

THE UNITED REPUBLIC OF TANZANIA



NATIONAL AUDIT OFFICE

PERFORMANCE AUDIT REPORT ON THE MANAGEMENT OF ACCESSIBILITY AND RELIABILITY OF ELECTRICITY SUPPLY SERVICES



A REPORT OF THE CONTROLLER AND AUDITOR GENERAL

March, 2020

THE UNITED REPUBLIC OF TANZANIA



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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). This is for the purposes of establishing the economy, efficiency and effectiveness of any expenditure or use of resources in Ministries, Departments and Agencies (MDAs), Local Government Authorities (LGAs), Public Authorities and other Bodies.

I have the honour to submit to His Excellency the President of the United Republic of Tanzania, Dr. John Pombe Joseph Magufuli and through him to Parliament of the United Republic of Tanzania the Performance Audit Report on the Management of Accessibility and Reliability of Electricity supply services. The main audited entity was TANESCO, EWURA and the Ministry of Energy.

The report contains findings of the audit, conclusions and recommendations that focused mainly on electricity accessibility and reliability.

TANESCO, EWURA and the Ministry of Energy have been given the opportunity to scrutinize the factual contents and comments on the draft report. I wish to acknowledge that the discussions were very useful and constructive.

My Office intends to carry out a follow-up audit at the appropriate time regarding to the actions taken by TANESCO, EWURA and the Ministry of Energy in relation to the recommendations given in this report.

In completion of the assignment, the Office subjected the report to the critical reviews of Dr. Jackson J. Justo, Lecturer from University of Dar es Salaam and Eng. Bengiel Humphrey Msofe, Professional Electrical Engineer who came up with useful inputs on improving this report.

This Report has been prepared by Eng. Andrew E. Kellei -Team Leader and Mr. Staford Kazyoba - Team Member under the supervision and guidance of Mr. Michael Malabeja - Ag. Chief External Auditor, Eng. James G. Pilly - Assistant Auditor General and Mr. Benjamin Mashauri - Deputy Auditor General. I would like to acknowledge the commitment of my staff and cooperation accorded to my audit team by all the respective Accounting Officers and their staff which has facilitated timely completion of this audit report.

Allfiture

Charles E. Kichere Controller and Auditor General The United Republic of Tanzania March, 2020

LIST OF ABBREVIATIONS

ABC	Aerial Bundle Conductor
CAIDI	Customer Average Interruption Duration Index
CIP	Capital Investment Plan
DMD	Deputy Managing Director
ESI	Electricity Supply Industry
EWURA	Energy and Water Utility Regulatory Authority
HQ	Headquarters
HT	High Tension
K'South	Kinondoni South
kV	Kilo Volt
LT	Low Tension
LV	Low Voltage
m	Metres
MDA	Ministries, Departments and Agencies
MoE	Ministry of Energy
RCRO	Regional Customer Relation Officer
SAIDI	System Average Interruption Duration Index
REA	Rural Energy Agency
SAIFI	System Average Interruptions Frequency Index
SDM	Services Delivery Management
STE	Short Term Employee
TANESCO	Tanzania Electric Supply Company Limited
TBs	Technical Breakdowns
TEDAP	Tanzania Energy Development and Access Expansion Project
TShs.	Tanzania Shillings
TZS	Tanzania Standards
V	Volts

EXECUTIVE SUMMARY

Quality of electricity supply provided to customers results from a range of quality factors. The compulsion to ensure that quality factors are achieved and maintained has been assigned to TANESCO. The obligation to ensure compliance to the quality factors has been delegated to EWURA while the Ministry of Energy has been given an oversight role to ensure TANESCO achieves its role.

The main objective of the audit was to assess whether TANESCO has a mechanism to ensure electricity services are reliable, accessible and timely connected to customers. The audit covered activities of electricity supply (33kV and 11kV) and distribution networks (400V and 230V) during the three years' period i.e. from 2016/17 to 2018/19.

Main Audit Findings:

TANESCO had 72,463 pending surveys resulted to pending quotations to the Customers

Contrary to Customer Service Charter, TANESCO did not timely conduct surveys and therefore accumulated **72,463** potential new customers pending quotations. The pending surveys would have generated a possible income ranging from **TShs. 23.3 Billion** and **TShs. 37.4 Billion**.

Delayed connection to already paid customers

TANESCO did not timely connect 155,127 customers who had already paid for new service line. The delayed connections have significantly contributed to customer complaints.

The delayed connections accumulated a potential income of **TShs. 8.33 Billion** and a potential compensation of **TShs. 12.23 Billion** for failure to connect within the stipulated time if all customers decide to take action and demand compensation.

Connection materials were not supplied in a right proportion

The service line materials such as poles, meters and Aerial Bundle Conductors(ABC) were not supplied in the right propotions to the regions to facilitate timely connections.

There were incidences when customers would miss one or more of the connection materials. Customers would either have poles but meters were missing or have both poles and meters but conductors were missing.

Maintenance practices did not minimize breakdowns

The maintenance practices at TANESCO were more reactive than proactive. The increase in number of reported emergency temporary breakdowns kept the maintenance brigades busy in corrective maintenance than in preventive maintenance. The practice negatively affected the reliability of supplied power which was reflected through voltage fluctuations and frequency of power outages.

73% of inspected poles were decayed

TANESCO reported to have inspected a total of 20,340 High Tension (HT) poles and 19,474 Low Tension (LT) poles. In all inspected poles, a total of 29,142, equivalent to 73% of all inspected poles were decayed. However, in only five visited regions there was a total of 25,565 decayed poles for the period of three years under review. Excessive decayed poles put the power reliability at risk of total blackout.

The power voltage supplied exceeded the limits set by standards

Despite lacking records for measured values of the voltage for 400V and 230V, the availed records for 33kV transmission line showed the Minimum reading exceeded by 16% and the Maximum exceeded by 18%. Also, over 60% of received customer complaints were either voltage problems or no power.

If the voltage is too low, the amperage increases, which may result in the components melting down or causing the appliance to malfunction. If the voltage is too high, this will cause appliances to run 'too fast and too high' which will shorten their service life.

TANESCO did not minimize electricity power interruptions

On average **805,470** customers were affected by **1,407** power outage hours per year in a frequency of **1,548** times per year.

The impact of high frequency of power outages include interruptions at hospitals, clinics and emergency operating rooms, where life-support machines are used which may cause loss of lives. Interruptions to industrial customers may affect production negatively and affect the supply chain in various economic activities.

TANESCO did not have reliable information to measure the Efficiency in relation to Power System Reliability

TANESCO did not have realistic data of the number of customers connected to individual feeders, spurs or substations/ transformers and therefore, it was not possible to calculate the reliability indices for power distribution lines of 400V and 230V.

Lack of reliability indices made it difficult for TANESCO to accurately pinpoint trouble areas and take specific corrective actions to enhance reliability.

TANESCO lost an average of TShs. 67 Billion per year due to power losses

TANESCO generated an average of 733 million-kilowatt hour per year for the three years audited. The energy billed was only 471 million-kilowatt hour equivalent to 64% of the generated power. Power loss attracted an average loss of TShs. 67 Billion.

Slow pace in responding to customer complaints

There was a total of 61,511 pending Customers' complaints. The complaints included technical and non-technical issues. The total pending non-technical complaints were 49,713 equivalent to 81% of all the complaints.

EWURA inconsistently reported issues related to reliability

The issues which were reported by EWURA were not consistent despite being provided with the format of issues required to be reported. The inconsistency was mainly on the issues related to monitoring of TANESCO compliance to standards such as the Tanzania Grid Code requirements on duration of power interruptions, voltage and frequency deviations to customers.

EWURA incorrectly reported issues of quality of power supply

EWURA neither correctly reported the indices nor reported in the required format. EWURA did not include in the calculation the total number of connected customers in the affected areas as well as details of which interruption hours were for load shedding as per the Tanzania Grid Code requirements.

Ministry of Energy inadequately executed monitoring, evaluation and performance reporting roles

The Ministry of Energy did not present specific performance indicators for assessing activities related to reliability and accessibility of electricity supply services. The issued reports did not cover issues of power reliability.

Overall Audit Conclusion

We conclude that, TANESCO does not adequately use its established mechanism to ensure electricity services are reliable, accessible and timely connected to customers.

Despite the efforts made by TANESCO to improve its operations, TANESCO has not ensured that, basic services such as surveys for new connections to electricity are conducted on time and service lines are connected within the stipulated timeframe. Also, despite having operational customer service desks, it was noted that they do not respond to customers' complaints and queries timely.

Many temporary breakdowns are reported by customers at the emergency desks. Actually, TANESCO does not collect all the information, analyse and use the results to plan and conduct risk-based maintenance of the distribution networks.

Moreover, TANESCO does not adequately ensure the quality of power supplied. The outage hours and outage frequencies have been beyond the limits specified by the standards. Frequent breakdown to the distribution systems has resulted into power interruptions.

The Ministry of Energy and EWURA being the overseer and regulator respectively, do not sufficiently ensure electricity is accessible through

proactive and systematic ways of combating problems of power outages, voltage and frequent fluctuations.

Audit Recommendations:

The Ministry of Energy should:

1. Ensure that issues of accessibility and reliability of electricity supply services are covered in monitoring and evaluation of TANESCO.

EWURA should:

- 1. Ensure that the resources for comprehensive monitoring of TANESCO are available, and
- 2. Ensure that monitoring and reporting on power reliability use relevant and reliable data.

TANESCO should:

- 1. Ensure logistical arrangements are improved so as to minimize the number of pending surveys,
- 2. Ensure balanced distribution of service line connection materials to minimize pending connections,
- 3. Prioritize on maintenance of critical elements in order to increase power reliability level and minimizing power loss,
- 4. Ensure that feedback information in the SDM system is accurately received and timely logged in for easy traceability of delivered services,
- 5. Conduct research to find out better substitutes/alternatives to wooden poles, and
- 6. Ensure that reliable data for individual feeders/sub-stations are recorded to enable measurement of Performance efficiency in terms of reliability.

CHAPTER ONE

INTRODUCTION

1.1 Background

Power interruption has been affecting production in firms in sub-Saharan Africa and developing countries whereby it is attributed to low generation capacity, poor infrastructures and much dependency on hydro as the main source of electricity¹. Most of developing countries experience frequent power outages, intermittent supply and large-scale blackouts. Over the years, power outages have contributed to relegating economic development in these countries. Serious impacts have been noted by looking through the life of local communities, customers, utilities, all complaining on their economic losses.

Tanzania, like other countries in Sub-Saharan Africa, faces a problem of aging and inadequate transmission and distribution infrastructure. The government is striving to increase access to electricity, reducing technical and non-technical losses in order to bring modern energy to the citizens to enable them sustain economic growth.

According to the paper by the TANESCO Distribution and Customer Services Business Unit (which highlighted the major works performed during the 1st and 2nd quarter of 2018/19), overall 33 percent of the households in the Tanzania Mainland were connected to electricity by December 2018. Currently, power demand growth is between 10-15% per year. As of 30th June 2018, according to EWURA performance report on electricity subsector, the distribution network comprised of 103,290km.

Despite the government's efforts to increase access to electricity; there is significant difference between the percentage of people who have access to electricity and electricity connectivity whereby accessibility stands at 68% while connectivity stands at 33%.

1.2Motivation for the audit

The audit was motivated by the following observations:

a) Untimely Response to Customer complaints

TANESCO was facing a challenge of timeliness and quality of customer services delivery despite having a computerized customer Services Delivery Management system (SDM). Only 12,561 (36%) of 34,706 Customer complaints were resolved and 64% of complaints were pending.

¹ https://www.duo.uio.no/bitstream/handle/10852/49028/1/Thesis--SUM--30-October.pdf

The Customer Service Desks (Emergency Units) did not record full customers' details (problem details, special marks, and full customers' names). Failure to update in the System with clear problem found, work carried out and output of such work, emergency and front desk staffs being short-term employees (STE) and so lacking access to some of the systems such as LUKU system which created difficulties for them to serve customers well.

b) Untimely connection to Power Supply

There were delays in connecting electricity to new customers and reasons given for such delays were insufficient customer connection materials and failure of local manufacturers to meet the demand.

EWURA reported that TANESCO failed to connect 28% of all applications from new customers in the financial year 2017/18 and 32% of all applications in the financial year 2016/17.

c) Slow pace in ensuring electricity connectivity

Despite the ongoing efforts of the Government to invest in power generation, the electricity sector was facing the challenge of meeting goals and targets for connectivity.

Part of rural and some of urban areas in Tanzania are not electrified due to inadequate proximity of grid network, affordability of costs for electricity connection, insufficient funds to finance network expansions and lack of awareness on electricity connection fees which in the long run contribute to the fear of potential customers.

According to TANESCO Strategic plan 2017/18-2020/21, as of 2017 accessibility stands at 68% while connectivity was at 33%. The target was to increase electricity access level to 75%. To achieve the 75% target, TANESCO planned to connect at least 250,000 customers per year.

d) Old and Overloaded Substations

About 67% of all installed substations are outdated and lacking important modern Telecommunication systems to make them smarter. The existing substations were installed more than 40 years ago and still hold the same technology to date. Only 17 substations out of 52 available substations had telecommunication system integrated.

The telecommunication system makes it easy to control, perform condition monitoring, tracking and following the performance including tracing faults. Lack of telecommunications system has resulted into delay in responding to faults as engineers and technicians need to trace faults manually. This activity consumes a lot of resources in terms of time and finances.

Also, the review of the World Bank report for Tanzania Energy Development and Access Expansion Project (June, 2018) showed that, the electricity supply system in Dar es Salaam was unable to meet the growing demand for electricity from the existing and potential consumers. The high voltage bulk transmission system was not extended in many parts of the city, particularly in the Northeast and South, and most of the equipment in the main 132/33/11 kV substations were old and overloaded.

The report further stresses that, the existing network is contributing to increased system losses, frequent outages, low and fluctuating voltage conditions and poor system power factor. The main reported contributing factor was overloaded substations and old equipment.

e) System Average Power Interruption Frequency Index (SAIFI) exceeding Average

SAIFI measures average number of interruptions per customer per year. Electricity reliability depends much on reduction of interruptions to customers.

Tanzania Standard, TZS 1374:2011², Section 7, requires that the annual SAIFI should be less than 3 interruptions per customer per year. The annual System Average Interruption Duration Index (SAIDI) should be less than 650 minutes (10.8 Hours) per customer per year; and Annual Customer Average Interruption Duration (CAIDI) should be less than 4 minutes per interruption event per year.

EWURA³ reported total Electricity distribution outage of 33,561 hours and out of all total outage hours, 14,217 equivalents to 42% were unplanned outages. Total transmission outage hours in financial year 2017/18 were 2,844 hours of which 377 hours affected the customers. Total outage frequency was 670 of which 152 affected the customers.

f) *Insufficient customer connection materials*

The number of new service lines connected for the third quarter ended 31st March, 2017 was 54,138 customers which was 13% below the target of 62,500 customers. The low pace in service line connection experienced during the third quarter was reported to be due to insufficient essential customer connection materials including LV poles, energy meters and conductors.

² Standard on Power Quality - Quality of Service and Reliability

³ EWURA Performance Report for the year ended 30th June 2018.

g) Old cables and old transformers caused power outages

According to the Institute for Environment and Development on improving Tanzania power quality⁴, power outages in Tanzania were mostly contributed by old electricity infrastructure including cables (conductors) and transformers (substations). This was identified in an article published in June, 2018⁵.

The article⁶ showed that, at least two-thirds of Tanzanians do not have access to electricity and for those who do, they always experience problems relating to reliability and quality of service such as power cuts and fluctuations in power supply that can damage equipment.

The fluctuations in power supply affects people's daily lives, and particularly can be damaging for businesses from small village enterprises to larger manufacturing industries.

The same article showed that power outages in Tanzania cost businesses about 15% of the annual sales. In contrast, a more reliable electricity supply often means higher income and more jobs.

Poor quality of power supply, especially when the power is on, is also a problem in electricity services. The quality can be measured in terms of voltage fluctuations, also known as 'brownouts' - when the power is on, but the voltage is too low to power equipment properly. The combination of blackouts and brownouts can damage equipment and production line restart costs.

h) TANESCO was struggling to invest in new projects

The World Bank⁷ reported that, before the Tanzania Energy Development and Access Expansion Project (TEDAP) approval, little investment had gone into maintaining and modernizing the electricity supply network since the late 1980s, and the quality of service had deteriorated with total losses reaching about 24 percent, this largely was due to lack of transmission and distribution investments.

The World Bank further reported that, TANESCO had not been able to invest its own resources in Transmission and Distribution investments, as tariff levels did not allow the generation of adequate income. TANESCO

⁴ https://www.iied.org/improving-tanzanias-power-quality-can-data-help

⁵ https://www.iied.org/improving-tanzanias-power-quality-can-data-help

⁶ Article by the International institute for environment and development on improving Tanzania power quality published in June, 2018

http://documents.worldbank.org/curated/en/437881531497722984/pdf/P10164 5-TZ-Energy-Development-and-Access-Expansion-Project-ICR-Final-07102018.pdf

identified priority investments to upgrade the electricity network in three main urban areas—Dar es Salaam, Arusha, and Kilimanjaro—and TEDAP was to provide resources to support the planned Transmission and Distribution investments.

Due to the above preliminary indications of the existence of the problems, the National Audit Office of Tanzania decided to conduct a performance audit on Management of Reliability and Accessibility of electricity services. The aim was to assess whether TANESCO has a mechanism to ensure the services are reliable, accessible and timely connected to customers.

1.3 Design of the Audit

1.3.1 Overall Audit objective

The objective of the audit was to assess whether TANESCO has a mechanism to ensure electricity services are reliable, accessible and timely connected to customers.

1.3.2 Specific Audit objectives

Specifically, the audit aimed at determining whether:

- 1. TANESCO connects service lines to new customers timely;
- 2. TANESCO conducts risk-based maintenance of infrastructure for electricity distribution;
- 3. TANESCO complies with technical standards (quality and reliability) in electricity service delivery as stipulated in Tanzania Grid Code;
- 4. TANESCO customer service delivery timely responds to complaints, queries and requests for new connections;
- 5. EWURA ensures TANESCO is complying with technical standards that promote quality and reliability of electricity services; and
- 6. The Ministry of Energy (MoE) conducts monitoring and evaluation of electricity services to ensure that the service is accessible and reliable.

1.3.3 Assessment Criteria

The criteria used to assess the reliability, accessibility and timeliness of services are described hereunder:

(i) Timely connection of service line to new customers

According to TANESCO Customer Service Charter Section (A) 3(a-c), customers should be supplied with electricity within 30 working days if the existing infrastructure is within 30m and within 60 working days if line extensions are located between 30m and 100m from the nearest TANESCO

appropriate connective poles. For new networks to be established or if High Voltage Lines extensions are required for industrial and commercial customers, the Charter stipulates that within 90 working days the customers have to be connected with electricity.

Furthermore, TANESCO Customer Service Charter requires TANESCO to pay, in cash or credit to customers account 0.066% of the monies paid by the customers per day when it fails to complete the connection and supply electricity to customers within the specified time frame. Section 3(e) requires TANESCO to inform the customers about the situation and the specific time when connections will be done in case it fails to complete the connections and supply electricity to customers within the specified time frames.

(ii) Conducting risk-based maintenance of infrastructure for electricity distribution

According to Section 9 of the Corporate Business Plan 2016/17, TANESCO is required to avoid equipment performance degradation or failure through operational risk management. Also, to strategize and conduct operational risk evaluation and mitigation to ensure timely delivery of reliable services.

Besides, according to Objective 4.1.1(c) of Power System Master Plan of 2016, TANESCO is required to ensure accessible distribution routes by means of good maintenance practice.

Additionally, Chapter 3.4.6 (Objective F) of TANESCO strategic plan (2017/18 - 2020/21) requires TANESCO to conduct continuous maintenance of infrastructure.

(iii) Complying with technical standards (for quality and reliability)

On Power frequency, section 4.2 of Tanzania Standard on Power Quality of supply (TZS 1373 of 2011) requires that the standard frequency of the supply to be 50Hz.

Regarding to the Magnitude of supply voltage (voltage regulation), Tanzania Standard on Power quality of supply TZS 1373:2011 section 4.1 requires that, customers supplied at low voltage (LV), the standard voltage shall be 400V phase to phase, and 230V phase to neutral. For customers supplied at other voltage levels, the magnitude of the declared voltage shall be as specified in the supply agreement.

Also, Tanzania Standard (TZS 1374:2011), Section 7, requires that the annual System Average Interruptions Frequency Index-(SAIFI) be less than 3 interruptions per customer per year; Average Interruption Duration Index

(SAIDI) be less than 650 minutes (10.8 Hours) per customer per year; Annual Customer Average Interruption Duration (CAIDI) be less than 4 minutes per interruption event per year.

Furthermore, According to the Electricity Supply Industry (ESI) Reform Strategy and Roadmap 2014 section 6.2 to 6.4, the desired total losses in the electricity supply industry should be 12% by 2025 and 18-16% from July 2015 to June 2018.

(iv) Responding to complaints, queries and requests for new connections

According to TANESCO Customer Service Charter Delivery Standards Section F.1 (a), all complaints whether received by telephone, in person or in writing should be logged in customer complaint register. Section F.1 (b) requires that all complaints apart from technical faults received be handled on a one -stop basis without referral. Furthermore, section F.1 (c) requires that written customer complaints to be responded to in writing within 3 working days and the problem be resolved within 1 month. If the complaints cannot be solved within 1 month, the customer should be informed.

Also, according TANESCO Customer Service Charter Delivery Standards Section F.2 (a), all customer enquiries whether received by telephone, in person or in writing to be logged in the logging customer queries register/system. Section F.2 (b) requires that, where investigative work is required, all telephonic/queries received in person to be responded to within 5 working days. Section F.2 (c) requires written queries to be responded to within 5 working days and Section F.2 (d) requires, queries be resolved within one week unless there is a prior explanation.

Furthermore, according to TANESCO Customer Service Charter Delivery Standards Section F.3, all written customer requests (for example moving of meters, changing of meters, pole movement, change of mode of supply), should be replied to in writing by TANESCO within 2 weeks of receipt of a written request. The reply should include information on the cost to the customer, the customer's obligations and the timeframe for carrying out the request.

(v) EWURA ensuring that TANESCO complies with technical standards for quality and reliable electricity supply services

Section 7(1) (c) (ii) of EWURA Act, requires the Authority to monitor the performance of the regulated sectors in relation to standard of services.

Also, EWURA's Manual for inspection, Power quality section 4.1.1.1(1) requires the Authority to inspect TANESCO for voltage limits.

Likewise, Section 31 of the Electricity Act (Cap 131), requires the Authority to monitor and assess compliance of licensees to governing laws, rules and guidelines through inspections.

Still, Section 7(1) (b) (iii) of EWURA Act requires the Authority to establish standards for the terms and conditions of supply of services.

(vi) Monitoring and Evaluation by the Ministry of Energy

The Ministry of Energy Strategic Plan 2018/19-2020/21 requires monitoring to be conducted regularly and performance reports produced quarterly, semi-annually and annually for proper tracking of the performance.

Furthermore, Section 4.3.3 of Strategic Plan 2018/19-2020/21 of the Ministry of Energy states that, in order to measure its performance, the reports will be prepared quarterly, semi-annually and annually and feedback be provided to all head of divisions, departments and Units.

1.3.4 Audit Scope and Limitations

TANESCO, EWURA and the Ministry of Energy were the main audited entities.

The audit covered an examination period of three years from July 2016 to June 2019 with a focus on the information on the status of pending surveys, pending connections and connection material balances based on the time of the audit.

Information on accessibility and reliability of electricity supply services was collected from TANESCO Headquarters where the data from all regions were available. We also visited five regions of Dar es Salaam, Arusha, Mwanza, Mbeya and Dodoma. The regions were selected based on the availability of EWURA zonal Offices. Actually EWURA has a regulatory role (Inspection and Monitoring) of accessibility and reliability.

On the other hand, EWURA and the Ministry of Energy were covered in this audit because of their roles as regulator of the electricity sector and policy maker respectively.

1.3.5 Methods for Data Collection and Analysis

Three different methods were used in collection of data and information presented in this audit.

We reviewed various documents from the Ministry of Energy, TANESCO and EWURA. The documents were reviewed so as to identify the risks/impacts

and assess the possible causes of the identified problems, gather evidence and be able to conclude on the findings and finally issue audit recommendations.

The information collected from the documentary reviews was further corroborated with the information gathered from interviews held with the selected officials from the audited institutions (TANESCO, EWURA and the Ministry of Energy).

The following documents were reviewed:

- i. Planning documents,
- ii. Performance and Progress Reports,
- iii. Monitoring and Evaluation reports, and
- iv. Other documents such as Action Plans, Annual Procurement Plans, Annual Reports and Customer Service Register.

Interviews and discussions were conducted with the aim of confirming or explaining the information obtained from the documents. Further to that, interviews were conducted in order to provide some clues on the relevance of information, in the case information in the formal documents either was lacking some facts or was incomplete. Hence, interviews, then were used to provide context and additional perspectives in relation to the documents reviewed.

Interviews and discussions were carried out with:

- i. Various Officers at TANESCO (Including Principal Engineers, Construction Engineers, Planning Engineers, Maintenance Engineers, Customer Relations Officers)
- ii. Officials from EWURA including Electrical Engineers at Zonal Offices, and
- iii. Officials at the Ministry of Energy who are involved in decision making, execution and support for provision of electricity supply services.

In each visited TANESCO regional office, physical observation was made on customer services and emergency desks to observe how customers were handled, how complaints were documented and how SDM system was capturing the process from reporting of the problems, referrals to the final solution.

1.4Standards used during the Audit

This audit was undertaken in compliance with the International Standards of Supreme Audit Institutions (INTOSAI). It was also implemented by following a guideline of conducting performance auditing of the National Audit Office of Tanzania.

1.5 Data Validation Process

TANESCO, EWURA and the Ministry of Energy was given the opportunity to correct factual errors in the draft report. We wish to put on record that, meetings with the audited entities were successful and constructive.

1.6Structure of the Report

This report contains five chapters. Chapter 1 introduces the audit by giving background information, motivation of the audit, audit objective, scope, and methods of data collection and analysis as well as assessment criteria. Chapter 2 provides governing legislation, description of the audit area and processes involved in ensuring reliability and accessibility of electricity supply services.

Chapter 3 provides findings of the audit. Chapter 4 provides the conclusion of the audit and Chapter 5 presents the audit recommendations for future improvements.

CHAPTER TWO

REGULATORY FRAMEWORK, KEY ACTORS AND PROCESSES IN MANAGING ELECTRICITY ACCESSIBILITY AND RELIABILITY

2.1 Introduction

This chapter provides the description of the policy and legal framework, key actors with their main responsibilities and key tasks performed while managing Accessibility and Reliability of Electricity Supply Services including the processes involved.

2.2 Regulatory Framework: Policies and Legislations

Management of Accessibility and Reliability of Electricity Supply Services is governed by the National Energy Policy, laws and regulations.

2.2.1 National Energy Policy, 2003

The National Energy Policy of 2003 identifies electricity power as a need that has to be made available for economic activities in the rural areas. It is, therefore, a case of long-term interest and a pre-requisite for a balanced social-economic growth for all in Tanzania. This is due to the fact that electricity addresses all issues from the distribution side to the end user in an environmentally sound manner.

The policy states that there should be continued electrification of the rural economic centers by making electricity accessible and affordable to the low income customers. Also, the policy insists on facilitating the increased availability of energy services, namely grid and non-grid electrification to the rural areas.

The National Energy Policy, 2015 insists on the provision of adequate, reliable and affordable modern energy services to Tanzanians in a sustainable manner.

2.2.2 Electricity Act No. 10 of 2008 and other laws

The Electricity Act provides the information that regulates generation, transmission, distribution, supply and use of electricity energy. The Act has empowered TANESCO to generate, transmit and distribute electricity energy in the country.

Summary of legislations governing accessibility and reliability of electricity supply services as shown in Table 2.1

Table 2.1:Legislations governing Accessibility and Reliability ofElectricity Supply Services

S/N	Legislation	Issues covered	Responsible Actor
1	Electricity Act, 2008	Section 21(2) of the Electricity Act requires that a distribution licensee to comply with the applicable requirements of the Grid Code	TANESCO
2	The Energy and Water Utilities Regulatory Act (EWURA Act) of 2001	Describes the roles of EWURA in promoting the availability of regulated services to all consumers including low income and disadvantaged consumers	EWURA
3	The Tanzania Electricity Grid Code	Grid Code is the technical and procedural rules and standards on transmission and system operation. It derives its legal authority from the Electricity Act and from the Energy and Water Utilities Regulatory Authority (EWURA) Act.	TANESCO and EWURA

2.2.3 Operational Manual

Distribution activities are guided by the Engineering Instructions Manuals. The manuals provide guidance to DMD-Distribution and Customer Services on issues related to:

- (a) reliability of power supply and distribution network maintenance
- (b) quality of power supply
- (c) System expansion and new connection
- (d) street lighting
- (e) Metering large power users and distribution system
- (f) revenue loss reduction
- (g) Demand and Energy Management

2.2.4 Customer Service Charter

TANESCO business commitment to its customers is guided by the Customer Service Charter. The Charter gives service delivery standards such as duration in days not to be exceeded in every specific situation related to customer services. Such situations are as follows:

- i. Customer connection
- ii. Metering
- iii. Notice of power interruptions

- iv. General customer's rights and obligations
- v. TANESCO obligation to customers
- vi. Customer's complaints, enquiries and requests

Service Delivery Standards

TANESCO has service delivery standards covering various operations as shown in Table 2.2.

S/N	Requirement	Indicator	Minimum standard
1.	Quotations to	Existing infrastructure	Within 7 working
	customers	Lines Extensions required	Within 10 working
			days
		New Network required/ supply is	Within 14 working
		commercial customers	uays
2.	Construction of Service Line	Existing infrastructure	Within 30 working days
		Lines Extensions required	Within 60 working days
		New Network required/ supply	Within 90 working
		is required for industrial and	days
		commercial customers	
3.	Payment to	Failure to connect within set	Days after
	Customers	time	30/60/90 days
4.	Power interruption	Customers to be notified (planned interruption)	5 days in advance
	Notification	Customers to be informed the	Within 24 hours
	Procedure	interruption	
		Power restoration to	Within 8 hours
		individual/small area	depending on the fault
		Power restoration for small	Within 8 hours
		faults (e.g. fuse failure)	
5.	Customer	Time to respond -Received in	Immediately
	Complaints	person or telephonically (except technical fault)	resolved
		written complaints	3 working days
		Time to resolve -written	Within 1 month
		complaint	

Table 2.2: Service Delivery Standards

S/N	Requirement	Indicator	Minimum standard
6.	Customer Queries	Time to respond -investigative work required, Telephonically, in person or written	Within 5 working days
		Time to resolve -there is prior explanation	Within 1 week

Source: TANESCO Customer service charter

2.2.5 The Ministry of Energy (MoE) Strategic Plan

Objective C of the Strategic Plan of 2018/19 - 2020/21 of the Ministry of Energy focuses on ensuring that energy resources are developed efficiently and sustainably thereby contributing significantly to the socio-economic development of the country.

The objective aims at ensuring adequate, reliable and affordable electricity services to the public. It further focuses on enhancing power reliability and coverage of distribution networks and accelerates the rural electrification to foster socio-economic transformation; strengthening legal and regulatory framework in the power sub-sector. It ultimately results into improving security of power supply to meet demand; enhancing socio-economic transformation; and reducing the use of wood fuel and charcoal as the household source of energy, and hence, protecting the environment.

2.2.6 ESI Reform and Roadmap

Electricity Supply Industry (ESI) Reform and Roadmap 2014-2025 has the main objective of improving the governance and performance for sustainable socio-economic transformation and environmental protection through quality service delivery. The specific reform objectives, among others, are:

- a) Creating ESI that supports the National Developmental Goals;
- b) Establishing efficient ESI in an environmentally sound and sustainable manner;
- c) Promoting financial and commercial viability of the sector; and
- d) Ensuring availability of adequate, reliable and affordable electricity supply.

Figure 2.1: ESI Primary Reform Objective



Source: ESI Roadmap 2014-2025

Accessibility to electricity and connectivity targets

TANESCO Strategic Plan of 2017/18 - 2020/2021 has set the following targets:

- a) Increase electricity access level from 67.5% to 75% by 2021; and
- b) Connection of 250,000 new customers annually.

2.3 Roles and Responsibilities of the Main Actors

2.3.1 The Ministry of Energy

The Ministry of Energy (MoE) is responsible for developing and reviewing Government policies related to electricity supply and distribution. The Ministry of Energy provides guides to TANESCO and REA on the preparation of electrification plans, leads the development of the energy sector, and takes all the necessary measures to organize the industry and to create conditions for enabling sustainable and efficient performance of the energy sector.

The Ministry has a mission to provide reliable, affordable, safe, efficient and environmentally friendly modern energy services to all while ensuring effective participation of Tanzanians in the Energy Sector.

2.3.2 Rural Energy Agency (REA)

The Rural Energy Agency (REA) was established under Section 14 of the Rural Energy Act No.8 of 2005 as an autonomous institution under the Ministry of Energy and became operational in 2006. REA was established so as to promote and facilitate access to modern energy services in the rural areas of Mainland Tanzania. The Agency is governed by the Rural Energy Board (REB), which is also entrusted to oversee administration of the Rural Energy Fund (REF).

The main function of the Agency is to facilitate provision of modem energy services in the rural areas of Mainland Tanzania by providing grants, subsidies, technical assistance, research and development, training and other forms of capacity building to qualified energy project developers prior to the realization of Rural Energy projects. The Agency also works with key partners and collaborators from the government agencies, private sector, non-governmental organizations (NGOs) and community-based organizations (CBOs) to mobilize resources for its functions.

Though not explicitly mentioned in the Rural Energy Act, an important task of REA is to coordinate rural electrification initiatives.

2.3.3 Tanzania Electric Supply Company (TANESCO)

Tanzania Electric Supply Company (TANESCO) is the state-owned national utility, responsible for generation, transmission and distribution of electricity in Mainland Tanzania and selling bulk power to Zanzibar. TANESCO takes the lead on the implementation of urban electrification and at the same time, assumes responsibility for the supervision, quality assurance, performance evaluation, infrastructure commissioning, operation and maintenance related to rural electrification (the construction of which are procured by the REA).

TANESCO has a vision of being efficient and commercially focused electricity utility supporting development of Tanzania; and to be the power house of East Africa. The Mission is to generate, purchase, transmit, supply and sell electricity in the most effective, competitive and sustainable manner.



Figure 2.2: Organisation Structure of DMD-Distribution & Customer Services

Distribution and Customer Service Business Unit;

The unit is responsible for the following activities:

- i. To prepare designs of low voltages distribution networks using international standards and company's specifications to minimize distribution losses, outages and accidents,
- To ensure sales effectiveness and efficiency; review and coach top sales performance; ensure Sales channel management and optimization; track and analyse market development; manage and forecast sales pipeline; and implement and improve incentive programs,
- iii. To ensure that the company achieves and maintains a zero-accident tolerance program and the members of the public are safe from the company activities and usage of electricity,
- iv. To monitor implementation of local and donor funded electrification projects particularly to district headquarters, urban areas, agro based industries, small townships, East Africa cross-

border centres, development centres, settlements and rural villages,

- v. To guide the company to achieve its goals on increasing the pace of electrification for economic growth, improve people's standard of life, reduction of migration to urban centres and protecting the environment by reducing tree-cutting for charcoal and firewood,
- vi. To monitor and improve all processes impacting both internal and external customers including development of customer satisfaction evaluations; implementation of continuous improvement processes and assessment of operations at all customer touch points, and
- vii. To solve customer queries and handle request in the shortest and most professional way possible in order to increase transparent in working environment

2.3.4 Energy and Water Utility Regulatory Authority (EWURA)

In 2001, the Energy and Water Utilities Regulatory Authority Act (the EWURA Act) of 2001 was passed. EWURA became operational in 2006. EWURA is responsible for the regulation of four sectors: electricity, petroleum, natural gas and water. EWURA's core functions related to power supply are licensing and regulating access to the market, tariff setting and establishing and monitoring of technical standards that promote quality and reliability in electricity service provision.

EWURA's strategic objective was to improve quality, availability and affordability of the regulated services, electricity being among them. The strategies for implementation of this objective include development and review of regulatory tools such as;

- i. Monitoring and enforcing quality of service standards
- ii. Promotion of commercial viability of regulated suppliers;
- iii. Development and implementation of measures to protect customers interest;
- iv. Licensing and registration of regulated suppliers
- v. Promotion of modern energy use;
- vi. Ensuring efficient procurement of regulated infrastructure; and
- vii. Facilitating investments for sustainable supply of electricity.
2.4 Description of Processes

2.4.1 Process Description for New Connection to electricity supply services

Procedures/processes involved in the request for electricity service connection:

- i. Customer to fill the application form,
- ii. Customer to return or submit the filled application form
- iii. Survey is conducted by visiting the site as part of the process or input to enable costing for the service requested (quotation)
- iv. Quotation prepared by TANESCO is dispatched to the customer to enable payment for the service.

The quotation needs to be completed within the set timeframe depending on the specific situation of the applied service as indicated in the Table 2.3.

Table 2.3: Set Time Frame for customer to receive Quotation from TANESCO

Specific situation of applied service	Delivery Time (Working Days)
Existing infrastructure	7
Lines Extensions required	10
New Network required/ supply is required for industrial	14
and commercial customers	

Source: TANESCO Customer service charter

- v. Customer to effect payment for the service to TANESCO
- vi. Connection to service Line

Construction of service lines need to be completed within the set timeframe depending on the specific situation of the applied service as indicated in the Table 2.4.

Table 2.4:Set Time Frame for Construction of Service Line byTANESCO

Specific situation of applied service	Delivery Time (Working Days)
Existing infrastructure	30
Lines Extensions required	60
New Network required/ supply is required for industrial and	90
commercial customers	

Failure to connect within set time	TANESCO to pay in cash or credit to
	customer account 0.066% of the monies
	paid by the customer per day unless a
	force majeure event occurs (such as war,
	floods, earth quake, riots etc.,)"

Source: TANESCO Customer service charter

Immediately after connection, TANESCO registers the customer in the Billing System.



Figure 2.3: Process Description for New Connection to Electricity Supply ServiceProcess

2.4.2 Process Description of Resolving complaints and queries

- i. Customer's complaint or query is reported by telephone, in person or in a written form at the emergency section,
- ii. Emergency Unit depending on type or category of the reported complaint or query, responds, schedule it for survey, refers or resolves the issue or problem,
- iii. During survey, the emergency unit identifies the problem and reports it appropriately,
- iv. Depending on the type of service needed to resolve, if it involves cost then quotation for resolving the problem is given to the customer. If no cost that will be involved, then the problem is resolved,
- v. The Customer is supposed to effect payment for the service to TANESCO in case his reported problem involves cost, and
- vi. TANESCO upon receipt of payment are supposed to solve the reported complaint, query or problem within the set timeframe.

Immediately after resolving the complaint, TANESCO is supposed to update the status of customer's complaint as resolved and closed in the SDM System.

2.5 Budget and Sources of funds for TANESCO

The Business Plan 2016/17 considered the Capital Investment Plan (CIP) to procure, fund and serve an investment stream of TShs. 5.3 trillion over a period of 5 years. The CIP has assumed sources of funds from but not limited to TANESCO funds (through tariffs), Government subsidies, Development partners' grants and loans (concessional and commercial), REA and other financing institutions.

Table 2.5. Approved corporate budget 2010/17-2010/17		
Financial Year	Corporate Budget (in Billion TShs)	
2016/17	1,039.17	
2017/18	1,425.02	
2018/19	1,425.02	

Source: Corporate Business Plan 2016/17

CHAPTER THREE

FINDINGS

3.1 Introduction

This Chapter presents findings related to the performance of TANESCO in ensuring that electricity services are reliable, accessible and timely connected to customers. The audit findings cover six major parts that provide insights in relation to accessibility and reliability of electricity supply services. The areas covered are:

- i. Timeliness in customers' services connections;
- ii. Risk based approach to maintenance;
- iii. TANESCO complying with technical standards (for quality and reliability);
- iv. TANESCO responding to complaints and queries;
- v. EWURA ensuring TANESCO complies with the technical standards; and
- vi. Monitoring and Evaluation by the Ministry of Energy.

3.2 Service line connections to new customers.

TANESCO has seven stages from Application for new connections to the Registration of the Meter after connections. The stages are: Application, Completion and submission of application forms, Conducting Surveys, Providing quotations, Payments, Connection to electricity power, and Registration of the customer into the system.

The review of Annual Service Line Duration reports showed that, the delays mostly occurred on the survey and connection stages as narrated below:

3.2.1 Delays in providing quotations to the Customers

TANESCO Customer Service Charter gives 7-14 days to provide a quotation to a customer who has filled in the Service Line Application Form and has provided all necessary attachments⁸. The number of days vary depending on the distance of the existing infrastructure.

⁸ One passport size photograph of the customer and wiring diagram of the house/building properly drawn and rubber stamped by the registered Electrical Contractor who undertook the wiring

According to the Charter, a customer is to be provided with a quotation within 7 working days if the customer resides within 30m from the existing infrastructure. And, 10 working days if the requested connection will need lines extensions of more than 100m. And 14 days if customer resides in an area where there are no existing networks or if a customer applied for industrial and commercial connection.

Based on the reviewed Customer Service Report, we noted that, there were delays in conducting surveys and provision of quotation to customers. The longest recorded delays were up to three years. This means that, there were pending customers waiting for surveys since July 2016 (based on the scope of the audit). Table 3.2.1 shows total conducted surveys versus surveys conducted within the stipulated time.

Financial	Total number of	Number of Surveys	% of total
Years	conducted surveys	conducted on time	surveys
2016/17	223,876	129,934	58
2017/18	217,704	131,877	61
2018/19	268,420	162,971	61

 Table 3.2.1: Total conducted surveys versus timely surveys

Source: Service Delivery Report, 2020

Table 3.2.1 shows an increase in the number of conducted surveys from 223,876 in the financial year 2016/17 to 268,420 in the financial year 2018/19. The number of surveys conducted on time also increased from 129,934 to 162,971 over the same period. However, the rate of increase in the number of conducted surveys increased, but still the rate of surveys conducted on time never exceeded 61%.

In the visited five regions, there were a total of 4,693 pending surveys. Chart 3.2.1 shows the distribution in percentage.



Source: SDM, visited regions 2020

Charts 3.2.2 to 3.2.4 show the number of received survey (quotation) request for customers within 30m, 30 to 100m, and over 100m versus

number of customers provided with quotations within the specified time (7, 10, and 14 days).

The performance of TANESCO to conduct survey services to customers who are within the range not exceeding 30metres and whose connection time is within seven days is as shown in Chart 3.2.2.



Source: Service line delivery report, 2020

Chart 3.2.2 indicates that performance never exceeded 59.5% in last three years. This means that, roughly about 42% of all customers were not connected on time over the three years.

Chart 3.2.2 also shows an increase in number of applications from 158,295 in the financial year 2016/17 to 212,965 in the financial year 2018/19. The number of surveys conducted also increased from 91,410 to 123,458 over the same period. However, the rate of increase in the number of applications in this category exceeded the rate increase of the number of surveys conducted.

Based on the above analysis, the percentage of applications that got survey services declined and the number of cases that were not surveyed on time kept increasing.

The performance of TANESCO to conduct survey services to customers who reside within a range between 30 and 60metres whose connection time was limited to ten days is as shown in Chart 3.2.3.



Source: Service delivery report, 2020

Chart 3.2.3 shows that performance never exceeded 61.6% in the last three years. This means that, roughly about 38.4% of all the customers were not connected on time.

There was a slight linear improvement from 64% to 66% between 2016/17 and 2018/19 in the survey services to customers who either reside in areas where there were no existing networks or where a customer applied for industrial and commercial connection. Surveys in this category were supposed to be conducted within 14 days after applications. On average, the performance of TANESCO in this category was 66% as shown in 3.2.4.



Source: Service Delivery Report, 2020

At the time of the audit (January 2020), there were 72,463 customers in the country waiting for TANESCO to conduct surveys and provide them with quotations. The list of the respective zones and total number of pending surveys is as presented in Table 3.2.2.

lo January 2020				
ZONE	Pending Surveys	Percentage of Total (in %)		
North	15,865	22		
Dar es Salaam and Coast	14,189	20		
Lake	14,677	20		
South West Highland	13,041	18		
Central	8,432	12		
West	3,411	5		
South	2,848	4		
TOTAL	72,463	100		

Table 3.2.2: Total pending surveys in TANESCO zones for FY 2016/17to January 2020

Source: Service Line Applications Progress Report, 2020

Table 3.2.2 Shows that the Northern zone was leading in having many customers who were waiting for survey; while the Southern zone had the lowest number of pending surveys. The reasons that contributed to this variation are shown in Table 3.2.3.

To get the onsite picture of the problems, we visited five (5) regions, in which there was a total of 4,693 pending surveys which represent 7% of all pending surveys.

Table 3.2.3 shows the summarized reasons for the pending surveys in all visited regions:

Region	No. of Pending Surveys	Reason given	
Mbeya	1,573	Few vehicles	
		 houses being in un-surveyed areas and/or on road reserve area 	
Kinondoni	1,321	Few vehicles	
South		 unavailability of customers at sites 	
Dodoma	876	Few vehicles	
Arusha	745	Few vehicles	
		 Unavailability of customers at sites 	
		 Houses being on road reserve area 	
Mwanza	178	Few vehicles	
		Land conflicts	
TOTAL	4,693		

Table 3.2.3: Reasons for pending surveys at Visited Regions:

Source: Service line received forms report, 2020

Based on the significant number of the pending surveys (Table 3.2.2 and Table 3.2.3), we made an estimate of the potential revenue. The established connection charges were TShs. 320,960 (with bracket) and

TShs. 515,618 (with single pole). Therefore, the total potential revenue for the five visited Regions was estimated to be TShs. 1.5 Billion and TShs. 2.4 Billion per year respectively. However, the estimated potential revenue by TANESCO national wide with 72,463 pending surveys could range from TShs. 23.3 Billion to TShs. 37.4 Billion per year.

Apart from the problems related to pending surveys, we also noted delays in connecting customers who had submitted all requirements to TANESCO. The detailed findings are presented in the subsequent sections.

3.2.2 Delays in Connecting Customers

TANESCO Customer Service Charter states clearly that, if the customer has paid all monies owing and met all other obligations in the Service Line Application Form, and if, where applicable, all subsidies have been received, the provision of supply will be within 30 working days where the existing infrastructure can be used (within 30m of the existing infrastructure); within 60 working days where line extensions of not more than 100m (that is when the customer is located between 30m and 100m from the nearest TANESCO appropriate connective pole); and if new networks have to be established or if High Voltage Lines extensions are required for industrial and commercial customers (that means if there is no nearby infrastructure to supply the applicant) the period for providing supply shall be within 90 working days.

In the visited five regions there were a total of 11,657 pending customer connections. Chart 3.2.5 shows the distribution in percentage.



Source: SDM, visited regions, 2020

We noted that in total for Mainland Tanzania, there were 155,127 customers who paid monies to TANESCO for new service line connections since the financial year 2016/17 to January 2020 but they were still waiting for the connection service. The number of pending connections and their respective zones was as presented in Table 3.2.4.

Table 3.2.4: Number of customers waiting for connection as of FY 2016/17 to January 2020

Zone	Number of Customers waiting connection	Percentage
Dar es Salaam and Coast	49,464	32
North	30,147	19
South West Highland	23,381	15
Central	22,583	15
Lake	14,659	9
South	8,005	5
West	6,888	4
Total	155,127	100

Source: Service Line Applications Progress Report-SDM system, 2020

Charts 3.2.6 to 3.2.8 show total number of customers within 30m, 30 to 100m, and over 100m who made payments for service line connections versus number of customers connected within the specified times of 30, 60 and 90 days respectively.



Source: Service Delivery Report, 2020

Comparing financial years 2018/19 and 2017/18, Chart 3.2.6 shows a sharp decline in performance of TANESCO for financial year 2018/19. About 69% of customers who had already paid were connected on time whereas the remaining 31% of customers were not connected.



Source: Service Delivery Report, 2020

Chart 3.2.7 shows a varied performance of TANESCO with an average performance of 58% in three years. The remaining 42% of customers were not connected.



Source: Service Delivery Report, 2020

Chart 3.2.8 shows some performance improvement between financial years 2016/17 and 2017/18. However, the performance declined in financial year 2018/19. On average each year about 46% of customers were not connected.

The situation of pending connections in the visited regions was as presented in Table 3.2.5.

Region	No. of Pending Connections	Reason given
Arusha	6,296	Fewer Poles
		Fewer meters
		 Fewer vehicles
Mbeya	2,653	 Fewer 25mmsq ABC conductors
		Fewer Poles
		Fewer vehicles
Kinondoni South	1,713	 Fewer single phase meters
		Fewer vehicles
Dodoma	763	• Fewer vehicles (decided to hire as
		an altenative solution)
Mwanza	232	 Fewer 25mmsq ABC conductors
		 Fewer 50sqmm ABC conductors
Total	11,657	

Table 3.2.5: Situation on Pending Connections in visited Regions

Source: SDM Visited regions, 2020

Based on the analysis of balance of connection materials report, the common reason for fewer service line connection materials, was TANESCO being unable to adequately establish the required materials; and to properly plan and manage the available materials.

We further reviewed a list of balance of service line connection materials in the visited regions. The balances were as presented in Table 3.2.6.

Table 3.2.6: Balance of Service Line Connection materials in the visited Regions as of January 2020

Type of Material	K'South	Arusha	Mwanza	Mbeya	Dodoma
ABC 50sqmm (m)	9,900	13,500	0	100,335	83,001
ABC 25sqmm (m)	16,340	73,000	500	8,559	20,366
9m Poles (No)	1,625	0	1,300	333	4,577
1 Phase Meter (No)	25	72	800	1,460	1,288
3 Phase Meter (No)	100	0	0	40	81

Source: Stores of the visited regions, 2020

The analysis of Table 3.2.6 shows that, at the time of the audit, Kinondoni South region had 1,713 pending connections and a balance of only 125 meters (100 meters being three phase). This shows that, it was unrealistic to complete the pending connections with only 25 single phase meters.

Arusha region lacked three phase meters and poles while the pending connections were 6,296 customers. Mwanza region lacked 50 sq.mm ABC and three phase meters with 232 pending connections.

Further analysis showed that, Mwanza had a balance of 1,300 poles despite having only 232 pending connections whereas Arusha which had no poles at all and pending connections amounted to 6,296 customers. The available poles in Mwanza, were enough to supplement the deficit of poles in Arusha and other surplus service line materials from other regions could have supplemented other regions with deficit.

A detailed analysis was conducted at TANESCO HQ to determine planned procurements of service line connection materials (poles, meters and conductors). The analysis is as presented in the Tables 3.2.7 to 3.2.9.

Financial Year	No. of Planned Poles	No. of Procured poles	Percentage procured (%)
2016/17	90,343	84,452	93
2017/18	124,181	118,454	95
2018/19	151,369	78,953	52

 Table 3.2.7: Planned procurement for poles versus procured poles

Source: Service Delivery Report, 2020

			•
Financial Year	Length of	Lengh of	Percentage
	Planned	Procured	procured
	Conductors	Conductors	
	(km)	(km)	
2016/17	3,347	3,289	98
2017/18	5,949	5,175	87
2018/19	9,191	6,254	68
		Line Deset 202	0

Source: Service Delivery Report, 2020

Table 3.2.9:	Number of required single phase energy meters versus
	number of procured meters

Financial Year	No. of planned energy meters	No. of procured energy meters	Percentage procured
2016/17	203,384	200,563	97
2017/18	267,701	256,164	96
2018/19	279,470	212,571	76

Source: Service Delivery Report, 2020

The analysis of Tables 3.2.7 to 3.2.9 shows that, TANESCO was unable to procure service line materials as planned. The situation was worse in Financial Year 2018/19 whereby the utility company managed to procure

only 52% of the required poles, 68% of the required conductors and 76% of the required single-phase energy meters.

We further assessed if the procured materials were properly distributed based on the needs of each region. The findings are presented in the following subsequent sections:

3.2.3 TANESCO did not distribute connection materials in the right proportions

We noted that, the service line materials such as poles, meters and Aerial Bundle Conductors(ABC) were not supplied in the right propositions to the regions to facilitate timely connections. This was evidenced by the balance of materials in different regions.

Further analysis to compare balance of poles to each TANESCO region in last three financial years (2016/17 to 2018/19) was carried out. The results are summarized in Tables 3.2.10:

S/N	TANESCO Regions	2016/17	2017/18	2018/19
1.	Coast	0	0	5,500
2.	Tanga	0	0	3,563
3.	Kinondoni North	6	0	2,718
4.	Ruvuma	0	0	1585
5.	Kilimanjaro	573	279	766
6.	Manyara	5	0	719
7.	Kagera	0	137	490
8.	Temeke	0	29	377
9.	Kigoma	0	0	271
10.	Mara	94	0	258
11.	Singida	235	1	254
12.	Kinondoni South	71	107	234
13.	Mbeya	15	0	195
14.	Shinyanga	3	111	153
15.	Katavi	0	260	125

Table 3.2.10: Balance of poles in different regions for FY 2016/17 to 2018/19

S/N	TANESCO Regions	2016/17	2017/18	2018/19
16.	Morogoro	0	93	57
17.	Mtwara	888	55	27
18.	Iringa	213	25	25
19.	Simiyu	0	63	7
20.	Rukwa	86	15	5
21.	Lindi	1075	63	4
22.	Ilala	0	211	0
23.	Geita	2	0	0
24.	Dodoma	0	0	0
25.	Njombe	0	0	0
26.	Songwe	0	0	0
27.	Tabora	0	0	0
28.	Arusha	0	0	0
29.	Mwanza	0	0	0

Source: Material balance report, TANESCO ,2020

Table 3.2.10 shows that there were regions with balance of poles reaching 5,500 (Coast) while other regions such as Mwanza, Geita, Tabora, Songwe, Njombe and Arusha had zero balances.

Based on the interviewed TANESCO officials, there were incidences when customers would miss one or more of the connection materials. In such situations, customers could have poles but missing meters or could have both poles and meters but missing conductors.

In most cases, these situations were due to weaknesses of TANESCO in managing the available resources as stated earlier as well as its failure to relocate materials from regions with surplus to those having the need.

3.2.4 Potential compensation of TShs.12.23 Billion for delayed connections and TShs. 8.33 Billion for potential Consumption

TANESCO Customer Service Charter Section 3(e) requires TANESCO to inform the customers on the progress of connection work. The utility company is supposed to inform the customers about the completion time including the situation when completion is not done on time. Further TANESCO Customer Service Charter requires TANESCO to pay compensation in cash or on credit to customers' account amounting to 0.066% of the monies paid by the customers for each day delayed to complete the connection and supply electricity to them within the specified timeframe.

Table	3.2.11	:	Estimated	Amount	of	compensations	for	delayed
conne	ctions							

Financial Years	Total delayed connections	Possible Penalties for delay (Billion TShs)
2016/17	51,777	2.94
2017/18	43,873	4.90
2018/19	69,220	4.39
Total	164,870	12.23

Source: Service Delivery Report-SDM system, 2020

Table 3.2.11 depicts that TANESCO would have been required to compensate all customers who were not connected with electricity sevices as per Charter in the tune of TShs. 12.23 Billion

Based on interviews with TANESCO officials, TANESCO, intentionally, did not raise awareness to customers on the availability of the compensation fund, as a result no affected customer ever filed claim.

Furthermore, we estimated potential consumption of 155,127 customers pending connection assuming an average of 210.6kWh are consumed by a customer per day as presented in Table 3.2.12

Financial Years	Total connected customers	Energy Consumption (million kWh)	Average consumption per Customer (kWh)	
2016/17	2,026,095	454.80	224.47	
2017/18	2,223,638	459.01	206.40	
2018/19	2,484,202	499.20	200.95	
	Average	471	210.6	
Potential Revenue		210.6kWh/Customer x255TShs/kWh x155,127		
		Customers = TShs. 8.33 Billion		

Table 3.2.12 : Estimated Amount of potential income from consumption

Source: Power loss and connected customers reports, 2020

Table 3.2.12 shows that, there was a potential consumption of TShs. 8.33 Billion for the pending customer connection.

3.3 Maintenance of infrastructure for reliable electricity supply services

Objective 4.1.1(c) of Power System Master Plan of 2016 requires TANESCO to ensure accessible distribution routes by means of continuous maintenance practice.

Besides, according to Section 9 of Corporate Business Plan 2016/17, TANESCO is required to avoid equipment performance degradation or failure through operational risk management. On the other hand the company is required to strategize, and conduct operational risk evaluation and mitigation to ensure timely delivery of reliable services.

Additionally, Chapter 3.4.6 (Objective F) of TANESCO Strategic Plan (2017/18 - 2020/21) requires TANESCO to conduct continuous maintenance of infrastructure.

3.3.1 Conducted Maintenance did not minimize breakdowns

We noted that, throughout the period under the audit the conducted maintenances did not minimize the number of reported temporary breakdowns (TBs).

Review of Emergencies common problem reports showed an increasing trend of reported problems. The reported problems increased from 533,625 in year 2016/17 to 655,462 in year 2018/19 as presented in Table 3.3.1

Table	3.3.1:	Frequency	of	reported	emergency	problems	2016/17-
2018/	19						

Financial Year	Frequency of Reported Problems	Percentage increase
2016/17	533,625	N/A
2017/18	620,455	16
2018/19	655,462	23

Source: Emergencies common problems report, 2020

From Table 3.3.1, it can be seen that, there is a rate of increasing frequency of reported problems. From 2016/17 to 2018/19 the frequency increased to 23%.

The increasing frequency was also observed in the visited regions as presented in Table 3.3.2.

Region	Frequency in Financial Years						
	2016/17 2017/18 2018/19						
K'South	46,144	49,192	48,543				
Arusha	28,868	39,017	40,476				
Mwanza	29,774	33,285	32,957				
Mbeya	25,191	29,657	31,265				
Dodoma	8,737	18,849	21,569				
Total	138,714	170,000	174,810				

Table 3.3.2: Frequency of reported emergency problems 2016/17-2018/19 in the visited regions

Source: Emergencies common problems report, 2020

From Table 3.3.2, the frequency of reported problems increased from 138,714 in 2016/17 to 174,810 in 2018/19.

Review of the emergency status reports showed that, frequently reported incidents were such as loose connections in brackets, low voltage, decayed poles, sparks on the poles, meters not displaying, LUKU meters not accepting units, voltage fluctuations and broken conductors.

Following an increase in frequencies of reported emergencies, maintenance relied more on corrective measures rather than being planned which ultimately increased the number of breakdowns.

3.3.2 TANESCO inadequately conducted maintenance that considered frequently reported incidents

The reviewed maintenance reports showed that, the maintenance of distribution infrastructure inadequately focused on frequently reported temporary breakdowns. The maintenance activities were more of corrective than preventive maintenance. Engineers failed to follow their schedule of planned maintenance and often embarked in solving TBs (temporary breakdowns) reported on emergency desks. Reactive maintenance practice led to more frequently reported problems since even the planned preventive maintenance activities were not conducted and this increased the rate of reported breakdowns.

We reviewed maintenance reports and found that, there was a continuous and increasing number of both decayed High Tension (HT) poles and decayed Low Tension (LT) poles. For the period from financial year 2016/17 to 2018/19, a total of 15,345 HT decayed poles were noted which is equivalent to 75% of all inspected HT poles.

Likewise, in the period of financial year 2016/17 to 2018/19, there were a total of 13,797 decayed poles equivalent to 71% of all inspected LT poles. The details are as shown in Table 3.3.3.

2016/17 to 2018/19				
Poles description(s)	Fi	Financial Year		
	2016/17	2017/18	2018/19	ΤΟΙΔΙ
HT Poles Inspected	4,746	9,012	6,582	20,340
HT Decayed Poles Found	3,697	6,521	5,127	15,345
% of decayed HT poles	78	72	78	75
LT Poles Inspected	4,281	9,256	5,937	19,474
LT Decayed Poles Found	2,958	6,736	4,103	13,797
%age of decayed LT poles	69	73	69	71

Table 3.3.3: Poles inspected versus Decayed found in all Regions for FY 2016/17 to 2018/19

Source: Distribution LT Maintenance TANESCO HQ Report, 2020

Table 3.3.3 shows an alarming result that needs an immediate measure to correct. In average 73% of all poles were decayed.

However, further analysis was made to find the number of decayed poles in the visited regions. For the period under the audit there was a total of 25,565 decayed poles in only five visited regions. Details of the number of decayed poles is as presented in Table 3.3.4

Table 3.3.4: Noted Decayed HT Poles in visited regions for the Financial Years 2016/17 to 2018/19

S/N	Pogion	Fi	nancial Ye	ar	Total No. of poles
	Region	2016/17	2017/18	2018/19	
1	Mbeya	4,876	4,673	4,315	13,864
2	Arusha	612	3,003	1,449	5,064
3	Dodoma	788	1,257	1,065	3,110
4	Mwanza	642	654	470	1,766
5	Kinondoni South	740	557	464	1,761
	Total	7,658	9,859	7,763	25,565

Source: TANESCO Visited Regions Maintenance Reports 2020

From Table 3.3.4, Mbeya region was leading in having a big number of decayed poles followed by Arusha.

Review of maintenance reports for the period under the audit revealed that non-prioritization to risk in maintenance was a result of frequent emergency breakdowns. Based on interviews with TANESCO officials, inadequate conducting planned preventive maintenance was also due to lack of reliable transportation.

Further review of maintenance reports showed that a total of 2,716 distribution transformers were inspected and 1,464 equivalents to 54% were found to have faults and so were replaced. Details are as presented in Table 3.3.5.

Table 3.3.5: Distribution transformers inspected versus transformers replaced in the financial years 2016/17 to 2018/19

Transformers description(s)	Financial Year			Total
	2016/17	2017/18	2018/19	ΤΟται
Transformer Inspected	694	1,060	962	2,716
Transformer Replaced	346	638	480	1,464
%age of replaced transformers	50	60	50	54
	T 1		D / 00	20

Source: Distribution LT Maintenance TANESCO HQ Report 2020

Table 3.3.5 shows that in average, more than half of the inspected transformers were found with faults.

The effect of having more than 73% decayed poles put the power reliability at risk of total blackout.

3.4 Complying to Technical Standards

3.4.1 The power voltage supplied exceeded the limits set by standard

Section 4.2 of Tanzania Standard on Power Quality (Quality of supply) (TZS 1373:2011) requires the standard frequency of the supply to be 50 Hz. Section 4.1 requires the standard voltage to be 400V phase to phase, and 230V phase to neutral. For customers supplied at other voltage levels, the magnitude of the declared voltage is supposed to be as specified in the supply agreement.

Furthermore, Tanzania Standards for power quality (quality of supply) TZS 1373:2011 Section 4.3.2, requires the allowable deviation from maximum and minimum value of voltage to be 5% for 33kV and 11kV, 10% for 230V and 400V, and allowable deviation from the maximum and minimum frequency to be 2.5 %, respectively.

We noted that, TANESCO did not conduct measurement and record the values of the voltage of 400V and 230V which was supplied to customers. Both voltage quality parameters and specified compatibility levels were not assessed. The compatibility levels and limits provide measures of acceptable voltage quality at the point of supply to end customers of electricity utilities. The Standard requires measurement and evaluation of the quality of the supplied power to be made at the instant of its consumption.

The review of customer complaints showed that, more than 60% of received customer complaints were either voltage problems or no power. EWURA told us that, customers complained to be receiving less than 200Volts instead of the required 230Volts.

The review of voltage reports for 33kV networks as measured by TANESCO showed power fluctuations. Table 3.4.1 shows recorded maximum and minimum voltages.

Financial		33		Remarks/	
Year	Reading	Allowable	Reading	Allowable	Comments
	Max	Max	Min	Min	
2016/17	38.20	36.3	28.00	29.3	Both Maximum and Minimum readings exceeded by 16% and 15% respectively
2017/18	37.00	36.3	30.00	29.3	Maximum exceeded by 12%
2018/19	39.00	36.3	29.35	29.3	Maximum exceeded by 18%

Table 3.4.1: Maximum and Minimum Voltages for 33kV lines

Source: Maximum and minimum voltage report, 2020

Table 3.4.1 shows that, for the last three years the maximum voltage for 33kV exceeded by 18% and the Minimum dropped by 15%. It should be noted that, the allowable deviation is $\pm 5\%$.

The exceeded limits may result into incorrect operation of electrical equipment (especially electronic and computer devices) and ultimately causing distortion of the voltage supply in the installation.

3.4.2 Lack of reliable information to measure the Performance Efficiency in relation to Power Supply Reliability

Power supply reliability is measured through indices such as SAIFI, SAIDI and CAIDI and they are calculated using different data that are supposed to be collected and recorded by TANESCO.

Section 7 of the Tanzania Standard TZS 1374:2011 requires TANESCO to keep records of the date, start time and duration of each planned and unplanned interruption, the number of affected customers and total number of connected customers in a specific affected feeder in order to determine the indices (SAIFI, SAIDI and CAIDI).

The records were supposed to be used to calculate the indices. The data required included data for interruptions due to planned, unplanned and load shedding requirements.

Review of power interruptions report showed that, TANESCO kept records of interruptions (planned and unplanned hours), frequency of interruption and number of customers affected. However, TANESCO did not record and keep data for the total number of connected customers in the affected areas/feeder, spurs or substations/ transformers and so it was not possible to calculate the indices for power distribution line of 400V and 230V. Also TANESCO did not keep data and details regarding interruption hours for load shedding. This information was crucial for calculation of indices.

As a result of lacking information, TANESCO did not have details of affected areas as required by the Standard. The Standard requires an emergency priority critical loads list to be as follows:

- a) Interruptions at hospitals, clinics and emergency operating rooms, interruptions at dwellings where life-support machines are used;
- b) Area interruptions (i.e. more than one customer affected) where most of the customers are industrial customers;
- c) Interruptions that affect large industrial customers (where there are consumptions that exceed 10 MVA);
- d) Area interruptions where most of the customers are residential customers;
- e) Interruptions that affect individual industrial customers; and
- f) Interruptions that affect rural customers.

This lack of information was observed in EWURA inspection reports and later confirmed by officials from EWURA that TANESCO did not establish measures to record the correct number of affected customers during power supply interruptions.

We also noted that, EWURA developed format to be used by TANESCO for calculation of reliability indices. However, the format did not provide room to fill the data for total number of customers connected or separating planned, unplanned and load shedding outages. Other information required by the format included number of customers affected, outage hours, number of outage and total number of customers connected in a feeder, spur or distribution transformers of the power distribution infrastructure.

According to EWURA, lack of awareness on the use of the format made it difficult for the TANESCO officials to populate the required data using the format. Nevertheless, EWURA informed the audit team that the exercise to sensitize on the format to TANESCO officials had started.

3.4.3 Number of unplanned outages exceeded planned outages

We also noted that, the number of planned outages exceeded planned outages in the 33kV transmission line. Table 3.4.2 presents outage hours (planned and unplanned), the number of affected customers and outage frequency.

Financial Year	Planned Outage in (Hrs.)	Unplanned outage in (Hrs.)	%	No. of affected Customers	Outage frequency
2016/17	497	566	113	775,871	1,025
2017/18	940	785	84	794,465	1,810
2018/19	638	796	125	846,072	1,810
Average	692	716	104	805,470	1,548

Table 3.4.2: 33kV transmission line average outage hours 2016/17-2018/19

Source: TANESCO power interruption statistics, 2019

Table 3.4.2 shows that, for the period under the audit, the 33kV transmission line had unplanned outages exceeding planned outages by up to 125%. Average outage hours per year were 1,407 which in average affected 805,470 customers. In addition, total average frequency per year was 1,548 times.

The situation was better in 11kV transmission line when compared to 33kV. Table 3.4.3 presents outage hours (planned and unplanned), number of affected customers and outage frequency.

Financial	Planned	Unplanned	%	No. of	Outage
Year	Outage in	outage in		affected	frequency
	(Hrs.)	(Hrs.)		Customers	
2016/17	300	240	80	566,414	385
2017/18	628	379	60	602,376	615
2018/19	355	270	76	674,298	467
Average	428	297	69	614,363	489

 Table 3.4.3: 11kV transmission line average outage hours

Source: Power interruptions report, 2020

At 11kV distribution lines, the percentage of unplanned was up to 80%, the average outage hours per year were 724 which in average affected 614,363 customers. In addition, total average frequency of outages per year was 489 times.

The cause for high number of frequencies of power interruptions was explained by officials to be increasing number of electrical faults at the transmission lines. The number of faults was also contributed by lack of preventive maintenance. As a result, TANESCO conducted more of reactive maintenance than preventive. If unplanned outages exceeded planned outages, it is an indication that, most of the time was spent in conducting reactive (corrective/breakdown) maintenance rather than preventive maintenance.

The impact of high frequency of power outages include interruptions at hospitals, clinics and emergency operating rooms, dwellings where lifesupport machines are used which may cause death; interruptions to industrial customers where production can be stopped; and interruption at business centres where economic activities may be disturbed.

3.4.4 TANESCO lost an average of TShs. 67 Billion per year due to power losses

According to the Power System Master Plan (2016), it was projected that TANESCO would have a power loss of 16% in year (2016/17) to 13.7% (2018/19) for both distribution and transmission networks as shown in Chart 3.4.5.



Source: Power System Master Plan (2016) and Power Loss Report (2020)

From Chart 3.4.1, it is noted that there was a declining trend in total power losses from 37% in year 2016/17 to 34% in year 2018/19. Thus, the gap between the projected and actual losses was about 21% in 2016/17 and 2017/18, and 20% in year 2018/19.

We reviewed and analysed power generated against energy billed/sold to identify power loss and quantify the loss in monetary value. The result is as presented in Table 3.4.4.

Table 3.4.4: Energy generated versus energy sold for financial years 2016/17 to 2018/2019

	Fnergy	Fnerøv	Sales	Energy Losses		
Financial Year	Generated million kWh	Billed/Sold million kWh	Revenue (Billion TShs)	kWh (million)	%	Billion TShs ⁹
2016/17	720.73	454.80	117.6	265.93	37	67.8
2017/18	715.77	459.01	117.4	256.76	36	65.5
2018/19	761.29	499.20	124.7	262.09	34	66.8
Average	732.6	471	139.9	261.59	36	66.7
-						

Source: Power loss (2019) and Power generated reports (2020)

Table 3.4.4 shows that, generally there was a decreasing trend on percentage of power loss. This attracted a loss of approximately TShs. 67 Billion. The estimated monetary values of losses were based on recorded sales revenues.

⁹ Average Price for 1 kWh is estimated to be 255 TShs.

We further analysed energy generated, and energy distributed to identify the loss in transmission line. The results showed that about 28% of power generated was lost on transmission as presented in Table 3.4.5.

Financial Year	Energy Generated million kWh	Energy Distributed Million kWh	Energy Loss (Million kWh)	%age loss
2016/17	720.73	510.61	210.12	29
2017/18	715.77	509.34	206.43	29
2018/19	761.29	558.52	202.77	27
Average	732.6	526.16	206.44	28

Table 3.4.5: Transmission Power loss for financial years 2016/17 to 2018/2019

Source: Power loss report, TANESCO, 2019

Based on Table 3.4.5, there was slight decline of power loss in the transmission line. The transmission line power loss was on average 206.4 Million kWh which is equivalent to 28 percent of all generated energy.

Furthermore, we wanted to identify the power loss in the distribution line. The results of the assessment are as presented in Table 3.4.6.

Table 3.4.6: Distribution Power loss for financial years 2016/17 to 2018/2019

Financial Year	Energy Generated million kWh	Energy Distributed (million kWh)	Energy Billed/Sold (million kWh)	Sales Revenue (Billion TShs)	Energy Loss (Million kWh)	%age loss		
2016/17	720.73	510.61	454.80	117.6	55.81	7.7		
2017/18	715.77	509.34	459.01	117.4	50.33	7.0		
2018/19	761.29	558.52	499.20	124.7	59.32	7.8		
Average	732.6	526.16	471	139.9	55.15	7.5		
	Source: Dower Loss report TANESCO 2010							

Source: Power loss report, TANESCO, 2019

Table 3.4.6 shows that, the distribution line loss was 7.5% with a constant trend. The potential annual revenue lost as a result of Distribution power losses was estimated to be TShs. 14.1 Billion.

3.5 Responding to customer complaints and queries

We found the following as regarding to responding to customer complaints and queries:

3.5.1 Inadequate information entered in the Service Delivery Management System (SDM)

We noted that, TANESCO developed a Service Delivery Management System (SDM) with a view to document, process and speed up Customer Services delivery.

However, it was noted that, data entered into the SDM was incomplete and did not provide enough information for decision makers to take actions.

According to TANESCO Customer Services Status Annual Reports covering 2016/17-2018/19, the information contained in the system missed details needed to adequately explain the activities which were carried out.

We visited emergency customer service desk and randomly selected specific reported complaints (Temporary Breakdowns-TBs) which were referred to specific departments for solution. We aimed at assessing whether emergency desks were able to provide information on the status of the referred TBs while working on desk. The results of the conducted tests were negative as status of the referred TBs were not updated on the system although the TBs were solved.

Feedback information of what works were carried at sites for specific complaints to help the management or operators to be updated and therefore, be in a good position to correctly answer the customers when they make follow-up calls. Missing feedback information partly led to pending status of complaints in the system.

3.5.2 TANESCO did not log all complaints in the register or SDM

We noted that, complaints were received but not all were logged in SDM upon receipt. This was evidenced through physical observations of the customer service desks and emergency units in the visited regions.

Customers who went in person for Complaints or queries at Customer Services Section, were not logged, recorded or registered in a register or SDM. This practice made it difficult to assess the total number and kind of customers' challenges or problems at the end of the specific day.

For complaints or queries received in writing, the letters which were received at customer service desks were not logged in the SDM system upon

their receipt. They were forwarded to Regional Managers where they were commented and referred to the appropriate sections or departments or were sent back to Regional Customer Relation Officer (RCRO) where the letters were scanned and then were fed into the SDM. This tendency of not logging in the letters in the SDM system contributed to the letters not reaching the respective departments on time or not reaching at all. Through the review of specific departments' or sections' registers, it was revealed that the letters which were referred to those departments were not found in their lists.

3.5.3 TANESCO did not resolve all non-technical complaints

According to SDM, there were a total of 61,511 pending customers' complaints national wide. The complaints included technical and non-technical issues. The practice showed that, since non-technical complaints did not need verification at site, they could be resolved instantly as they were reported and they were not supposed to stay pending. Any reported complaints such as meter accuracy queries, account queries and meter reading queries are referred as non-technical.

According to SDM, there were 49,713 pending non-technical complaints which represented 81% of all complaints. Details of reported complaints are presented in Table 3.5.1

Financial Year	Complaints		Resolved	Pending	
	All	Non-	All	All	non-
		technical			technical
2016/17	552,611	18,986	539,842	12,769	1,185
2017/18	670,801	50,346	653,730	17,071	10,812
2018/19	772,070	116,609	710,559	61,511	49,713
Average	665,161	61,980.33	634,710	30,450	20,570

Table 3.5.1: Technical and non-technical complaints status in the Financial Years 2016/17-2018/19 national wise

Source: Customer Services Status Annual Reports, 2020

Table 3.5.1 shows the increasing trend of the number of pending which refers to increasing of non-resolving of technical and non-technical complaints.

In the visited regions, there was a total average of 1,320 pending technical complaints (unresolved). More details have been presented in **Table 3.5.2**.

S/N	Region	Financial Year			
		2016/17	2017/18	2018/19	
1	Dodoma	843	170	705	
2	Arusha	245	561	466	
3	Kinondoni South	261	154	234	
4	Mbeya	0	18	243	
5	Mwanza	1	6	54	
	Total	1,350	909	1,702	

Table 3.5.2: Unresolved Technical Complaints in the Financial Years 2016/17-2018/19 in visited Regions

Source: Emergency Status Annual Reports 2020

As per the data presented in Table 3.5.2, TANESCO Dodoma region led by having greater number of unresolved complaints followed by Arusha, Kinondoni South then Mbeya, and the least of all was Mwanza region. Total Average number of customers with pending status was 1,702.

According to interviews conducted with TANESCO officials, pending customers' complaints were partly caused by inadequate feedback mechanism which provided a loophole for delaying or not feeding the information in the SDM system to update status.

3.5.4 Untimely responding to complaints and queries

Review of Customer service detailed reports 2016/17-2018/19 for the visited regions (Kinondoni South, Arusha, Mwanza, Mbeya and Dodoma) showed varying extent and trends in proportions of customer complaints that took more than 14 days to resolve.

In Kinondoni South region on average, about 60 percent of the received complaints and queries on customer services took more than 14 days to resolve. More details have been presented in Table 3.5.3

Financial Year	No. of received	Resolved exceeding 14 days	% of delayed responses
2016/17	111	88	79.3
2017/18	93	39	41.9
2018/19	49	29	59.2

Table 3.5.3: Timings in dealing with Complaints in the Financial Year 2016/17-2018/19 at Kinondoni South

Source: Kinondoni South region Customer Services Detail Report, 2019

Table 3.5.3 shows the extent to which the proportion of delayed responses declined in 2017/18 and rose again in 2018/19.

In Arusha region, the average proportion of delayed responses was 50 percent with a declining trend from 67 to 39 percent as shown in Table 3.5.4

Table 3.5.4: Timings in dealing with Complaints in the Financial Year2016/17-2018/19 at Arusha region

Financial Year	No. of received	Resolved exceeding 14 days	% of delayed responses
2016/17	3	2	67
2017/18	22	10	45
2018/19	71	28	39

Source: Arusha region Customer Services Detail Report, 2020

Table 3.5.4 shows the extent to which the proportion of delayed responses had a declined trend despite number of complaints being in an increasing trend from 3 in 201/17 to 71 in 2018/19.

In Dodoma region, where nothing was reported in year 2016/17, there was a decreasing trend from 40% in 2017/18 to 34% in 2018/19 as presented in Table 3.5.5

Table 3.5.5: Timings of Complaints in the Financial Year 2016/17-2018/19 at Dodoma region

Financial Year	No. of received	Resolved exceeding 14 days	% of delayed responses
2017/18	10	4	40
2018/19	53	18	34

Source: Dodoma region Customer Services Detail Report, 2020

In Mbeya Region, on average, about 80 percent of the received complaints and queries on customer services took more than 14 days to resolve in year 2016/17. More details have been presented in Table 3.5.6

Table 3.5.6: Timings of Complaints in the Financial Year 2016/17-2018/19 at Mbeya region in 2016/17-2018/19

Financial Year	Received	Resolved exceeding 14 days	% delayed responses
2016/17	55	44	80
2017/18	19	10	53
2018/19	47	26	55

Source: Mbeya Customer Service Detail Reports, 2020

From Table 3.5.6 the proportion of delayed responses had a declined trend in year 2017/18 then an increasing trend in year 2018/19

Delay in responding to complaints was mainly contributed by the slow pace of customer care desk in logging in complaints as well as referring the complaints to the respective departments.

This affected the provision of customer services and ultimately affected the revenue of TANESCO.

3.6 Monitoring of power reliability and quality by EWURA

This section covers regulatory issues carried out by EWURA. It covers the findings of the assessment of whether EWURA ensures that TANESCO is complied with technical standards that promote quality and reliability of the electricity services.

3.6.1 Inadequate resources to cover regulatory inspections

EWURA is required to monitor the performance of TANESCO in relation to standard of services delivered¹⁰.

Review of EWURA Annual and Regulatory performance reports showed that, for the three years covered in this audit, EWURA did not inspect all regions as presented in Table 3.6.1.

Financial Year	No. of Regions	No. of Inspected	No. of regions not Inspected	Percentage not Inspected		
2016/17	29	19	10	35		
2017/18	29	21	8	28		
2018/19	29	24	5	17		

Table 3.6.1: Inspection coverage by EWURA

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From Table 3.6.1, there was a decreasing trend in the percentage of regions which were not inspected and increasing trend of Inspected regions from 19 regions in 2016/17 to 24 regions in 2018/19.

According to interviews conducted with EWURA officials, failure to inspect all TANESCO regions was attributed by the lack of finance and manpower on the part of EWURA. The audit team was further informed that, EWURA

¹⁰ Section 7(1) (c) (ii) of EWURA Act

was not capable of doing the full scope inspections to all TANESCO regions and other electricity utilities. The planned coverage in terms of scope and number of regions depended on the available budget for each respective year.

Moreover the audit was informed that, the objective of EWURA was to inspect TANESCO regions by sampling, thereafter it instructed the utilities to rectify the observed anomalies on the sampled areas and then replicate the same to other areas which were not inspected.

EWURA did not present the criteria for sampling that were used to decide on the selected sample for inspection. This ultimately implies that, EWURA did not have plans to solve the problem of inadequate resources in terms of finance and manpower.

3.6.2 EWURA did not report on key issues related to compliance to technical standards

It was noted that, issues related to monitoring of compliance to standards were inadequately reported in the Regulatory Performance Reports on Electricity Sub-Sector.

According to EWURA Act and EWURA's manual for inspection11, EWURA is supposed to conduct inspection and report on the following key elements every year:

- Frequency and Voltage limits
- outages and distribution losses
- Installation of energy meters,
- Construction Standards,
- Customer Service Charter
- Using qualified Electrical installation personnel

However, review of Regulatory and Annual Performance Reports on Electricity Sub Sector for the years ended 30th June 2017 and 2018 revealed that, EWURA reports covered only the following:

- Energy distribution losses in 2016/17 and 2017/18;
- Installation of energy meters in 2016/17 and 2017/18; and
- Customer Service Charter in 2017/18.

¹¹ Section 4.1.1.1(1), Section 5.3 and Annex 1

(The Regulatory Performance Report for 2018/19 was yet to be released at the time of this audit)

Other elements were not touched as indicated in Table 3.6.2.

Table 3.6.2: Key Elements Reported on Monitoring of Compliance to standards in financial years 2016/17 to 2018/19

S/N	Key eleme	nt	2016/17	2017/18	2018/19
1	Losses and Energy meters installati on	Energy distribution losses Energy metering system installation	Total distribution losses were 586.28GWh (8.83%) which is lower than the year ended June 2016 which was 10%.	TANESCO had a total energy loss of 14.72% of which 5.89% was for transmission and 8.83% was for distribution.	
2	Construct ion Standards	Primary substations 33kV and or 11kV feeder lines Secondary substations 230V and or 400V Circuit	Not Reported	Not Reported	Informati on not yet released
3	Customer Service Charter	Average compliance to Customer Standard Charter	Not Reported	TANESCO connected 72% of 273,272 applications	
4	Electrical installati on activities	Installations done by Licensed personnel Adherence to installation standards	Not Reported	Not Reported	

Source: Regulatory Performance Reports on Electricity Sub-Sector for the Years Ended 30th June 2017 and 2018

From Table 3.6.2, it can be seen that, EWURA never reported on whether TANESCO used qualified Electrical installation personnel including the issues of construction standards which are the key elements for managing power losses.

Comparison of transmission and distribution losses reported by EWURA as presented in Table 3.6.1 with the losses reported by TANESCO (presented in Table 3.4.4 to 3.4.6) revealed that EWURA made errors in computing the losses as presented in Table 3.6.3.

Financial Year	Losses	Reported by EWURA	Reported by TANESCO
2016/17	Transmission Losses	Transmission Not reported Losses	
	Distribution Losses	8.83%	29%
	Total Losses	Not Applicable	37%
2017/18	Transmission Losses	5.89%	7%
	Distribution Losses	8.89%	29%
	Total Losses	14.72%	36%

Table 3.6.3: Erroneous power losses reported

Source: TANESCO Power Loss Report (2019) and EWURA Regulatory Performance reports (2017 and 2018)

3.6.3 EWURA incorrectly reported issues of quality of power supply (reliability)

The quality of power supply in terms of reliability indices, SAIFI, SAIDI and CAIDI depends much on the availability of reliable and quality data relating to the actual number of affected customers by power supply interruptions which are required for calculation of the indices.

Section 7 of the Tanzania Standard TZS 1374:2011 requires TANESCO to keep records of the date, start time and duration of each planned and unplanned interruption, the number of affected customers and total number of connected customers in a specific affected feeder in order to determine the indices (SAIFI, SAIDI and CAIDI).

In order to calculate the indices, the data for interruptions due to planned, unplanned and load shedding requirements should be evaluated separately. SAIFI should be the sum of the three factors and should be calculated on monthly basis and reported annually. The annual SAIFI should be less than 3 interruptions per customer per year.

SAIDI is the average duration (minutes) of the supply interruptions per customer per year. The data to be used are those for interruptions due to

planned, unplanned and load shedding requirements and should be evaluated separately. SAIDI is the sum of the three factors and should be calculated on monthly basis and reported annually. The annual SAIDI should be less than 650 minutes per customer per year.

Furthermore, CAIDI which is the average duration of each supply interruption per customer who experienced the interruption per year, is the data for SAIDI divided by SAIFI calculated at the end of each year. The annual CAIDI should be less than 4 minutes per interruption event per year.

The standard also provided the recommended reporting format for distribution system performance which requires the indices be reported on annual basis and compared over a sliding window for the previous five years and indices which fall outside the limits should be highlighted.

However, review of Regulatory Performance Reports on Electricity Sub sector for the periods under the audit showed that, EWURA neither correctly reported the indices nor reported in the required format. This was due to the following facts:

- 1) EWURA calculated the indices annually and reported monthly;
- EWURA included in the calculation planned outages, unplanned outages, affected customers and frequency of interruption but excluded total number of connected customers in the affected areas;
- 3) EWURA did not detail which interruption hours was for load shedding; and
- 4) EWURA did not show in the performance report in terms of priority the areas that were more affected by the interruptions.

EWURA informed the audit that, the reason for the above incorrectly reported indices was due to the fact that, EWURA obtains data inputs for its report from TANESCO. On the other hand, TANESCO are required to submit true and correct data and information to EWURA.

EWURA further claimed that, there were several efforts to remind TANESCO of this obligation, but TANESCO has not been able to submit the reliability indices as required.

Incorrect reporting of issues of power quality and reliability may affect investment plans of the country. EWURA reports are expected to provide

useful information or data to stakeholders and readers regarding to the electricity sub sector for decision making.

3.7 Monitoring and Evaluation by the Ministry of Energy

This section presents the results regarding to monitoring and evaluation of the electricity services to ensure the services are accessible and reliable. It presents the assessment of specific indicators, targets, goals and activities related to power accessibility and reliability.

3.7.1 There were no specific performance indicators, targets, and goals on reliability of electricity supply services

According to the Ministry of Energy Strategic Plan 2018/19-2020/21, monitoring was supposed to be conducted regularly and performance reports produced quarterly, semi-annually and annually for proper tracking of the performance. The Ministry was expected to have targets for the purpose of preparing the performance indicators for monitoring.

The review of Ministerial Strategic Plan of 2018/19 to 2020/21, revealed that, the Ministry of Energy did not present specific performance indicators for assessing activities related to reliability and accessibility of electricity supply services.

Further, interview with the officials from the Ministry of Energy indicated that, they did not make follow-up of specific issues of reliability of electricity services rather they were attached to specific projects especially the rural electrifications.

Lack of specific set performance indicators, targets and goals on the specific issues of reliability and accessibility of electricity supply services, and the methods of achieving them has been caused by the fact that officials are engaged with multiple activities, and hence the failure to prioritize.

3.7.2 The Ministry of Energy did not execute monitoring, evaluation and performance reporting roles as expected

The Ministry of Energy Strategic Plan 2018/19-2020/21 requires the MoE to regularly conduct monitoring and performance reports produced accordingly.
However according to the interviews conducted with officials from the Ministry of Energy, it was noted that, Ministry officials only participated in supervisory role in Electricity projects in different regions but there was no implementation status reported to enable monitoring activies.

Furthermore, the review of Action Plans of the Ministry of Energy for financial year 2016/17 to 2018/19 showed that, the Ministry of Energy planned to monitor the implementation status of Electricity Industry Reform Strategy and Roadmap but did not allocated fund to actually perform monitoring and evaluation activities.

Following lack of fund to conduct Monitoring and Evaluation activities, the Ministry did not execute its role as expected.

3.7.3 Performance reports did not cover issues of reliability

According to the Strategic Plan of the Ministry of Energy, the Ministry was expected to prepare quarterly, semi-annually and annual performance reports and provide feedback to all heads of divisions, departments and units. The reports were expected to show achievements made against Strategic Plan objectives and targets to facilitate the review of strategic plans. In order to inform these reviews and update the Strategic Plan indicators, periodic service delivery surveys were expected to be planned and conducted regularly.

It was noted that, the Ministry of Energy issued quarterly and annual progress reports but the reports did not cover issues of power reliability. The Ministry of Energy only issued annual reports covering issues of accessibility of electricity supply such as increasing generation and rural electrification.

We however noted that, there were no specific monitoring and evaluation reports for reliability of electricity supply service activities delivered by MoE.

Lack of specific monitoring and evaluation reports on reliability and accessibility of electricity supply service activities was caused by the fact that MoE did not include issues of reliability and accessibility of electricity supply services when conducting monitoring and evaluation.

CHAPTER FOUR

CONCLUSION

4.1 Introduction

This Chapter provides the general conclusion and specific conclusions which are related to findings described in the previous chapter. The specific conclusions connect to new customers; maintenance of infrastructure; standards of service; timeliness in responding to customer complaints; regulation by EWURA and Monitoring and Evaluation by the Ministry of Energy.

4.2General Conclusion

Based on the findings and analysis provided in Chapter Three, we conclude that, TANESCO does not adequately use its established mechanism to ensure electricity services are reliable, accessible and connections are timely made for customers.

Despite the efforts made by TANESCO to improve its operations, TANESCO has not ensured that, basic services such as surveys for new connections to electricity are conducted on time and service lines are connected within the stipulated timeframe. Also, despite having operational customer service desks, it was noted that they do not respond to customers' complaints and queries accordingly.

Many temporary breakdowns are reported by customers at emergency desks. However, TANESCO does not collect all the information, analyse and use the results to plan and conduct risk based maintenance of the distribution networks.

Moreover, TANESCO does not adequately ensure the quality of power supplied. The outage hours and outage frequencies have been beyond limits specified by the standards. Frequent breakdown to the distribution systems has resulted into power interruptions.

The Ministry of Energy and EWURA being overseer and regulator respectively, do not sufficiently ensure electricity is accessible through

proactive and systematic ways of combating problems of power outages, voltage and frequency fluctuations.

4.3 Specific Conclusions

4.3.1 Connecting service lines to new customers

Delays are common for TANESCO when connecting service lines to new customers. Connection to service line was not prioritized as an activity that can boost income generation of the company in such a way that there were many pending surveys and connections.

Delays in connecting customers at the specified timeframe may attract penalties if customers decide to take the path of demanding for the payment as compensation for delayed services.

4.3.2 Conducting risk-based maintenance of infrastructure for electricity distribution

Despite customers being able to report problems through customer service and emergency desks, the registered information is not adequately used to assess risks and prioritize high risk areas when planning and conducting maintenance activities.

TANESCO rather developed reactive maintenance plans which did not help minimize power outages upon implementation.

4.3.3 TANESCO complying with technical standards in electricity service delivery

TANESCO does not adequately comply with the requirements of the technical standards of ensuring reliability. This makes it difficult for the company to keep records of all interruptions as required by the standards. Keeping records would allow the company to do a self-assessment on the compliance to the requirements of the standards.

TANESCO neither documents exact areas nor takes initiative to avoid the high frequency of power outages and low voltages.

4.3.4 Customer service delivery in responding to complaints and queries

The customer service desks within TANESCO failed to adequately register, update and respond to customer complaints on time. The failure to update customer's complaint details on time leads to not being able to understand how many and when specific complaints or queries were resolved including whether the complaints were closed or not. This creates difficulties in assessing institution's service delivery performance which ultimately leads to poor or inadequate service delivery to customers.

4.3.5 EWURA ensuring that TANESCO complies with technical standards

EWURA is unable to ensure that TANESCO complies with technical standards that promote quality and reliability of electricity services. This is because EWURA depends much on information from TANESCO in regulating the company meanwhile, TANESCO does not submit to EWURA true and correct data.

Despite TANESCO having repetitive observed issues in inspection, TANESCO does not take enough initiatives to ensure the issues are rectified and are not repeated in the next inspection.

4.3.6 Monitoring and Evaluation of electricity services by the Ministry of Energy (MoE)

The Ministry of Energy does not adequately conduct monitoring and evaluation of TANESCO activities. To conduct monitoring and evaluation activities for electricity supply services, there must be plans prepared to show what and how the activities will be monitored. It is through the prepared plans that the Ministry can identify activities to focus on and be in a position of providing the information that would enable to track progress and enhance decision making.

The Ministry does not have documented plans for conducting monitoring and evaluation for activities related to electricity supply. Because of this lack of planning and conducting M & E, there has been a series of noted failure by TANESCO to make improvements in the issues of reliability and accessibility of electricity supply services such as sustainable preventive maintenance.

CHAPTER FIVE

RECOMMENDATIONS

5.1 Introduction

This chapter presents recommendations directed to EWURA, TANESCO and the Ministry of Energy on what should be done to improve accessibility, reliability and timeliness in connecting to electricity services.

The National audit office believes that the implementation of these recommendations will significantly improve the way electricity supply services are managed.

5.2 Recommendation to the Ministry of Energy:

The Ministry of Energy should:

1. Ensure that issues of accessibility and reliability of electricity supply services are covered in monitoring and evaluation of TANESCO.

5.3 Recommendations to EWURA

EWURA should:

- 1. Ensure the resources for comprehensive monitoring of TANESCO are available, and
- 2. Ensure monitoring and reporting on power reliability use relevant and reliable data.

5.4 Recommendations to TANESCO

TANESCO should:

- 1. Ensure logistical arrangements are improved so as to minimize the number of pending surveys,
- 2. Ensure balanced distribution of service line connection materials to minimize pending connections,
- 3. Prioritize on maintenance of critical elements in order to increase power reliability level and minimize power loss,

- 4. Ensure feedback information in the SDM system is accurately received and timely logged in for easy traceability of delivered services,
- 5. Conduct research to find out better substitutes/alternatives to wooden poles, and
- 6. Ensure that reliable data for individual feeders/sub-stations are recorded to enable measurement of Performance efficiency in terms of reliability.

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APPENDICES

Appendix 1: Responses from the Audited Entities

This part covers the responses from TANESCO, EWURA and the Ministry of Energy. The responses are divided into two parts i.e. general comments and specific comments in each of the issued audit recommendations. These are detailed in the appendices 1(a), 1(b) and 1(c) below:

Appendix 1(a): Responses from the Ministry of Energy

General Comments

The Ministry of Energy appreciates the work done by Auditors for the purpose of improving TANESCO performance, however the Ministry has a role of ensuring that energy resources are developed efficiently and sustainably thereby contributing significantly to the socio-economic development of the country. The focus being enhancing power reliability and coverage of distribution network and accelerate rural electrification to foster socioeconomic transformation, strengthening legal and regulatory framework in the power subsector.

Specific comments

S/N	Recommendation	Comments	Planned	Implementati
		from MoE	actions	on Timeliness
1	Ensure that issues of accessibility and reliability of electricity supply services are covered in the monitoring and evaluation of TANESCO	Auditor's observation is noted	The Ministry of Energy will develop a monitoring and evaluation mechanism to include key performance indicators and measures for power accessibility and reliability across the Country	June, 2020

Appendix 1(b): Responses from EWURA

This part covers the responses from EWURA. The responses are divided into two parts i.e. general comments and specific comments in each of the issued audit recommendations. This is as detailed below:

General Comments

Inadequate coverage of regulatory inspections

In accordance with available resources, in terms of finance and manpower, EWURA is not capable to do full scope inspections to all TANESCO regions and other electricity utilities. The planned coverage in terms of scope and number of regions depends on the available budget for that respective year. The objective of the Authority was to inspect on sample basis and instruct utilities to rectify the observed anomalies on the sampled areas and replicate the same to other areas which were not inspected.

It is EWURA's expectation that after inspection and reporting the findings to TANESCO and other utilities will use the reports as a tool to devise a mechanism to improve power reliability and customer services.

EWURA inadequately reported issues related to reliability

All sector performance reports are published during quarter 3 of the next Financial Year, therefore the Electricity Sector Performance report for the year 2018/2019 is expected to be published during the month of April 2020 after being approved by the Board of Directors.

The Electricity Sub-sector Performance Report has been published in 2016/17 and 2017/18. Therefore, through reviews EWURA will continue to improve and standardize it.

It should be noted that apart from the Electricity Sub-sector Performance Report, there are other reports such as Electricity Division Quarterly reports, and EWURA Annual Reports which also report about the performance of the Electricity Sub-sector.

EWURA incorrectly reported issues of quality of power supply (reliability)

EWURA obtains data inputs for its report from the regulated utilities, and in accordance with Section 15 (4) of the Electricity Act, 2008 utilities are required to submit true and correct data and information to EWURA. Despite several efforts to remind TANESCO of this obligation, TANESCO has not been able to submit the reliability indices as required.

The Authority will continue to pursue TANESCO to ensure compliance to the requirement of the law.

Specific comments

S/N	Recommendation	Comments from EWURA	Planned actions	Implementatio n Timeliness
1	Ensure that the resources for comprehensive monitoring of TANESCO are available	The recommenda tion is noted for action.	 Review Electricity Inspection Manual to identify areas for improvements in line with the recommendatio n. To intensify the inspections 	FY 2020/21 Continuous
2	Ensure that monitoring and reporting on power reliability use relevant and reliable data.	Noted for implementat ion	 With help of NVE (Norwegian Water Resources and Energy Directorate) EWURA will review the Electricity Regulatory Information System (ERIS) in order to improve it for obtaining more reliable data from Utility. Capacity building to TANESCO on Power reliability data requirement and calculation. 	FY 2021/22

Appendix 1(c): Responses from TANESCO

General Comments

Delay in providing quotations to Customers:

Following to the post analysis done related with the above findings, the following are the observation from the analysis; Way leave disputes, Double issuance of application forms, Waiting for completion of new projects, No existing electricity infrastructure and No access to the applicant.

Delayed connection to already paid Customers:

From the analysis above and through the sample taken we have noted that 2017 to 2018 customers were already connected but not updated into the SDM system. Some of customers from late 2019 are still in the process of being connected. Engineering report on pending service line indicates only 18,678 (13,228 and 5,350 for 30 meters and above 30 meters respectively).

Connection materials were not supplied in a balanced proportion:

Materials were distributed in balanced form subject to be used not only for service lines but also to distribution projects within Regions. The former Company policy was all materials being purchased centrally up to financial year 2017/2018 and thereafter in 2018/19 the Company decentralized procurement management cases to Zones which now foresee the Regions needs accordingly.

Maintenance practices did not address risk of operation:

Principally and according to organization structure Regions have maintenance Teams, emergency gangs and other gangs as per organization structure. Maintenance gangs always perform maintenance which are scheduled and their origination of which comes from inspection and emergency reported temporary breakdowns. Thus, there are cases that are dealt with under reactive and there are cases which are corrected under proactive style and the reason behind is the nature and type of breakdown.

75% of inspected poles were decayed:

DESCRIPTION	NUMBER	INSPECTED	DECAYED	DECAYED VS TOTAL	
				NO.POLES	
MV Poles	548,104	20,340	15,345	2.8%	
LV Poles	1,659,652	19,474	13,797	0.8%	
DESCRIPTION	NUMBER	INSPECTED	REPLACED	REPLACED VS TOTAL T/F	
Transformers	21,910	2,716	1,464	6.6%	
Outages frequency:					

Inspection is based on Age of system and Frequency of reported cases. The system is compose

We concur with audit findings on the level of outages to be on the higher side. POREP has been designed to reduce the number and duration voltage by under taking the following: Thorough inspection of lines, Data analysis, Maintenance planning documentation, Carrying maintenance activities, and Monitoring and evaluation.

TANESCO does not have reliable information to measure the performance efficiency in relation with power system Reliability.

We have started pilot project for GIS implementation in four Regions i.e. Ilala, Kinondoni North, Temeke and Coast region. We are aiming to rollout country wide in financial year 2020/21.

TANESCO lost an average of Tanzania Shillings 67 Billion per year due to power loss.

Any system worldwide has component loss in the form of I^2R which is termed as technical loss. Another form of loss is non-technical loss which is the component attributed to energy theft and billing deficiency. Energy loss of 10% as observed is within the acceptable value.

TANESCO strives to reduce distribution losses by introducing MV distribution system.

Slow pace in responding to Customers' complaints.

We concur with the audit findings on slow pace in responding customer complaints; however management has started to prepare One Stop Centre Operation manual with the objective;

- To serve as one entry point for all customers with all business operations and reduce customer movement from one point to another seeking same services.
- To simplify business process through timely service delivery.
- Monitoring and evaluation of business units and staffs.
- Enhance Just In Time (JIT) service delivery mode.
- Improve quality of service provision for customers.
- Enhance full utilization of company business systems.
- Increase transparency and reduce corruption through establishment of clear business procedures in an open working environment.
- Increase specialization of work through centralization of business operations on one working environment.

Improve case management reduce bureaucracy and administrative overburden of a company.

Specific comments

S/ N	Recommendation	Comments from TANESCO	Planned actions	Implementati on Timeliness
1.	Ensure logistical arrangements are improved so as to minimize the number of pending surveys,	On pending surveys, we have started limiting double issuing of application forms by restricting registration of new Customers by using only National IDs.	Screening all double issues of applications Application forms with no owners to be deleted from system	By April 2020
2.	Ensure balanced distribution of service line connection materials to minimize pending connections,	On pending supply to new connections, we have insisted all Regions to fully utilize the locally launched Service Delivery Management System after final updating. The latest pending report is undergoing corrections	Issues of way leave disputes, consulting relevant parts to compromise the case Enhanceme nt of monitoring and evaluations	By April 2020
3.	Prioritize on maintenance of critical elements in order to increase power reliability level and minimizing power loss,	The main crush program launched some few past years named as POREP (Power Reliability Enhancement Program) is going on under three observations. (Quick fixes, Medium term and Long term). Established Dsm Control centre (DCC) at Mikocheni to foresee automation during	Quick fixes that involves short term solution e.g. Tree cutting Medium term that involves replacing decayed poles Long term that involves new medium	From January 2020 to December 2023

S/ N	Recommendation	Comments from TANESCO	Planned actions	Implementati on Timeliness
		outages and closing of feeders.	line extensions and substation constructio n. Planning to rollout DCC system country wide	
4.	Ensure that feedback information in the SDM system is accurately received and timely logged in for easy traceability of delivered services	Management has started to establish One Stop Shop (OSS) with the aim to serve, receive and process customer concern in one place and providing feedback/resoluti on to the customer in accordance to Customer Service Charter	Preparation of One Stop Shop manual to cover the following; Operation & organizatio n, Office layout Systems, Customer service business processes and Staffing with proper qualificatio ns	June 2020
5.	Conduct research to find out better substitutes/alternati ve to wooden poles	We have started using underground cables for medium lines within Dsm City Planning to use concrete poles	Works has been contracted, some works have been completed and other in progress. Concrete pole factory (TANESCO's subsidiary company) has started production.	Continuous

S/	Recommendation	Comments from	Planned	Implementati
Ν		TANESCO	actions	on Timeliness
6.	Ensure that reliable	SDM system is	To add the	June 2020
	data for individual	internal	escalation	
	feeders/sub-stations	developed system	matrix to	
	are recorded to	started in 2014	the new	
	enable measurement	with version	version in	
	of Performance	number 1.0.0.0.	accordance	
	efficiency in terms	The current	to what is	
	of reliability	version is 3.2.0.6.	stipulated	
		Management is in	in Customer	
		the view of	Service	
		keeping on	Charter	
		updating from		
		time to time		
		depending on	To generate	
		stake holder's	automatic	
		views and	response	
		comment.	one the	
			customer's	
			service	
			request	
			logged into	
			SDM system	

Appendix 2: Detailed Main audit questions with sub-questions

This part	provides	the	list	of	audit	questions	and	their	respective	sub-
questions	:									

Audit	Does TANESCO ensure that service lines are timely
Question 1	connected to new customers?
Sub Audit	Does TANESCO conduct demand forecast of materials to ensure
Question 1.1	timely connection?
Sub Audit	Does TANESCO distribute materials effectively to ensure timely
Question 1.2	connection of service lines?
Sub Audit	What are the corrective actions taken by TANESCO for
Question 1.3	untimely connection and supply?
Audit	Does TANESCO conduct risk based maintenance of
Question 2	infrastructure for electricity distribution?
Sub Audit	Does TANESCO plan for operational risk-based maintenance of
Question 2.1	infrastructure for distribution?
Sub Audit	Does TANESCO conduct risk-based maintenance of
Question 2.2	infrastructure to ensure reliable electricity services?
Audit	Does TANESCO comply with technical standards (for quality
Question 3	and reliability) in electricity service delivery?
Sub Audit	Does TANESCO render electricity service in compliance to
Question 3.1	power quality standards?
Sub Audit	Does TANESCO have mechanisms to minimize electricity power
Question 3.2	interruptions?
Sub Audit	Does TANESCO minimize power loss?
Question 3.3	
Audit	Does TANESCO respond to all complaints and queries?
Question 4	
Sub Audit	Does TANESCO receive and register all customer complaints
Question 4.1	and queries?
Sub Audit	Does TANESCO respond to all received complaints and queries
Question 4.2	on the stipulated time?
Audit	To what extent does EWURA ensure that TANESCO comply
Question 5	with technical standards for quality and reliable electricity
	services?
Sub Audit	Does EWURA monitor reliability (power quality) of electricity
Sub Audit Question 5.1	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO?
Sub Audit Question 5.1 Sub Audit	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical
Sub Audit Question 5.1 Sub Audit Question 5.2	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards?
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and reliable?
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6 Sub Audit	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO?Does EWURA monitor TANESCO compliance to technical standards?Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and reliable?Does MoE conduct monitoring activities for
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6 Sub Audit Question 6.1	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and reliable? Does MoE conduct monitoring activities for electricity services?
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6 Sub Audit Question 6.1 Sub Audit	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and reliable? Does MoE conduct monitoring activities for electricity services? Does MoE conduct evaluation to activities of ensuring
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6 Sub Audit Question 6.1 Sub Audit Question 6.2	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and reliable? Does MoE conduct monitoring activities for electricity services? Does MoE conduct evaluation to activities of ensuring accessibility and reliability of electricity services?
Sub Audit Question 5.1 Sub Audit Question 5.2 Audit Question 6 Sub Audit Question 6.1 Sub Audit Question 6.2 Sub Audit	Does EWURA monitor reliability (power quality) of electricity services offered by TANESCO? Does EWURA monitor TANESCO compliance to technical standards? Does Ministry of Energy conduct monitoring and evaluation of electricity services to ensure the service is accessible and reliable? Does MoE conduct monitoring activities for electricity services? Does MoE conduct evaluation to activities of ensuring accessibility and reliability of electricity services? Does MoE produce performance reports on electricity services

Appendix 3: Detailed Assessment Criteria and Sources

Audit Issue	Assessment Criteria And Source
Whether TANESCO	TANESCO Customer Service Charter gives 7-14 days to
ensures service lines are timely connected to new customers	 provide a quotation to customer who has filled in the Service Line Application Form and has provided all necessary attachments¹². The numbers of days vary depending on the distance of the existing infrastructure. a) A customer is to be provided with quotation within 7 working days if the customer resides within 30m from the existing infrastructure. b) 10 working days if the requested connection will need lines extensions of more than 100m; and c) 14 days if customer resides in an area where there are no existing networks or if a customer applied for
	industrial and commercial connection.
Whether TANESCO conducts risk based maintenance of infrastructure for	Objective 4.1.1(c) of Power System Master Plan of 2016 required TANESCO to ensure accessible distribution routes by means of continuous maintenance practice.
distribution	TANESCO to avoid equipment performance degradation or failure through operational risk management.
	Additionally, Chapter 3.4.6 (Objective F) of TANESCO strategic plan (2017/18 - 2020/21) requires TANESCO to conduct continuous maintenance of infrastructure.
Whether TANESCO comply with technical standards (for quality and	Section 4.2 of Tanzania Standard on Power Quality (Quality of supply) (TZS 1373:2011) requires the standard frequency of the supply to be 50 Hz.
reliability) in electricity service delivery	Section 4.1 requires the standard voltage to be 400V phase to phase, and 230V phase to neutral. And for customers supplied at other voltage levels, the magnitude of the declared voltage shall be as specified in the supply agreement.
	Tanzania Standards for power quality (quality of supply) TZS 1373:2011 Section 4.3.2 requires the allowable deviation from the nominal value of voltage to be $\pm 5\%$ for 33kV and 11kV, $\pm 10\%$ for 230V and 400V, and allowable deviation from the nominal value of frequency to be $\pm 2.5\%$, respectively.
	Tanzania Standard, TZS 1374:2011, Section 7, requires that the Annual System Average Interruptions Frequency

¹² One photograph of the customer and wiring diagram of the house/building properly drawn and rubber stamped by the registered Electrical Contractor who undertook the wiring

Audit Issue	Assessment Criteria And Source
	Index-(SAIFI) to be less than 3 interruptions per customer
	per year. Average Interruption Duration Index (SAIDI) is supposed to be less than 650 minutes (10.8 Hours) per customer per year.
	Annual Customer Average Interruption Duration (CAIDI) is supposed to be less than 4 minutes per interruption event per year.
	TANESCO targets to reach a loss of 11.4% (in both distribution and transmission) By the year 2025.
Whether TANESCO responds to all complaints and queries	TANESCO Customer Service Charter requires TANESCO to spend a minimum of 5 working days and the maximum of 14 working days for all circumstances of complaints and queries.
	TANESCO Customer Service Charter Delivery Standards Section F.1 (a), all complaints whether received by telephone, in person or in writing should be logged in customer complaint register.
	Furthermore, according to TANESCO Customer Service Charter Delivery Standards Section F.3, all written customer requests (for example moving of meters, changing of meters, pole movement, change of mode of supply), should be replied to in writing by TANESCO within 2 weeks of receipt of a written request. The reply should include information on the cost to the customer, the customer's obligations and the time frame for the carrying out of the request.
Extent to which EWURA ensures that TANESCO	Section 7(1) (c) (ii) of EWURA Act requires EWURA to monitor the performance of the regulated sectors in relation to standard of services;
technical standards for quality and	Section 4.1.1.1(1) of EWURA's Manual for inspection requires EWURA to inspect TANESCO for voltage limits;
services	EWURA's manual for inspection section 5.3 and Annex 1, mention voltages, frequencies and outages to be key elements to asses when establishing compliance monitoring on quality of power supply and reliability; and
	EWURA's manual for inspection section 5.3 and Annex 1, requires distribution losses and installation of energy meters, Construction Standards, Customer Service Charter and using qualified Electrical installation personnel to be key elements when establishing compliance monitoring on technical standards.

Audit Issue		Assessment Criteria And Source
Whether	the	Ministry of Energy Strategic Plan 2018/19-2020/21
Ministry of Ene	ergy	requires monitoring to be conducted regularly and
conducts		performance reports produced quarterly, semi-annually
monitoring a	and	and annually for proper tracking of the performance.
evaluation	of	
electricity servi	ces	Furthermore, Section 4.3.3 of Strategic Plan 2018/19-
to ensure	the	2020/21 of the Ministry of Energy states that, in order to
service	is	measure its performance, the reports will be prepared
accessible a	and	quarterly, semi-annually and annually and feedback be
reliable		provided to all head of divisions, departments and Units.

Appendix 4: Methods for Data Collection

This part provides the detailed methods for data collection which are: reviews of documents, interviews and observations.

a) Interviews

Interview method was used to collect information so as to be able to respond to the audit questions and provide conclusions against the audit objective. The interviews allowed the audit to get a broader understanding of the audit area and identify existing challenges, root causes and eventually the consequences to those problems.

The audit conducted interviews and discussions with officials from the Ministry of Energy, TANESCO and EWURA. The Table below provides a detailed list of individuals and entities that were interviewed during the audit and the reasons for interviewing each of them.

S/N	Interviewed	Reasons for interview
	officials	
		At the Ministry of Energy
1	Commissioner	To confirm or get explanation of the context in the
	for Electricity	Energy policy regarding accessibility and reliability
2	Assistant	To confirm or get explanation whether Monitoring and
	Director	Evaluation is conducted to TANESCO to ensure that
	Monitoring and	offered electricity supply Services are with
	Evaluation	accessibility and reliability
3	Energy	To confirm or get explanation from the responsible
	Engineer	official at the Ministry of Energy on the extent of
		conducted monitoring and evaluation activities to
		TANESCO
4	Assistant	To confirm or get explanation of the context in the
	Commissioner	Energy policy in regards to electricity supply services
	Tor Electricity	
		At IANESCU
1	Manager Call	TANKEGO timing to explanation on the extent of
	Centre	TANESCO timing to customer service delivery.
2	Customer	To confirm whether TANESCO timely responds to
	Relation	customers' complaints, inquiries and requests. If not
	Officers	so get explanation on the causes and impacts of
	Discussion and	Untimely responses and resolving.
3	Planning and	To confirm or get explanation on now Planning and
	design Engineer	designing of projects consider issue of electricity
	Oneration	supply accessibility and reliability
4	Operation	to confirm or get explanation on now TANESCO comply
	manager	to construction procedures and maintenance to ensure
		power reliability

Table 4 (a): List of interviewed officials and reasons for interview	N
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S/N	Interviewed officials	Reasons for interview
5	Principal Engineers	To confirm or get explanation on how TANESCO comply to Construction procedures and Maintenance to ensure power reliability in their regions
6	Planning Engineers	To confirm or get explanation on the strategies TANESCO has in the planning of surveys to enable timely construction for Service Line and new projects
7	Maintenance Engineers	To confirm or get explanation on whether TANESCO develops and implements risk-based maintenance
8	Construction Engineers	To confirm or get explanation on the extent TANESCO strategizes to timely connect or construct service Line connections and new projects
At EWURA		
1	Principal Electricity Inspector	To confirm or get explanation on the extent EWURA conducts compliance monitoring inspections
2	Principal Engineer	To confirm or get explanation on the extent EWURA conducts compliance monitoring to ensure that TANESCO comply to technical standards
3	Zonal Engineers	To assess the extent of conducted inspection and compliance monitoring in the regions under their jurisdiction

b) Review of documents

Documents were reviewed in order to obtain appropriate and sufficient information to enable the audit come up with findings which are supported by evidences.

The reviewed documents were those falling within the period under audit i.e. 2016/17 up to 2018/19. Some of the documents reviewed and reasons for review are detailed in the Table below:

S/N	Reviewed Documents	Reasons for Review
1	National Energy Policy 2003	To assess what policy states about
		Electricity power reliability
2	Electricity Act No. 10 of 2008	To assess what is the Act's requirement
		in regards to electricity Accessibility And
		Reliability.
3	The Energy and Water	To assess what is the Act's requirement
	Utilities Regulatory Act of	in regards to EWURA's role of ensuring
	2001	that TANESCO comply to standards of
		electricity supply services
4	TANESCO Engineering	To assess the procedural guidance given
	Instructions Manual	to TANESCO in regards to reliability of
		power supply and distribution network

Table 4 (b): List of reviewed documents and reasons for review

S/N	Reviewed Documents	Reasons for Review
		maintenance; and quality of power
		supply
5	TANESCO Customer Service	To assess whether the delivery services
	Charter	offered by TANESCU are in accordance to
6	TANESCO Stratogic plan	To assess TANESCO's set strategic plans
0	2017/18-2020/21	to ensure electricity supply accessibility
	2017/10/2020/21	and reliability
7	TANESCO Corporate Business	Assessing the extent TANESCO's
	Plan 2016/17	cooperate plans consider electricity
		supply accessibility and reliability
8	TANESCO Power System	Assessing the extent which power master
	Master Plan of 2016	plan considers power Accessibility and
0	TANESCO Approved Corporate	Reliability
7	Budget 2016/17-2018/19	Plan for the year 2016/17-2018/19
10	Electricity Supply Industry	To assess the objectives set and their
	(ESI) Reform and Roadmap	implementation in relation to Electricity
	2014-2025	Supply accessibility and reliability for the
11	Ministry of Enorgy (MoE)	year 2010/17-2010/19
	Strategic Plan of 2018/19 -	strategies and plans of the Ministry
	2020/21	considers monitoring and evaluation
		activities for Electricity supply reliability
12	TANESCO Service Line	Assess whether the Service Line
	duration reports 2016/17-	connection request was attended within
	2018/19-SDM system, 2020	stipulated time. If not so establish the
		impacts, causes and evidences to be base
13	Service Line Applications	Assess the progress status of customers
15	Progress Report-SDM system.	requested for Service Line connection at
	2020	time of audit.
14	Service Line material	To assess whether the Service Line
	procurement plans 2016/17-	material procurement was according to
	2018/19	developed plans and whether the plans
		were reflecting actual situation of
15		To assess the commonly reported
J	Common Problems Reports of	problems and whether there was
	2016/17-2018/19	consideration of risk areas during
		maintenance plans and implementations
		in period under review.
16	Tanzania Standard on Power	To assess and establish whether the set
	Quality (Quality of supply)	standards for power quality (quality of
47	(125 13/3:2011)	supply) are complied with.
17	Tanzama Standard, TZS	to assess and establish whether the standards set for power interruptions
	1374.2011	limits are complied with
18	TANESCO LT Maintenance	To assess and establish whether the
	Reports 2016/17-2018/19	maintenances activities were conducted

S/N	Reviewed Documents	Reasons for Review
		by considering risk areas and challenges faced in relation to accessibility and reliability of electricity supply services.
19	TANESCO Emergency Status Annual Reports 2016/17- 2018/19	To assess whether technical complaints of customers were resolved within stipulated time, and if not so establish causes and impacts of delays customers' services.
20	TANESCO Customer Service Status Annual Reports 2016/17-2018/19	To assess whether non-technical complaints of customers were resolved within stipulated time, and if not so establish causes and impacts of delaying customers' services.
21	TANESCO Customer Services Detail Reports 2016/17- 2018/19	To assess and establish whether complaints of customers were resolved within stipulated time, and if not so establish causes and impacts of delaying customers' services.
22	EWURA Regulatory Performance Reports on Electricity Sub-Sector for the Year Ended 30th June 2017 and for the Year Ended 30th June 2018	To assess whether and extent EWURA conducted and reported power supply reliability compliance monitoring inspections. If not so establish the causes and impacts.
23	EWURA Annual Reports 2016/17-2017/18	To assess whether and extent EWURA conducted compliance monitoring inspections and reported power supply reliability issues. If not so establish the causes and impacts.
24	EWURA Inspection Plans 2017/18-2018/19	To assess whether and extent EWURA planned and implemented compliance monitoring inspections plans on issues related to power supply reliability. If not so establish the causes and impacts.

c) Physical Observations and Verifications The audit visited TANESCO Regions namely: Kinondoni South, Arusha, Dodoma, Mwanza and Mbeya.