comprehensive appraisal was not done, hence taxpayer's money was invested in the projects which had no certainty of viability.

Based on **Table 3.3**, Mwanza Irrigation zone had the biggest (60%) shortage of staff deficiency, followed by Morogoro. Mwanza region serves 27 districts with only 20 staff and runs a shortage of 30 staff. In Mwanza on average one staff was serving one district, given the facts that, there were more than one projects in each district, one staff per districts becomes a challenge to ensure the projects were effectively supervised. In addition, Mbeya had the lowest staff deficit.

On average, in Mbeya two staff could manage one district. Although Mbeya had good ratio of staff to district, it had no competitive advantage over other zones. This is because, the projects were more scattered in each district. This made it even more difficult for two staff to manage the project effectively.

In order to fill the staff gap, it was noted that it sometimes necessitates outsourcing from other Irrigation Zones to fill the urgent needs.

Apart from insufficient number of staff, NIRC is having inadequacy in some essential tools for quality control. The equipment available for quality control were very essential to confirm on the stated quality by contractor and project manager even in their absence. **Table 3.4** shows few tools for quality control present at NIRC. The specific number of tools required for individual irrigation zone is shown in **Appendix 9**

Based on **Table 3.4**, it is depicted that the Commission did not have tools for length measuring (laser distance) and water flow meters. It was noted that, the Commission had 81 percent of surveying instrument (total station). This is to say that the Commission through its Zonal Irrigation Offices were highly equipped with instrument for performing topographical surveys. Absence of flow meters might impair the accuracy when there was a need of assessing the correctness of water velocity as it was indicated in the design reports. Likewise, absence of laser distance forces inspectors to use other conventional methods like walking around with tape measures when there is a need of cross checking distance indicated on the design report or drawings.

S/No	Category of Tools	Number Required	Number Available	Percentage Available
1.	Length measuring (laser distance)	21	0	0
2.	Water flow (flow meter)	25	0	0
3.	Field Concrete Strength (rebound hammer)	29	14	48
4.	Surveying instruments (total station)	16	13	81
5.	Crack detector	23	15	65

Table 3.4: Tools' category, Availability Versus Required for Supervision of Irrigation Activities by NIRC

Source: Need assessment of tools and equipment from NIRC

Under staffing impairs timely project completion as the working program might not be followed by contractors due to insufficient availability of project supervisors. Further, inadequate working tools lead to need of more time to achieve segment that could have been achieved shortly, and sometimes it can leave contractor's work unchecked. This can compromise quality of work, and the contractor could use this loophole to cheat on the specifications or quantities used without being detected. Ultimately the project may perhaps be subjected to unnecessary cost overruns

i) Over dependency on funding from Development Partners to support irrigation activities

During interview with ZIOs⁸ and review of annual budgets indicated that, zonal irrigation offices were not adequately funded. Review of approved budget and disbursement records showed that ZIOs received between 1.9 and 3.3 percent of the approved budget to carry out irrigation activities including feasibility studies. Total release was equivalent to TZS 5.31 billion out of TZS 181.9 billion. This contributed to slowing progress of irrigation activities for all sampled irrigation zones. **Table 3.5** presents the budget performance for all Irrigation Zones the FY 2014/15 to 2017/18.

Table 3.5: Accumulated Funds Budgeted Versus Disbursed for IrrigationProjects for the FY 2014/15 to 2017/18

Irrigation Zone	Cumulative funds budgeted (in TZS billion)	Accumulative funds disbursed (in TZS billion)	Percentage released
Mwanza	28.5	0.55	1.9
Kilimanjaro	10.1	0.23	2.3
Morogoro	4.9	0.13	2.7

Interview with Zonal Irrigation Officials from Mwanza, Mbeya, Mtwara, Morogoro and Klimanjaro

Irrigation Zone	Cumulative funds budgeted (in TZS billion)	Accumulative funds disbursed (in TZS billion)	Percentage released
Mtwara	133.3	4.4	3.3
Mbeya	5.1	0.0	0
Total	181.9	5.31	3

Source: Auditor's analysis from Budget Implementation plan

Table 3.5 above shows that, all visited Zonal Irrigation Offices were under funded for the financial years under review. Mbeya irrigation zone was not funded by 100 percent of the approved budget. Meanwhile Mtwara was underfunded by 96.7 percent.

It was noted that donor financing played a bigger role than in government funding irrigation projects. For the past four years, Development Partners financing contributed to 89.6 percent of the total funds disbursed to irrigation projects than government.

This, overdependence impaired the execution of irrigation projects as the approved funds to NIRC were not fully released by both government and development partners. The approved budget and subsequent release for both government and development partners is as shown in **Figure 3 (a&b)**.

Figure 3(a&b): The approved budget and subsequent release for both government and development partners







Figure 3b: Disbursed funds by: Government versus Development Partners (DPs)
Based on **Figure 3a**, the approved budget for the last four financial years has been dominated by donor financing. The trend shows an increase in financing from TZS 19 to TZS 47 Billion from 2014/15 to 2015/16 followed by a decline from TZS 47 to TZS 15 Billion in the financial year 2017/18. Likewise, the approved budget indicated that the government contribution has declined from TZS 15 to TZS 6 Billion in the financial years 2014/15 to 2017/18

Based on **Figure 3(b)**, the government released only TZS 2.2 Billion out of TZS 6 Billion that was approved in 2016/17. There were no disbursement that was made for the remaining three years. This was contrary to Development Partners, who for the four financial years managed to release funds to cater for irrigation activities. Nevertheless, the funds released by Development Partners who were the major contributors in the four years was always below the approved budget as presented in **Table 3.6**

Partners for 2014/15 to 2017/18						
Development Partners Funds						
Financial Years	Approved budget(Billion TZS)	Amount Released(Billion TZS)	Percentage Released (%)			
2014/15	18.9	10.7	57			

5.1

1.1

2.5

11

4

17

Table 3.6:Trend showing declining release from developmentPartners for 2014/15 to 2017/18

Source: Budget plans from NIRC

47.3

29.3

14.5

2015/16

2016/17

2017/18

9

Table 3.6, shows the declining in funds disbursement from development partners. It is indicated that, the highest observed disbursement was for the financial years 2014/15, where the disbursement was 57 percent. The lowest disbursement observed was for the financial year 2016/17 where the disbursement declined to 4 percent.

This trend makes the irrigation works to be vulnerable because of the uncertainty of funding from both development partners and the government. Due to unreliable funding to NIRC, the irrigation offices in zones have been changing their priority⁹. As a result investment made on irrigation projects was done without considering if the projects were technically and economically feasible. Interview with NIRC officer about the declining trends revealed that NIRC was in the process of developing a new funding approach. In this new funding model, NIRC would register all irrigator's organizations to be paying fees to NIRC from part of their collections. The introduction of fees is expected to reduce the level of financial dependency on development partners.

3.2.2 Inadequate Use of Feasibility Studies Components in Designs

All feasibility studies and detailed designs of irrigation works are supposed to be done by NIRC. This is according to Section 4.2.1.6(ii), of the National Irrigation Development Strategy 2016.

However, review of feasibility studies reports and interviews with ZIOs revealed that about 85% (17 out of 20) of the reviewed irrigation projects were implemented without or with partial consideration of feasibility studies. Only three projects (Lumuma, Bagamoyo BIDP, and Mwasubuya) complied with all eight (8) components of feasibility studies. However, their reports were not available due to poor documentation of both hard copies and soft copies. The components of feasibility studies, in the remaining 17 projects, were applied partially to various degrees as shown in **Appendix 6**.

Percentage in coverage of feasibility studies components varied from one irrigation zone to another. It was noted that, no any irrigation Zone covered all components of feasibility studies in the sampled irrigation schemes. See **Table 3.7** for more details.

		Zones
S/No	Irrigation Zone	Percentage coverage of feasibility study's
		Component in sampled irrigation schemes
1	Morogoro	69
2	Mbeya	38
3	Mtwara	44
4	Kilimanjaro	28
5	Mwanza	66

Table 3.7:Coverage of Feasibility studies components by IrrigationZones

Source: Feasibility studies' Reports

Based on **Table 3.7**, it was noted that, Morogoro Irrigation Zone covered 69% of the feasibility studies components in the sampled irrigation schemes. Kilimanjaro was least in covering feasibility studies components during the execution of the irrigation projects as it covered only 28 percent.

In addition, the percentage coverage of individual components for feasibility studies in the five visited zones varied. Soil investigation was the least covered in all five irrigation zones. Meanwhile, topographical surveys and Engineering and preliminary design were covered by 100 percent in all irrigation zones.

It was noted that, topographical survey must be done because it gives the layout of the field hence upstream and downstream for setting out canal route is known. Also Preliminary design has to be conducted because it gives the cost estimates of the project hence determines if the project is feasible in both technical and economic aspects. **Table 3.8** shows the percentage of each Feasibility studies components as conducted by irrigation zones.

S/N	component of Feasibility Studies	Percentage(%) covered in five visited Zone	Remarks(Impact of not covering)
1	Agronomical Analysis	35	Decide types of crop to be grown. If not conducted could led to wrong selection of crop and hence wrong type of infrastructure might be constructed.
2	Soil investigation	15	Soil with weak bearing capacity to handle the structure might be selected. This might pose risk to collapse of structure
3	Hydrological/Water analysis	30	Infrastructure with insufficient amount of water
4	Geotechnical Investigation	50	Structure built in soft stratum hence can easily collapse
5	Topographical Survey	100	Structure with backflow properties
6	Socio-economic analysis	35	Project which is not economically feasible
7	Environmental Assessments	25	Project which is subjected to environmental adverse hence can be washed away by floods or can suffer drought
8	Engineering and preliminary design	100	As this component gives estimates of quantities, it can either over estimate or under estimate cost of project if not well performed.

 Table 3.8: Coverage of feasibility study's components

Source: Feasibility studies' Reports

Review of the project documents showed impacts of absence of some components of feasibility studies. Consequences of skipping some components of feasibility studies varied across the visited irrigation zones as shown hereunder in **Table 3.9**

Table 3.9:	Impacts noted when some components of feasibility study
	were skipped

Irrigation	Irrigation	Component	Noted	Cost
Zone	scheme	skipped	changes	Implication
Morogoro	Minepa	Geotechnical investigation	Change of the proposed location of the headwork to a new location after	

			finding that the hard stratum was not found as it had been designed	
	Kiroka	Geotechnical investigation	Emerged sub- surface water which made pillars for aqueduct not to be suitable option, instead cross drainage structures were built for the sustainability of the project during site revision	
Mbeya	Mghambalenga	Geotechnical investigation	Canal route excavated materials changed from normal soil (as in BoQ) to 75% rock actual site condition. Hence canal length was reduced from five (5) Kilometres to one (1) Kilometre	Variation of TZS 42 million
Kilimanjaro	Themi ya simba	Soil Investigation	Presence of black cotton soil at the chainages 319.2m and 1600m. This led to bending of canal wall toward inside (excessive lateral earth	Variation of TZS 11.8 million

			pressure) See photo 1	
	Kigongoni	Geotechnical investigation	Presence of hard rock along right of way of the right abutment wall(at the headwork)	Variation of TZS 4.9 million
Mwanza	Buhangaza	Engineering and Preliminary design	The canal changed from 578.3m BoQ length to 590m actual site condition length.	Variation of TZS 26 million
	Kyota	Engineering and Preliminary design	Quantified BRC ¹⁰ weight in BoQ was 847kg for the canal length of 385m, while in actual situation was enough for only canal length of 119.23 m.	

Source: Auditor's analysis from progress reports

Based on **Table 3.9** following deficiency were noted for the seven (7) schemes that were observed to have some defects. Four (4) schemes skipped geotechnical investigation, two(2) schemes skipped detailed design and one(1) scheme skipped soil testing component of feasibility study. In these seven (7) irrigation projects, the most frequently skipped aspects of feasibility studies were geotechnical investigation. During interviews with officers at ZIOs revealed that, cost of conducting geotechnical study was higher than other studies and needed expertise and equipment. The audit observed bending of canal due to impact of black cotton soil. This was among the impacts connected to lack of geotechnical data for this project (Refer Photo 1).

Unlike other components of the feasibility study, which are within the expertise knowledge of civil, irrigation, agronomists, land surveyors and

¹⁰ Wire mesh fabric constructed from British Reinforcement Company

agricultural engineers present in LGAs and Zonal Irrigation Offices, the Geotechnical investigation require specialized expertise that needs to be outsourced to consultants. Therefore, NIRC should find the way of capacitating zonal officials in order to handle this aspect of geotechnical studies.



Photo 1: Bending inside of Themi ya Simba canal due to impact of black cotton soil, taken by auditors on 26th November 2018

Skipping all components of feasibility studies in these irrigation projects led to poor project design (e.g. Kiroka, Minepa), under estimation of project costs (e.g. Kigongoni, Buhangaza) and extended completion time for the projects as shown in **Table 3.11**. All these projects ended up into causing re-designing, costs variations and time extensions (e.g in Mgambalenga and Themi ya Simba). Generally, the intended Value for Money cannot be realized because the farmers do not get in time the water for irrigation as it was intended.

Environmental aspect during the execution of irrigation project

The audit noted that, 5 out of 20 reviewed irrigation projects did not consider environmental aspect of feasibility study. This is contrary to section 20(g) of National Irrigation Act of 2013.

During interviews with Zonal Irrigation Officials, it was revealed that environmental aspect was not integrated in the irrigation project because LGA did not consider it as an important aspect. As a result, budget for EIA was not developed. Because of that, most of completed irrigation projects do not have plans to mitigate the impacts of likely environmental issues, such as heavy rains or excessive draught.

For example, Wami-Luhindo the Irrigation scheme was highly affected with severe rainfall. The culvert and a 10 meter length of a built canal were eroded because of excessive storm. The audit noted that there were no mitigating measures designed to deal with these incidents. In this area, there was uncontrolled farming, grazing and other human activities in the upstream. Because of that, the water stream was widened and therefore the quantity of water that crossed the existing culvert was more than its designed capacity. **Photo 2** depicts the destructed culvert. This destruction added cost of repairing and increased more risk of further destruction.



Photo 2: Destructed culvert (Circled red) and construction activities of new structure of aqueduct at Wami-Luhindo Irrigation Scheme as it was taken by Auditors on 12th July 2018

In addition to that, the audit noted the siltation condition at Mwenda-Mtitu and Themi ya Simba irrigation schemes (Refer **Photo 3a and 3b**). The siltation caused reduction of the depth of canal (reduced canal discharge capacity). Because of this, there was an overflow of the discharged water, which led to loss of water before reaching the farms. Because of the overflow the designed flow rate was reduced and the downstream could not get enough water. Downstream canal siltation was caused by uncontrolled erosion in the upstream part and noncompliance with best practises of environmental management within the catchment area.



Photo 3a: Siltation of sand (with red mark) as observed at canal in Mwenda Mtitu Irrigation scheme-Mbeya. Photo taken by Auditors on 21st July 2018

Photo 3b: Part of Themi ya Simba Irrigation scheme filled with muds. Photo taken by Auditors on 26th November 2018

On top of that, another impact of not conducting environmental Impact assessment was noted at Kyota Irrigation Scheme of Mwanza Irrigation Zone.¹¹ The scheme lacked enough water during dry period as the result of environmental changes hence posing problems to farmers. To rectify this problem Muleba DC, re-scoped the work, and approved variation order of about TZS 6 million to excavate a charcoal dam for water storage.

¹¹ Meeting Minutes of Muleba Tender Board

3.3 Inadequate mechanisms to monitor Tender evaluation and Awarding Process

District Executive Directors (DEDs) being Accounting Officer of LGAs are independent in deciding and appointing members of the tender evaluation team¹². Meanwhile, NIRC¹³ is mandated to oversee all irrigation activities in the country. This mandate gives the chance for NIRC to set the monitoring mechanisms to oversee evaluation processes to ensure competent contractors are selected.

Review of tender documents, and interviews with officials from all visited ZIOs, revealed that tender documents were prepared by zonal irrigation offices, and tender evaluation process was done by LGAs. It was noted that 11 out of 13 evaluation processes on irrigation projects that were carried out in Morogoro, Mbeya and Kilimanjaro did not involve officials from respective Irrigation Zones.

Although it is not necessary that representative from zones to be included in evaluation teams, ZIO are responsible to oversee the process to ensure competent contractors are selected. Due to absence of mechanisms for monitoring the process of selecting contractors, there were contractors who were selected with poor working equipment, lack of enough technical personnel, low working experience, and insufficient working capacity. For more details on the impact caused by incompetent contractor is as shown section 3.4.1 on **Table 3.13**

It was further noted that, at Kakese Irrigation scheme in Mbeya Irrigation Zone, the evaluation team ignored some of the procurement procedures that required the contractor to include major work items on bidding document. The evaluation team awarded him the construction contract regardless of his failure to abide in filling bidding documents. The contractor to whom the contract was awarded (M/S SAJAC Investment) had bidding document with corrected bid amount of TZS 271,394,000.

However, the document did not indicate major work items of main canal excavation, farm roads, and standard structures. These items in the engineer's estimates were estimated to cost TZS. 247 million. The contractor only managed to mobilize materials, without further work execution. This resulted into a delay of about three years.

• Likewise, at Kiroka Irrigation scheme in Morogoro Irrigation Zone¹⁴, the ZIO representative was not involved during the evaluation

¹² Section 74 (1) of Public Procurement Act 2011)

¹³ National Irrigation Act of 2013(Section 14, and its regulation of 2015, section 28)

¹⁴ Correspondent letter with: Kumb.Na.ZON/IRR/DISTRICTMOROGORO/VOL IV/111

process. The deficiencies shown in **Table 3.10** were noted when it was reviewed at later stage with a view to evaluate performance.

Scheme	BoQ Item Before Review	BoQ Item After Review	Difference and action taken
Kiroka	Item 2.2.4, Excavation works of 2,550 cubic metres with rate of TZS 90,000 per cubic metre which resulted to TZS 229,500,000	Item 2.2.4, Excavation works of 2,550 cubic metres with rate of TZS 9,000 per cubic metre which resulted to TZS 22,950,000	ZIO instructed DED to work on the front loading ¹⁵ of TZS 206,550,000
KIIOKa	Item 2.2.6, masonry work was with the quantity of 37.5 cubic metres with rate of TZS 100,000 per cubic metre, which resulted to TZS 3,750,000	Item 2.2.6, document was reading 375 cubic metres, with the rate of TZS 100,000 per cubic metre, which resulted to TZS 37,500,000	ZIO instructed DED to work on the observed difference

Table 3.10: Variation of BoQ Items After Review by ZIO and Auditors' Comments

Source: Letter from Morogoro Irrigation Zone to Morogoro District Council Dated 11th January 2017

During interviews with NIRC and Zonal Officials it was revealed that for batch three of SSIDP projects, all procurement of contractors will be done by NIRC-HQ. The audit acknowledged that this is likely to improve the selection of contractors. However, it was noted that NIRC does not only supervise SSIDP projects but also other large irrigation projects. Since it has no proper mechanism of monitoring the procurement of all these projects, there is a risk that procurement of contractors will be delegated to LGAs and end up being handled in the same manner.

Absence of monitoring mechanism during tender evaluation processes might result in selecting incompetent contractors which can eventually lead to construction of projects with compromised quality, project delay and ultimately cost overruns.

¹⁵Front-loading means the contractor getting most of the money in the contract price while the physical progress is low

3.4 Inadequate Time Control in the Construction of Irrigation Projects

National Irrigation Commission through ZIEs is required to monitor whether the construction works progress is as planned and completed timely as stated in the contract¹⁶.

The audit team reviewed project progress and completion reports from the visited irrigation zones, and it was noted that 76 percent of all the reviewed irrigation projects were completed with delays. Delays in scheduled completion of projects can lead to additional deterioration of infrastructure that could have been avoided by timely completion. It also adds unnecessary overhead costs to the Contractor (Table 3.11).

Based on **Table 3.11**, it is deduced that, all irrigation schemes that were constructed at Morogoro irrigation Zone were delayed. It was further noted that, only schemes implemented at Mwanza irrigation zone had delayed for about 63 percent while the remaining irrigation zones had the projects delay of more than 6 percent.

Irrigation Zone	Number of Projects reviewed	Number of Projects completed without delay	Number of Projects completed with delay	Percentage of projects with delays
Morogoro	14	0	14	100
Mbeya	26	8	18	69
Mtwara	18	5	13	72
Mwanza	8	3	5	63
Kilimanjaro	17	4	13	71
Total	83	20	63	76

Table 3.11: Extent of Irrigation Project Delays experienced in visited
zones in Financial Years 2014/15 to 2017/18

Source: Auditor's analysis from SSIDP Project Status for Batch I and II

On average contract durations for all the 83 irrigation schemes was 165 days. It was noted that 25 percent of all the irrigation schemes were delayed for more than 192 days. This delay is greater than the average contract duration of all the reviewed irrigation schemes.

It was further noted that, average delays in completion varied from one irrigation zone to another as it is shown in **Figure 5**.

Based on **Figure 5**, Morogoro Zone had the bigest delays where contracts were delayed by an average of 370 days. In the same zone the minimum delay was 62 days while the maximum was delay 1054 days. Kilimanjaro Irrigation Zone had the minimum average delays whereby the contrcats

¹⁶Site Handbook for Construction Management & Supervision of Small Scale Irrigation Development Projects

were delayed by an average of 114 days, varrying from a minimum of 2 days to a maximum of 297 days.

Review of Irrigation Project Progress and Project Implementation Reports¹⁷ revealed four main reasons that caused projects completion delays. The reasons were:

- Contractor's problems;
- Unrealistic designs;
- Improper construction scheduling; and
- Delayed payments to contractors.



Figure 4: Average delay (Days) from visited Irrigation Zone **Source:** Auditors analysis from reviewed progress reports

¹⁷Site meeting Report Number 1-5 of Lumuma Irrigation Scheme, Monthly Progress Report No.2 of Chikwedu-Chipamanda; Projects Implementation Status for Mtwara and Mbeya Irrigation Zones

 Table 3.12 shows the frequency of occurrence of each cause from each irrigation zone in the scope of this audit

	Number of occurrences					>		
Cause of delay	Morogoro	Mbeya	Mtwara	Kilimanjaro	Mwanza	Total occurrence	Percentage t Weight	
Improper construction scheduling	17	5	7	11	4	44	57	
Unrealistic design	5	1	0	6	4	16	21	
Contractor's problems	4	1	3	3	0	11	14	
Delayed payments	1	0	5	0	0	6	8	

Table 3.12:	Causes of Project	Delays and	their	Scores	in \	/isited
		Irrigation Z	Zones			

Source: Auditor's Analysis Based on SSIDP Project Status Reports Batch I and II

From **Table 3.12** above, it is deduced that improper scheduling for project implementation schedule seems to have higher scores as it represents 57 percent of occurrence of causes. This is to say that, delays of many projects were the result of improper scheduling. Also, Unrealistic design was the next in frequently occurring cause of delay in the reviewed projects as it occurred 16 times which represents 21 percent of occurrence of all the causes. The last in causing delays was delay in payment to contractors as it occurred 6 times which is equivalent to 8 percent of all the causes of delay. These causes of delays were further elaborated in the following subsections.

3.4.1 Contractor's defaults due to lack of equipment and skilled personnel

Visits to the irrigation zones, revealed that, LGAs deployed local contractors with low capacity in terms of equipment, artisans and labourers. This was because most of LGAs did not have technical personnel who can evaluate the submitted bids for irrigation works¹⁸.

The audit noted contractors who had never constructed irrigation projects as their experience was much on other works like roads and buildings works¹⁹. It was further revealed that, small scale irrigation projects used

¹⁸ Reviewed letter of correspondence from Kiroka and Tulokongwa irrigation schemes.

¹⁹ Correspondent letter with: Kumb.Na.ZON/IRR/DISTRICTMOROGORO/VOL IV/111

local contractors with insufficient capital to perform construction work. As the result, works stopped whenever payments are delayed (Figure 5).

In addition, inadequate post-qualification during tendering processes contributed to the selection of incompetent contractors.

According to Section 74 (4) of Public Procurement Act of 2011 and its regulations of 2013 contractors are expected to be awarded contracts if they have sufficient equipment, capital and man power with appropriate skills for the job.

A review of contract files of Kyota, Buhangaza, and Kakese contractors indicated that after winning the tender, contractors did not deploy technical personnel that were stated in the contract documents. Instead they deployed staff with insufficient skills to deliver the projects. According to interviews with ZIO officials this was due to inadequate supervision to verify the presence of the personnel and equipment as stated. As a result, unfaithful contractors deployed incapable personnel and defective equipment.

Likewise, contractors did not mobilize the equipment needed for Tulokongwa, Hangagadinda and Kirya irrigation schemes. It was further noted that the contractor of Tulokongwa demobilized some of equipment (two excavators) immediately after being payed the first Interim Payment Certificate (IPC 1). These contributed to the delays of 181 days and inadequate qualities of the built canal.

According to Clause 16.1 of General Condition of Contract (GCC) the Project Manager was expected to ensure that the contractor deployed the right staff and equipment, short of which sanctions had to be imposed. Based on review of contract files, the clients (LGAs) took appropriate actions in occasions; deduction of liquidated damage for Mapama Scheme; termination of contract at Kituri; and revision of BoQ rates for Tulo/Kongwa project. For more details (**Table 3.13**).

In Mtwara irrigation zone, at Chikwedu-Chipamanda scheme, time elapsed by half of the contract duration (61 days)²⁰ due to shortage in manpower while the work done was only a quarter of the scope. It was noted that, equipment and technical personnel indicated to be deployed by the contractor could not be evidenced on site.

It is also important to note that irrigation projects are normally implemented in remote areas. Projects with smaller contract sum become less attractive to large and competent contractors due to costs associated with mobilization of heavy construction equipment such as bulldozers and excavators. Hence ZIOs may sometimes need to consider clustering the projects in close proximity to revise the project costs by factoring in all the

²⁰ Project status for Mtwara Irrigation Zone- SSIDP-Batch II

risks inherent in these areas hence attract competent and high class Contractors (Class 4-1) to bid. Otherwise bidders will be limited to class 6-7 Contractors available within LGA areas, which are less experienced with fewer equipment and capital base.

Irrigation Zone	Scheme	identified	Action taken
Kilimanjaro	Mapama	Contractor failed to finish project on time regardless being warned	Project entered to liquidated damage of about TZS 5.9 million
	Kituri	 Contractor failed to finish project on time regardless being warned 	The Project was terminated
Morogoro	Signali	 Poor contractors' equipment lack of enough technical personnel lack of financial capacity 	No any evidenced sanctions
	Tulo/Kongwa	 Contractor had an experience on road construction and building works but not to irrigation work construction 	The BoQ was subjected to review to rectify the under rated gates
Mwanza	Buhangaza	 Contractor's key personnel were not present, and due to work being executed by non-technical personnel, the measurements indicated unnecessary increase of concrete quantity Excavation of canal was done beyond levels and dimension 	No any evidenced sanctions
	Kyota	Contractor's key personnel were not present on site	No any evidenced sanctions
Mtwara	Chikwedu- chipamanda	 Contractor's key personnel and equipment were not present on site 	No sanctions

Table 3.13: Contractor's Problems Identified and Action taken

Source: Auditor's analysis using data from progress reports

3.4.2 Change in contract period due to unrealistic designs

Extension of time being one among compensation events need to have evidence or justifiable reason(s) for it to be granted by the Project Manager.²¹ Unrealistic design led to missing, less or more quantities of items in BoQ as compared to actual site situation, resulting in contractor to claim for quantities and extension of time. During implementation of the project real situation applies. When this happens, they need extra time for preparation of drawings and approvals for any variation from contracted drawings, items and quantities. The extra time needed was among compensation events in the conditions of contract. Presence of unrealistic design gives room for the contractor to request for and be granted extension of time. That being the case, project completion schedule was affected, and ultimately, the intended services of the project to beneficiaries were delayed.

Review of tender board minutes from Muleba District revealed that, design was carried out without site visiting to verify the current site conditions. This contributed to having an omission and addition of items which could not have occurred if site visits were done. Presence of unrealistic designs were evidenced in the following cases:

Case 1: Mwanza Irrigation Zone

At Kyota irrigation scheme, item 3.3 (cross drainage structure at chainage 480) on the BoQ amounting to TZS 3.4 million had already been constructed on previous work is an impact of designing without visiting the site. However, this amount was not paid, rather it was shifted to new unplanned work of constructing a charcoal dam.

At Mwasubuya Irrigation Scheme, the project design report was not exhaustive enough to give a complete picture of the site conditions especially soil and water. Section 1.6.3, of the design report, just mentioned the presence of black cotton, clayey, and sand soil without going into details by mentioning chainages, soil depth for each type of soil present.

Likewise, on section 1.6.5 of that design report, it only mentioned availability of water resources. This report did not give information about water quantities, quality and sustainability of the available water sources.

²¹ Public Procurement Regulation Clause 52 (1)and (3) (8),

Absence of such information poses a risk of coming up with unrealistic designs, drawings and BoQ. This may further lead to time compensation which delays the services to beneficiaries of the irrigation projects.

Case 2: Kilimanjaro Irrigation Zone

At Mapama Irrigation Scheme in Kilimanjaro Irrigation Zone, unrealistic design led to shifting of contractor's working section from chainage 600m-1600m to new working section which was chainage 4000m-5000m. In addition, dimensions and drawings for flood protection bund were missing. These incidences resulted into a time extension of 32 days.²²

3.4.3 Improper Construction Scheduling

Construction scheduling was another factor that caused delay in completion of irrigation projects. Incidence of construction scheduling on when to start and finish the projects matters before starting construction works. Delays of many projects were partly the result of schedules that were not realistic as construction works fell during heavy rainfall and cropping seasons despite the fact that most of the construction contracts had short durations.

Review of different correspondences from contractors to client indicated that heavy rainfall was the main reason used by contractors when seeking time extension. However, there were no rainfall records for proving incidents of heavy rainfalls to support the requests for extension of time.

Improper scheduling of procurement and other indoor activities led to execution of irrigation projects during unfavourable seasons. This made project get interfered by rainfall and cropping season and led to suspension of works due to unfavourable conditions.

3.4.4 Delayed Payments to Contractors

Delays in payments to contractors were another reason that contributed to delay in project completion. Although this factor appeared less frequently in SSIDP irrigation projects, it still contributed to project delay and the situation might be severe in other irrigation projects of different nature if not intervened by NIRC.

Five (5) out of 18 irrigation projects that were constructed at Mtwara Irrigation Zone were delayed due to delayed payment to contractors. Likewise, in Morogoro 1 out of 13 was delayed due to delayed payments to contractor. Delay in payments had direct effects in physical work progress, and this happens when contractors' cash flow was affected (**Figure 5**).

²² Correspondence from NIRC with refe. No;KILZ/MAPAMA/IRR/61

Figure 5 shows that, physical progress of project depends on the cash flow of the contractor. For this case contractor continued working without being paid for five months, where he only achieved 31 percent of physical progress. This progress was attained on the first half of contractual period. For the remaining five (5) months, contractor managed to increase only 12 percent of the physical progress making cumulative progress of 43 percent, at the time when the contract period was over, and cumulative payment made was only 20.5 percent.

Severe delay in completing irrigation projects were experienced in projects out of SSIDP. Likewise, 17 Projects under the Big Results Now (BRN) were in Mbeya Irrigation Zone for the financial year 2014/2015. It was noted that six (6) irrigation projects were completed with delays, while the remaining eleven (11) irrigation projects were not completed till auditing period.



Source: Monitoring sheet for Nakahuga Irrigation Scheme 30th April 2018
 Figure 5: The Impact of Financial Delays on Physical Progress of irrigation Project Implementation

It was further noted that, for the BRN projects with contract amount of TZS 5.8 billion, the government did not pay to contractors the amount of about TZS 1.76 billion which is equivalent to 30 percent of the amount that was to be paid. Four (4) out of 17 irrigation projects were not funded by more than 50 percent till auditing period (**Appendix 7**).

Likewise, Idete Irrigation scheme which was implemented by Idete Prison in Morogoro Irrigation Zone with contract amount of TZS 2.53 billion had to be completed on 8th July 2014. However, till the time of this audit there is delay of 4.5 years. Examining of five Interim Payment Certificates, there was a noted delay in payments to contractors as shown in **Table 3.14**:

Projec t Name	Interim Payment Certificat es Number (IPCs)	date of Claim	Amount requeste d (in TZS millions)	Date Payed	Amoun t Paid (in TZS millions)	Days exceede d 28 days
	1	19/02/201 4	210	04/06/201 4	210	77
	2	24/10/201 4	393	06/01/201 5	393	46
ldete	3	16/02/201 5	226	08/04/201 5	226	23
	4	04/11/201 5	188	04/12/201 5	188	2
	5	14/04/201 6	147	31/05/201 6	147	19

Table 3.14: Delayed Payments to Irrigation Projects out of SSIDP

Source: Summary of IPCs from Morogoro Irrigation Zone

Table 3.14 above shows that payments of all certificates were delayed. The maximum delay observed was 77 days. While the minimum delays was 2 days

3.5 Inadequate Cost Control in the Execution of Irrigation Projects

National Irrigation Commission through ZIEs are required to monitor the construction works progress so that it is as planned and completed within contractual price²³. A cost overrun is also considered to be a big problem which hinders project progress, since it decreases the contractor's profit leading to high losses.

In contract management of construction projects any amount exceeding from contractual agreed price is termed as cost overruns.

Review of progress status reports for the projects showed that 31 out of the 78 reviewed projects which is equivalent to 40 percent were implemented at costs that were higher than the originally agreed contract prices (Table 3.15).

Table 3.15 shows that, the severity of cost overruns was noted at Mwanza Irrigation Zone where 63 percent of the schemes were constructed at prices above initial contract price. Morogoro was least as only 20 percent of its schemes were constructed with cost overruns.

²³ Site Handbook for Construction Management & Supervision of Small Scale Irrigation Development Projects

Contractuar Price					
Irrigation	Total number	of	Schemes constructed	Porcontago	
Zone	schemes		above contractual price	reicentage	
Morogoro	10		2	20	
Mbeya	26		10	38	
Mtwara	17		8	47	
Kilimanjaro	17		6	35	
Mwanza	8		5	63	
Total	78		31	40	

Table 3.15: Percentage numbers of Projects Constructed aboveContractual Price

Source: Auditor's Analysis using data from Project status Report for batch I and II

The audit further noted that, cost increase for all reviewed projects were TZS 665.6 million which was equivalent to 2.9 percent of the total contract sums of the reviewed projects (**Table 3.16**).

	reviewed in igation Projects							
	Agreed	Actual						
	Contract	Contract Sum	Amount					
Irrigation	Sum(in TZS	(in TZS	increased(in	Percentage				
Zone	Million)	Million)	TZS Million)	Increased				
	3,710	3,724						
Morogoro			14	0.4				
Mbeya	10,601	10,853	252	2.4				
Mtwara	3,515	3,648	133	3.8				
Kilimanjaro	3,830	3,920	90	2.3				
Mwanza	1,601	1,778	177	11.1				
Total	23,257	23,923	666	2.9				

Table 3.16: Increased Amount from Original Contract Prices for thereviewed Irrigation Projects

Source: Auditor's Analysis based on Project status reports from ZIOs

From **Table 3.16**, the cost increase ranged from 0.37 to 11 percent of the original contract sum, where Mwanza had an increase of 11 percent, which is equivalent to TZS 177 million. Mtwara irrigation Zone had an increased cost by 3.8 percent which is equivalent to TZS 133 million.

It was also noted that²⁴, the implementation cost for SSIDP irrigation projects did not increase beyond engineer's estimate as the project had a fixed budget which was closely monitored by financiers. For the SSIDP projects, cost overruns were mostly controlled by project re-scoping where works were reduced from the previous agreed scope (**Table 3.19**).

²⁴ SSIDP Progress reports to be sent to donors

Despite of re-scoping projects as a means of maintaining budgeted amount, this audit noted a slight increase of cost from the contractual amounts. These increments were due to the following factors:

- Contactor's default;
- Addition of work which was mostly done after using the balance amount from engineer's estimate; and
- Unrealistic design.

Review of Progress reports of different irrigation projects indicated that reasons of cost increase experienced varied in magnitudes from one irrigation zone to another. **Table 3.17** shows each reason have been presented with respective number of occurrences from all the irrigation zones visited.

	Number of Occurrence					
Causes of Cost Overruns	Morogoro	Mbeya	Mtwara	Kilimanjaro	Mwanza	Total score of occurrence
Contractor's Default	1	1	1	4	2	9
Addition of work	2	21	6	10	9	48
Unrealistic design	4	1	1	6	2	14

Table 3.17: Number of Occurrence on causes of Cost increase

Source: Auditor's Analysis from SSIDP project status

Table 3.17 above shows, additional work had higher scores of 48. Also, Unrealistic design was the next in frequently occurring to causing cost increase as it occurred 14 times in visited irrigation zones. The causes of cost increase on irrigation projects are further elaborated below:

3.5.1 Contractor's default

Review of progress reports of site meetings and interviews with Zonal Irrigation Officials indicated that contractor's incompetence's affected project progress in different ways. The contractor's incompetence is attributed by inadequate supervision of project manager; as a result projects are constructed below the standard delayed and with elevated costs. Contractors need to be supervised daily as many of them are executing more than one project while their capital is small.

That being the case there is risk for the contractor to demobilize equipment from one site and shift them to another site. For example, at the construction of Tulokongwa irrigation scheme, contractor demobilized two excavators after being paid an advance payment while the intended work was not achieved. Further contractor's problems identified in cost and quality of constructed work is as shown in Table 3.13

3.5.2 Addition of work

Forty eight (48) out of 78 reviewed irrigation projects, which is equivalent to 61 percent had addenda for addition of work. It was noted that, inadequate plan on what to achieve on the given irrigation scheme, and inadequate estimates in items of BoQ were the major causes of addition of work (Table 3.18).

Irrigation Zone	Number of projects	Number of Addenda	Percentage Addenda
Morogoro	10	2	20
Mbeya	26	21	81
Mtwara	17	6	35
Kilimanjaro	17	10	59
Mwanza	8	9	113
Total	78	48	62

Table 3.18: Number of Addenda observed in Irrigation Schemes

Table 3.18, depicts that, Mwanza Irrigation Zone had addenda for addition of work of about 113 percent while Morogoro Irrigation Zone had an addition of work of about 20 addenda

3.5.3 Unrealistic design

Review of project status reports revealed the incidents of unrealistic design in Morogoro, Kilimanjaro and Mwanza zones which contributed to project cost increase (Section 3.4.1, case 1 and 2). It was noted that, unrealistic design was mostly caused by designing which is conducted without having adequate site investigation.

Review of project progress reports and interviews with ZIOs, revealed irrigation projects were re-scoped due to fixed budgetary amount. Project re-scoping will reduce service to farmers as water will not reach on part of the initially intended farm areas (**Table 3.19**).

Irrigation Zone	Scheme	Variation caused re-scoping	Cost implicated
Kilimanjaro	Kigongoni	 Design of middle right of way between middle and right abutment walls of headwork that changed height from 3.4m original design to 2.8m An increase in length of stilling basin protection works by 4.5m to reduce scoring and 	This resulted in cost variation of TZS 23 million

Table 3.19: Irrigation Schemes with Variation that caused Re-scoping

Irrigation Zone	Scheme	Variation caused re-scoping	Cost implicated
		change length of stilling basin section from 22.47m to 23.85m.	
	Themi ya Simba	 Error in calculation of quantity of mass concrete for base.in B.O.Q. Resulted in change of design of canal cross section. Black cotton soils found along the main canal 1,155m. R.C slabs on top of walls and sand layer on base and walls provided. 	Resulted in total cost variation of TZS 30.5
Mwanza	Buhangaza	 Errors in calculation of BRC for, BoQ indicated the BRC required to be of 3314.43 kg for the length canal of 1578.3m. This was enough for canal length of 466.55m only Already excavated canal length was estimated to be 1578.3m while it was 590m only BoQ proposed the Division Box/Drop structure to be 10, while the required was only 5 	Led to cost variation of about TZS 26 million
	Kyota	Errors in calculation of BRC for, BoQ indicated the BRC required to be 847kg for the canal length of 385m. This quantity was only enough for canal length of 119.23 m. Hence the required BRC for 385m was 1888.04 kg.	This led to unnecessary cost variation of TZS 7.6 million.

Source: Auditor's analysis using data from Progress Reports

3.6 Failure of NIRC to conduct independent quality control activities

Section 14(1) of the National irrigation Act 2013, requires the irrigation inspector to ensure standards and specification of irrigation projects are met.

To check if independent quality control was done in all five irrigation zones covered, the audit team reviewed reports of 20 sampled irrigation projects in total. In all of these projects no zone conducted independent quality control. Instead, Kilimanjaro zone conducted one independent site visit²⁵ for one project (Themi ya Simba²⁶) out of 4 sampled projects. The visit was conducted when the project had already been completed.

The visit observed the presence of black cotton soil, absence of distribution boxes to distribute water for side farms (**Photo 4**) and water shortage during dry season.

Because these shortfalls were identified after project completion, the contractor had already left the site. This led to difficulty to work on issued recommendations as they would need additional costs of bringing back the contractor to implement them.

3.1.1 Inadequate Progress Monitoring of Construction Works

The project Manager is in charge to manage all contractual works on site on behalf of client. Monitoring of irrigation project becomes easy when the Project Manager is appointed from ZIO. It is where ZIE can easily track the progress of construction work. For those projects that are directly supervised by Project Manager from LGA, it becomes difficult to be monitored by ZIE. Instead the track of project depends on progress reports sent to ZIE and an invitation to attend regular progress site meetings.

 $^{^{\}rm 25}$ Independent site visit is visit meant for inspection which $\,$ is conducted by NIRC officials who are not party to the contract

²⁶ Ripoti Kuhusu Ziara Ya Ukaguzi Wa Miundombinu Ya Umwagiliaji Katika Skimu Ya Umwagiliaji Ya Themi Ya Simba Iliyofanyika Tarehe 02/10/2018



Photo 4, Themi ya Simba irrigation canal built with no distribution boxes for irrigating side farms, photo taken by auditors on 26th November 2018

The audit observed that²⁷ ZIO had no set mechanism to track project work progress from Project Manager appointed from LGAs. As a result, ZIO take most of the action depending on that information.

It was further noted that, ZIO used Project Committee (PC) to supervise work progress. Although the committee was trained for some construction basics, they were not competent enough to handle their function when critical part of work was executed. For example, at Buhangaza and Kyota irrigation schemes, site visit report showed that, the PC members were not clear on the quantity of work to be executed on the contract, and work was executed by non-technical personnel. This resulted into unnecessary increase of concrete, and canal excavation were done beyond the design levels and dimensions

Basing on site meeting schedule, PCs and progress reports alone can give a loophole for unfaithful contractors and Project Manager to hide some weaknesses that would have been revealed if they planned and conducted independent quality control.

Apart from depending on site meetings schedule, and progress reports to make decision the audit also found that Zonal Irrigation Officials lack the sense of independence as they cannot take any sanction when there was

²⁷ Interview minutes, and sampled site meetings from Zonal Irrigation Offices of Morogoro, Mbeya, Mtwara, Mwanza and Kilimanjaro

breach of National Irrigation Act. This is because, according the comprehensive Guideline 2010 Zonal Irrigation Officials were supposed to provide technical support to LGAs engineers. The audit noted that, the guideline²⁸ used was not updated to align with the National Irrigation Act 2013. Where the guideline mentions Zone as a technical back stoppers, the act identifies them as the overall supervisors of all irrigation activities carried out in the country. For example, on the review of correspondence letter from Morogoro DC, the District Executive Director ignored instructions from Zonal Irrigation Engineer (ZIE) by reminding him that he was not supervising irrigation projects under LGAs, but rather he was for backstopping only. For more details Refer **Appendix 8**.

Based on correspondence from ZIO-Morogoro to Morogoro DC²⁹, in year 2018 the council decided to engage the zonal officers to conduct an independent inspection in one of their completed projects (Minepa Irrigation Scheme). ZIO-Morogoro conducted this inspection to find out if the project was done according to standards.

After the inspection and evaluation of work conducted several shortcomings were identified and advice was given accordingly on:

- Defects at the headwork (intake outlet box) and sections of the main canal built by masonry which had already started being destructed by flood as backfilling was not adequately compacted
- Contractor requested to change the bedding specification from stone to concrete bedding contrary to contract requirements

This implies that, ZIO conducted independent inspection only when the LGAs called them. This shows that there was a risk that independent monitoring of irrigation projects work was inadequate, and ZIO had no full control over the quality of the irrigation projects implemented through LGAs.

The impact of ZIO not to conduct independent quality control was further evidenced at Mbeya irrigation zone. For example, for Uturo Irrigation Scheme (See Photo 5a) the constructed canal slope was not straight as finishing of the bed was not smooth. The irregular slope lead to creating ponding of water on some part of a canal. In addition, Photo 5b shows the poorly constructed canal for Mwenda-mtitu irrigation scheme. The canal embankment was not well cut to required slope and not well supported to control sand and soil falling on the canal. This irrigation scheme was at risk of siltation and hence clogging. ZIO had not introduced any mitigation measures such as build gabion walls or planting grasses to control more adverse impacts.

²⁸ Comprehensive Guideline for Irrigation Scheme Development under District Agricultural Development Plan

²⁹ Correspondence letter from Morogoro irrigation zone to DED of Morogoro council



CHAPTER FOUR

CONCLUSIONS

This chapter provides conclusions of the findings presented in chapter three. The basis for drawing the conclusion is the overall and specific objectives of the audit as presented in chapter one of this report.

4.1 General Conclusion

The Ministry of Agriculture through National Irrigation Commission had not effectively managed the pre-construction and construction works of irrigation projects to ensure sustainable availability of irrigation water. This was partly because Ministry of Agriculture had not given adequate priority to construction of irrigation infrastructures. As a result both preconstruction and construction works of irrigation projects were found to have deficiencies.

Generally, there was no harmonized monitoring mechanism between NIRC and LGAs when procuring contractors for construction of irrigation infrastructures. The Supervision role of NIRC on the construction of irrigation projects was not adequate. Most of the constructed irrigation works were found to deviate from the required specifications, cost and completion time. Because of that, constructed irrigation schemes were not performing well. Most of these schemes were not feasible and pose a risk of underperforming and collapsing because NIRC and other stakeholders either conducted partial feasibility studies or did not conduct them at all before designing the irrigation projects. Hence the engineering designs and BoQs were not backed up by detailed scientific facts that were supposed to be obtained from detailed feasibility studies and physical site visits. Inadequate funding of NIRC to cater for supervision of the irrigation activities contributed to inadequate performance of constructed the irrigation schemes in the country. As a result, food security in the country might be at risk as the existing irrigation infrastructure would be of low standards and would not be able to meet the increasing demand for irrigation water to farmers, because of the potential for increased irrigation coverage to improve food security would be limited and presence of erratic rainfall.

4.2 Specific Conclusions

4.2.1 Planning, Implementation and Use of the Components of Feasibility Study in Designing of Irrigation Projects

The National Irrigation Commission had not adequately planned and executed feasibility studies. Feasibility studies were not given adequate priority in the annual plans and budgets. This was demonstrated by the fact that irrigation zones that planned to conduct the feasibility studies were not given funds for such activity for more than two consecutive years.

Inadequate funding of irrigation projects contributed to failure in executing plan of conducting feasibility studies. Zonal Irrigation Offices were not sufficiently funded, as the projects for all sampled irrigation zones, received about 4 percent of the approved budgets during the period covered by this audit. This contributed to slowing the progress of irrigation activities.

In addition, many irrigation schemes were executed without having detailed feasibility studies. The components of topographical and engineering design appeared to be considered when executing irrigation projects while ignoring other components which were also vital. This resulted to designing and hence construction of irrigation schemes that were predisposed to flood, delays and re-scoping, which were also among the causes to projects cost overruns.

Had the component of environment in the feasibility studies been studied before, water shortage during dry period would not have been experienced, as the excavation of the charcoal dam for water storage would be covered within the original scope of the works. In addition, the variation and subsequent extension of time would be avoided.

National Irrigation Commission had not liaised with Local Government Authorities (LGAs) to set proper mechanisms for tender evaluation processes. This had led to the procurement of incompetent contractors who delayed completion of some irrigation works leading to unnecessary cost overruns.

4.2.2 Inadequate supervision on the construction of irrigation projects as per required specifications, agreed cost and expected completion period

There was inadequate time control in the execution of irrigation projects, as delay in the completion was experienced in many irrigation projects. 63 out of 83 projects, which represents 76 percent of the irrigation projects for SSIDP I and II had delays with varying magnitudes. These delays were due to contractors' defaults, unrealistic designing, bad timing (unfavorable weather), and delayed payments to contractors.

Also there were inadequate cost controls that were the result of inadequate planning, unrealistic designs, and addition of works which impacted much on the reduction of scope of work. Scope reduction had resulted to reduction of services that would have been provided by the project.

Improper scheduling of construction activities was regarded to be highest contributor of delays in completion of construction works. It was noted that 57 percent of all the causes of delay were linked to improper construction scheduling. Procurement and other construction activities were scheduled to be constructed during unfavorable weather and cropping seasons. It was not necessarily that rainfall impairs construction activities of irrigation projects, but rather it was much influencing the mobilization stage of materials and equipment. This is to say that, had the advance payments for mobilization made in due time, and the project managers strongly supervised the contractor to abide their work programs and specifications, there could be a chance of reducing a great number of delays in different irrigation projects.

Local contractors were not liquid enough to carry out the construction of irrigation projects, this contributed to delay in the completion of the irrigation projects. Some contractors did not deploy to the construction sites enough equipment and technical personnel that were indicated during tendering process. As a result, construction works were carried out by using limited equipment and laborers, ultimately compromised the completion time. This was an indication that post-qualification of the bidders was not done prior to awarding of contract to ascertain the declared contractor's resource capabilities during bidding.

4.2.3 NIRC did not conduct fully independent quality control to ensure standards are met during Construction of Irrigation Projects

Irrigation zones did not conduct independent quality control, to check and take appropriate measures where necessary. NIRC was not fully exercising its powers as the overall supervisor of irrigation activities as it is still functioning as a back stopping unit. Auditors were of the view that, quality of built projects would still be compromised until NIRC had realized its vested mandate on irrigation activities in the country. This is because NIRC did not act as an independent agency with minimal influence of LGAs in implementing construction of irrigation projects for assured quality supervision of the engaged contractors. For the case of irrigation projects initiated by LGAs NIRC did not participate fully in the project conceptualization, tendering and project executions.

CHAPTER FIVE

RECOMMENDATIONS

5.1 Introduction

This Chapter provides recommendations to the Ministry of Agriculture with a view to address issues observed during the audit. The National Audit Office believes that these recommendations need to be considered to ensure irrigation works are timely completed, according to agreed quality and at reasonable cost.

5.2 Planning, Feasibility Studies and Designing

- 1. NIRC should develop a database for recording irrigation schemes present, their physical and financial progress and the project status that will help in projects supervision activities such as planning, monitoring and follow up.
- 2. Ministry of Agriculture through NIRC should develop a plan and liaise with the Ministry of Finance and donor partners so as to ensure sustainable funds are available for the approved projects in order for the projects to be implemented to completion.
- 3. NIRC should strengthen supervision of the selection process to ensure that works are awarded to contractors with adequate human resources, working equipment and financial resources to implement the works. These should also be confirmed when the contractor is at site.

5.3 Selecting Contractors for the Construction of Irrigation Projects

1. Ministry of Agriculture should establish a coordination mechanism that will enhance NIRC and LGAs to cooperate in all stages when implementing irrigation projects.

5.4 Supervision of the Construction Activities

1. NIRC should ensure the procurement activities are planned to be carried out during favourable season in order to allow the construction activities to be carried out in the dry season to reduce the weather and seasonal related delaying factors such as rainfall and interference with cropping season.

- 2. NIRC should update its operational guideline (Comprehensive Guideline 2010) so as it aligns with its mandate and with the National Irrigation Act of 2013.
- 3. NIRC being the overall supervisor of all irrigation activities, it is responsible for establishing a mechanism that would make it take part in irrigation contracts execution so as to monitor construction progress and take an appropriate action in case there is a contract breach.

REFERENCES

- 1. URT (2013). Agricultural Sector Development Program (ASDP), Impact Evaluation of the Irrigation Investment of the Agricultural Sector Development Programme (ASDP), 10th April 2013.
- 2. URT (2010). Ministry of Agriculture, Food and Cooperation, Agriculture Sector Development Programme (ASDP).
- 3. URT (2010). Ministry of Agriculture, Food and cooperation, Zonal Irrigation Technical Support Unit, Comprehensive Guideline for Irrigation Construction, Dar es salaam.
- 4. URT (2011).National Audit Office, General Report, Annual General Report of the Controller and Auditor General. Dar es Salaam: National Audit office.
- 5. URT(2018). National Irrigation Commission (2014-2018), Budget plan
- 6. URT (2017).National Irrigation Commission Site handbook for Construction Management and Supervision of Small-Scale Irrigation Scheme Development
- **7.** United republic of Tanzania (2011), Public Procurement Act, and its sub-sequent amendments.
- 8. United Republic of Tanzania (2013).National Irrigation Act Number 5 of 2013, (National Irrigation Act 20013, 20 para 1 to 3) United republic of Tanzania (2016).National Irrigation Development Strategy (NIDS),
- 9. United Republic of Tanzania, Approved NIRC Organization Structure, National Irrigation Commission, Organization structure
- 10. United republic of Tanzania. (2002). National Irrigation Master Plan (NIMP),
- 11. United Republic of Tanzania (2010). National Irrigation Policy

LIST OF APPENDICES

Appendix 1: Types of Irrigation systems practiced in Tanzania

• Types of Irrigation Systems in Tanzania

There are three main types of irrigation systems in Tanzania that are Surface, Conventional Sprinkler, and Drip Irrigation systems. The detail of each type of irrigation system is briefly described below:

• Surface Irrigation System

There is a wide variety of irrigation systems used in our country. The predominant one is surface irrigation. In this system which is very common for small holders, distribution is usually by lined and unlined canals. Included in this category is the water harvesting or use of flood recession, which although informal but it's still considered as surface method. Furrows and basins are widely used in this. This system does give rise to salinity, but once attention is paid to adequate drainage, the problem is overcome.

• Conventional Sprinkler Irrigation System

This is widely used by large scale commercial farmers. It is not common among the smallholders as these are too many mechanical parts to break or lose but also requires pumping. In Tanzania, very few schemes use this approach.

• Drip Irrigation System

It is widely used on coffee and other crops. If well designed the system performs well. The system is rarely used in Tanzania.

Irrigation Zones in Tanzania

To properly manage irrigation activities, the government has divided the country into eight Irrigation Zones. Focus on Government strategy on irrigation development with emphasis on, Attainment of National Food Security; Increased productivity and income; Particular emphasis on production of high value crops Development of irrigation in the country is the responsibility of the following eight Irrigation Zones namely:

- Mwanza Zone (Mwanza, Mara, Kagera and Geita regions);
- Tabora Zone (Tabora, Shinyanga and Simiyu regions);
- Central Zone (Dodoma, Singida and Manyara regions);
- Morogoro Zone (Morogoro, Coast and Dares Salaam)regions;
- Mbeya Zone (Mbeya, Iringa, Songwe and Njombe regions);
- Mtwara Zone (Mtwara, Ruvuma and Lindi regions);
- Kilimanjaro Zone (Kilimanjaro, Tanga and Arusha regions); and
- Katavi Zone (Katavi, Rukwa and Kigoma regions).
Categories of Irrigation Schemes in Tanzania³⁰

Although it is difficult to develop strict rules for categorizing irrigation into classes based on area, the below three classes of irrigation schemes were adopted.

- Small Scale Irrigation Schemes; are schemes with area of up to 500 ha;
- Medium Scale Irrigation Schemes" are schemes having area between 500 ha and 2,000 ha;
- Large Scale Irrigation Schemes are schemes with areas of over 2,000 ha.

³⁰ URT, National Irrigation Strategy 2016

Appendix 2: Key document reviewed

Category	Name of Document	Reason			
	Comprehensive guideline for irrigation scheme construction	Guideline showing on how the irrigation infrastructures are carried out.			
	Strategic Plans	To obtain the information on different irrigation schemes which were planned to be constructed and those were constructed.			
Plans documents	Procurement Plans of different irrigation Projects 2012-2017	To assess whether all aspects on irrigation projects has been identified and prepared in Procurement plan.			
	Approved Medium Term Expenditure Framework for 2012/2013- 2016/2017	To know on how much resources has been allocated on implementing the construction of irrigation projects			
Operational documents	Procurement Files	To obtain and assess the pre pre-determine evaluation if consist key elements of designs and feasibility studies; selected evaluation team and their qualification, key reviews and negotiation made made before granting the award of contact			
	Construction Contracts between NIRC with Contractor and Consultants	To identify the contract sum, duration, scope of work and Terms of Reference			

		To review the
		implementation of
		projects through
		schedule of work, BOQs,
	Irrigation project files	site visits, meetings,
		identify the contract
		sum, duration, scope of
		work and Terms of
		Reference
		To identify strategies
	Monitoring and	taken by the government
	Evaluation reports	to track the progress of
		implementation of
		irrigation projects
		To examine the extent
Monitoring reports	Projects	achieved when
	implementation reports	implementing different
		irrigation projects
	Progress Report on	To understand the status
	different irrigation	of irrigation projects
	projects	

Ac	pendix	3:	List	of	Official	inter	viewec	l during	the	Main	Study	Phase
					• • • • • • • • •			·				

Institution	Interviewee	Reasons
National Irrigation Commission (NIRC)	Director general of the Commission	• He is responsible in making top decisions on all matters including irrigation activities in his directorate. For instance issuing irrigation projects construction permits and registering of irrigator's organizations.
	Director of designing, planning, Monitoring and Evaluation	 Responsible for designing, monitoring and evaluation of irrigation projects. Responsible to set KPIs used when monitoring construction of irrigation infrastructures
	Director of Infrastructure Development	• Responsible to provide expertise and services on construction, supervision and Maintenance of irrigation and drainage infrastructure
	Head of Human resources	 Responsible for Allocation of human resources to different irrigation zones Responsible to capacitate human resources on the aspect of irrigation activities
Zone Irrigation Office	Zonal Irrigation Engineer/ZIO Head	• Responsible for supervision of all irrigation projects that are conducted within that irrigation zone
LGAs	District Irrigation Engineers, Technician, and	• Daily responsible to supervise irrigation projects implementation activities such as feasibility study, detailed design, tender evaluation as well as tender awarding to the contractor within their locality in collaboration with zonal irrigation office representative.
	District Agricultural Officer	• They are coordinating all ASDP (which is responsible in the construction of irrigation projects) within their locality

Appendix 4: List of Irrigation Sub-Projects that are implemented by the SSIDP

District	Sub-project Number	Irrigation Development Area (ha)	District Sub-project Number Irrigation Development Area (ha)			District Sub-project Number	Irrigation Development	Area (ha)
Mbeya Zone			Tabora Zono	e		Morogoro Z	one	
Busokelo	2	850	lgunga	1	930	Bagamoyo	2	200
Chunya	1	200	Kakonko	1	217	Kibaha DC	1	200
lleje	1	540	Kasulu	Kasulu 3 1,01		Kilombero	1	200
Iringa	6	3,035	Kibondo	1	140	Kilosa	3	1,961
Kilolo	2	700	Nzega	2	1,150	Mkuranga	1	50
Ludewa	2	112	Tabora	1	500	Morogoro	2	647
Makete	1	120	Urambo	1	500	Mvomero	2	350
Mbarali	7	9,212	Uvinza	1	1,200	Rufiji	1	300
Mbeya	1	300	Uyui	1	375	Ulanga	2	1,000
Mbozi	2	290	Sub-total	12	6,027	Sub-total	15	4,908
Momba	1	1,600	Mtwara Zon	е		Kilimanjaro	Zone	
Mpanda	1	1,000	Lindi	2	1,800	Arusha	3	696
Njombe	1	160	Liwale	3	1,330	Hai	3	1,731
Nkasi	2	900	Masasi	1	350	Korogwe	1	310
Sumbawan ga	1	650	Mbinga	2	815	Lushoto	3	1,170
Sub-total	31	19,66 9	Mtwara	1	300	Meru	1	590
Mwanza Zon	е		Namtumbo	2	335	Moshi	2	1,280
Bariadi DC	2	1,302	Newala	1	1,200	Muheza	1	100

Bunda DC	2	360	Ruangwa	1	254	Mwanga	3	1,510			
Karagwe DC	1	300	Songea	4	950	Siha DC	2	420			
Kishapu	1	450	Tandahim ba	1	252	Sub-total	19	7,807			
Muleba DC	3	295	Tunduru DC	1	100	Central Zor	Central Zone				
Rorya	1	250	Sub-total	19	7,686	Babati DC	1	200			
Sub-total	10	2,957				Bahi	2	470			
			J			Dodoma MC	1	70			
						Kondoa	1	60			
						Kongwa	1	160			
						Manyoni	1	200			
						Mbulu	1	180			
						Mpwapwa	1	310			
						Simanjiro	4	1,790			
						Sub-total	13	3,440			
						Grand Total	119	52,49 4			

Appendix 5: Planned number of Feasibility Study versus amount of fund disbursed for the Financial Year 2014/15 to 2017/18

Irrigation Zone	Financial Year	Planned Number of feasibility study	Number of feasibility study conducted	Amount planned for feasibility study TZS Million)	Amount disbursed for feasibility study (in Million)
	2014/2015	0	0	0	0
Morogoro	2015/2016	0	0	0	0
	2016/2017	46	0	3600	0
	2017/2018	0	0	0	0
	2014/2015	7	3	300	
	2015/2016	7	0	200	0
mbeya	2016/2017	7	3	400	172
	2017/2018	7	3	200	
	2014/2015	64	0	14000	
Mtwara	2015/2016	64	0	14000	
muwara	2016/2017	65	1	15000	60
	2017/2018	64	0	14000	0
	2014/2015	8	0	700	0.00
Kilimaniara	2015/2016	8	0	700	0.00
Kitimanjaro	2016/2017	0	0	0.00	0.00
	2017/2018	0	0	0.00	0.00
	2014/2015	0	0	0	0
1000000	2015/2016	0	0	0	0
<i>i</i> wwdli2d	2016/2017	13	1	890	40
	2017/2018	0	0	0	0

Source: Auditor's Analysis from Budget Plans (2014/15 to 2017/18)

Аррспал		Inigación rioje			ii i cu	Sibility	Jua			
		Components of feasibility study								
Irrigation	Irrigation	Total number of feasibility	mical	_	al/Water	ech	phical	nomical	nental	ring & Y design

Appendix 6: Status of Irrigation Projects with their Feasibility Studies

Zone	Scheme	study components covered	Agronor	Soi	Hydrologica	Geote	Topogral	Social eco	Environn	Engineer
	Lumuma	8	✓	✓	✓	1	1	✓	✓	✓
Morogoro	Bagamoyo BDIP	8	1	✓	~	~	~	~	~	~
-	Signali	3	✓	x	x	х	✓	x	х	✓
Morogoro Mbeya Mtwara Kilimanjar o	Mwega	3	✓	x	x	x	✓	x	x	✓
	Mgambalenga	3	X X X ✓ X X X X X ✓ ✓ X X				✓			
Mbeya	Mkungugu/Kig asi	3	Х	Х	Х	~	~	х	х	~
	Mshewe	3	Х	Х	Х	✓	✓	Х	Х	✓
	lgiliganyi	3	Х	Х	Х	✓	✓	Х	Х	✓
Morogoro A Morogoro A Mbeya A Mbeya A Mtwara A Mtwara A Mtwara A Mtwanza A Maga	Chikweu- chipamanda	4	~	х	х	Х	1	~	х	1
	Kinyope	4	Х	Х	Х	✓	✓	Х	✓	✓
	Mtawango	4	Х	Х	Х	✓	✓	Х	✓	✓
	Hangagadinda	2	Х	Х	Х	Х	✓	Х	Х	✓
	Mapama	3	✓	х	х	х	✓	х	х	✓
Kilimanjar	Themi ya simba	2	x	x	x	x	~	x	x	~
0	Kigongoni	2	х	х	х	х	✓	х	х	✓
OKigongoni2XKivulini2X		х	х	х	✓	х	х	✓		
	Irenyi	4	х	х	✓	х	✓	✓	х	✓
Mwanza	Maliwanda	5	х	х	✓	✓	✓	✓	х	✓
Mwanza	Mwasubuya	8	✓	✓	✓	✓	✓	✓	✓	✓
	Kyota	4	x	x	✓	х	✓	✓	x	✓
Percentag	ge of F.S compone	ents covered	35 %	15 %	30 %	50 %	90 %	35 %	25 %	90 %
					•					

KEY

- Component of feasibility study covered
 Component of feasibility study not covered

Source: Feasibility Studies Reports

Appendix 7: Status of BRN Irrig	ation Projects	Conducted at I	Mbeya
Irrigation Zone			

	Project	Contract	Amount paid (TZS	Amount not	Percentag
S/N	name	amount (TZS	Million)	paid (TZS	e not
0		Million)		Million)	payed
1	Ipatagwa				
		369.79	299.08	70.71	19
2	Каруо				
		320.55	152.09	168.46	53
3	Mbuyuni-				
	Kimani	328.77	99.42	229.35	70
4	Chang'om			-	
	be	319.75	319.75	0.00	0
5	Motomba				
	ya	375.82	273.63	102.18	27
6	Kongolo				
	Mswiswi	436.23	436.22	0.00	0
7	Mwenda				
	mtitu	175.98	133.31	42.67	24
8	Gwiri				
-		175.98	106.55	69.43	39
9	Cherehan				
	i Mkoga	348.08	348.08	-	0
10	ldodi				
		531.10	358.35	172.76	33
11	Mapogoro				
	-	345.07	345.07	-	0
12	Pawaga	<i>(</i> - - - - - - - - - -			
	Mlenge	607.82	218.49	389.32	64
13	Ugalla				
		169.83	149.14	20.70	12
14	Karema	101			
		691.52	205.88	485.64	70
16	Mwamkul				
	u	645.38	641.01	4.37	0.7
17	Iloba	538.23	0.00	0.00	0
Tota	l	5,841.65	4,086.06	1,755.59	30

Appendix 8:Part of letter from Morogoro DC to ZIE-Morogoro indicating ZIO as back stoppers and not as a supervisor

serikali na pale inapoona panamahitaji ya kupitia au kukagua miradi iliyo chini yake itafanya biyo bila kusita. Kwa miradi ya Umwagiliaji ofisi yangu itaendelea kutumia ofisi ya Kanda a wadau wote husika pale inapobidi ili kuongeza ufanisi wa miradi iliyoko wilayani na si kwa mradi mmoja wa TuloKongwa. Ikumbukwe tu ofisi yako siyo mkaguzi wa miradi ya umwagiliaji bali ni ofisi inayotakiwa kutoa ushauri wa kiufundi na kitalaam kwenye miradi husika kadiri inapopasa (*technical backstopping*). Aidha kwa vile vipengele vilivyotolewa ushauri na kuhitaji utekelezaji ofisi yangu itawaelekeza watalaam wake kufanya hivyo mapema ili kutochelewesha mradi kumalizika kwa wakati hii ni pamoja na rejeo la maelekezo ya Katibu Tawala Mkoa katika kikao chake kilichoketi tarehe 20.04.2017 ofisi ya Mkuu wa Mkoa.

Napenda kukuhakikishia ofisi yangu itaendelea kupokea ushauri kutoka ofisi yako kadiri ya mahitaji ya miradi yote iliyoko wilayani.

Nakutakia kazi njema katika ujenzi wa Taifa

SUDI MPILI MOROGORO MOROGORO

	Working					Irrigat	ion Zo	ne				% a.v.ai
	tools (categor	Moro	goro	Mbey	a	Mtwara		Kilim o	anjar	Mwa	anza	lable
S/ No	y and name)	avai labl e	Tot al req uire d	avai labl e	Tot al req uire d	avai labl e	Tot al req uire d	avai labl e	Tot al req uire d	avail able	Total requi red	
1.	Length measuri ng (laser distance)	0	5	0	4	0	3	0	4	0	5	0%
2.	Water flow (flow meter)	0	5	0	4	0	3	0	3	0	10	0%
3.	Field Concret e Strength (reboun d hammer)	2	5	3	5	3	5	1	4	5	5	37%
4.	Surveyin g instrume nts (total station)	3	5	1	2	1	3	2	3	3	3	38%
5.	Crack detector	3	4	3	5	3	5	3	4	3	5	40%

Appendix 9: Tools Required For Quality Assurance

Appendix 10: Recommendations and Action Plan to National Irrigation Commission

No.	Recommendation	NIRC's Comment(s)	Action (s) to be taken	Timeline
1.	NIRC should develop a database for recording irrigation schemes present, their physical and financial progress and the project status that will help in projects supervision activities such as planning, monitoring and follow up.	Database has already been developed during the Review of the National irrigation Master Plan 2018. Which includes list of irrigation schemes (location, potential area and irrigable area, and its status-physical, production beneficiaries and irrigator's organization, water use permit etc).	Updating it with information of all the schemes and other important information as it demands is ongoing. NIRC has set aside 80,000,000/= in 2019/2020 budget for update of irrigation database	2019/2020 and activity are ongoing
2.	NIRC should strengthen supervision of the selection process to ensure that works are awarded to contractors with adequate human resources, working equipment and financial resources to implement the works. These should also be confirmed when the contractor is at site.	ProcurementprocessfollowsPublicProcurementActProcurementAct(PPA),2011 proceduresEvaluation committee iscomprisedofprofessionalexpertisewithadequateexperience based on thetender to be evaluated.TenderBoardrender to be evaluated.TenderBoardcontractor is capable ofperformingthe workbased on his documentsthroughpost-qualifications.Moreover, due diligenceiscarriedthroughcorrespondencestofirmswherethecontractor has workedbefore and even physicalvisit of his office is madewhere necessary.	NIRC to work in collaboration with PO-RALG office MOU with LGA on implementation of irrigation schemes. Evaluation committee will comprise members from NIRC and LGA. Terminating contracts and Blacklisting of contractors who breach contract performance by reporting them to the professional bodies such as PPRA, CRB or ERB. Eg. Award letter to M/s Fally Enterprises Itd of Sumbawanga for the construction of Mbaka Irrigation	2019/2020 - 2020/2021

No.	Recommendation	NIRC's Comment(s)	Action (s) to be taken	Timeline
			Scheme under Tender No.PA/137/HQ/2017- 18/W/05, lot 7 was cancelled for failure to submit performance security in time.	
3.	NIRC should ensure the procurement activities are planned to be carried out during favourable season in order to allow the construction activities to be carried out in the dry season to reduce the weather and seasonal related delaying factors such as rainfall and interference with cropping season.	NIRC has been complying with the recommendation. However, timely release of funds from Ministry of Finance has been a major limiting factor.	NIRC to set a discussion with the Planning Department of the Ministry of Finance on how to ensure timely release of funds.	First quarter of 2019/20
4.	NIRC should update its operational guideline (Comprehensive Guideline 2010) so as it aligns with its mandate and with the National Irrigation Act of 2013.	Review of the Comprehensive Guidelines with regard to the National Irrigation Act of 2013 has already been updated.	Timely updates will be carried as the need arises.	Ongoing

No.	Recommendation	NIRC's Comment(s)	Action (s) to be taken	Timeline
5.	NIRC being the overall supervisor of all irrigation activities it is responsible for establishing a mechanism that would make it take part in irrigation contracts execution so as to be able to monitor construction progress and take an appropriate action in case there is a contract breach.	Proper enforcement of the National Irrigation Act No. 5 of 2013 in all irrigation activities	NIRC should hold discussion/meetings with all stakeholders in the irrigation sector to create awareness on the National Irrigation Act 2013 and its Regulations.	2018/19 and 2019/2020 (First quarter)

Appendix 11: Recommendations and Action Plan to the Ministry of Agriculture

No.	Recommendation	MoA Comment(s)	Action (s) to be taken	Timeline
1.	Ministry of Agriculture through NIRC should develop a plan and liaise with the Ministry of Finance and donor partners so as to ensure sustainable funds are available for the approved projects in order for the projects to be implemented to completion.	The Ministry has accepted the recommendation and will liaise with the said counterparts to develop a plan	To hold meetings and discussions with Ministry of Finance and development partners.	2019/2020
2.	Ministry of Agriculture should establish a coordination mechanism that will enhance NIRC and LGAs to cooperate in all stages when implementing irrigation projects.	The Ministry will establish a coordination mechanism that will enhance NIRC and LGAs to cooperate in all stages when implementing irrigation projects.	To hold meetings with NIRC and LGAs	2019/2020