

Fixed Line Telephone Service Failure and Recovery: A case study in Ethiopian Telecommunication Corporation

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Declaration

I, Tamrat Biratu, declare that this work entitled **"Fixed Line Telephone Service Failure and Recovery: A case study in Ethiopian Telecommunication Corporation"**, is outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. I have produced it independently except for the guidance and suggestion of my Research Advisor.

This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree of Master of Business Administration [MBA]

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Date_____

CERTIFICATION

This is to certify that this project work, **"Fixed Line Telephone Service Failure and Recovery: A case study in Ethiopian Telecommunication Corporation",** undertaken by Tamrat Biratu for the partial fulfillment of Master of Business Administration [MBA] at Addis Ababa University, is an original work and not submitted earlier for any degree either at this University or any other University.

Signature _____

Date _____

Research Advisor

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Acronyms

CAAZ	Central Addis Ababa Zone
EAAZ	East Addis Ababa Zone
ETA	Ethiopian Telecommunications Agency
ETC	Ethiopian Telecommunications Corporation
NAAZ	North Addis Ababa Zone
SAAZ	South Addis Ababa Zone
SWAAZ	South West Addis Ababa Zone
WAAZ	West Addis Ababa Zone

Abstract

This case study is about fixed line service failure and recovery performance of Ethiopian Telecommunications Corporation. The relevant data were collected through both secondary and primary sources. The data was analyzed using qualitatively and simple statistical tools like percentages, averages, frequency and totals. Cause and effect diagram was used in identifying the major causes of service failure and delay in service recovery. Aging of cables, poor quality of apparatus, theft, damages due to construction of roads and buildings, installation of water pipelines and electric lines by respective organization were found the major causes of fixed line service failure. The average failure rate for all zone offices during the last five years were 67.2% out of average 399413 connected lines. In relation to delay in service recovery, the major causes were work overload and lengthy process to complete legal process. Based on these, it is recommended that ETC should take proactive measures in relation to old network maintenance and should work closely with other organizations like Addis Ababa police, Ethiopian Electric Power Corporation, Ethiopian water and Sewerage authority, Road authority, and Ethiopian quality and standard authority.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Telecommunication services play significant role in the all-round political, economic and social development of a given country. It is important in a day to day life of the society. The remarkable development in telecommunications technology has made people to communicate instantly across a distance, share information and do business. Oodan et al., (1996) further explained that the availability and reliability of telecommunications services affect the successes of business and social interaction which started to rely on the service provider.

The introduction of telecommunication services in Ethiopia dates back to 1894, seventeen years after the invention of telephone technology in the world. Ethiopian Telecommunications Corporation (ETC) is state owned sole telecomm service operator in the country. The Company is heavily investing to develop and maintain

network capable of supporting voice, data and video. In 2008, ETC signed With ZTE Corporation, a Chinese firm, to build a next generation network through vendor financing worth of 1.5 billion dollar investment *(www.ethionet.et)*.

Currently ETC provides various lines of telecomm services for the country. Among telecomm services, fixed line service is the oldest service ETC has been providing since its inception. Even though the Company has done a lot of remarkable jobs in developing modern information and communications technology network infrastructure, customers have been complaining about poor quality of fixed line service. Moreover, a review of Company reports has shown the existence of fixed line service failure and longer service recovery period which takes from a week to a year in some cases.

ETC's customers face frequent fixed line service failure and overbilling because of some technical problems. Company reports for the past five years have shown that the problem is not new to ETC. In addition to the frequency of service failure, the service recovery also takes up to months or a year depending on the nature of service failure.

The data collected from the nine month performance report of Central Addis Ababa Zone has shown that, fixed line service faults repaired within 1-2 days, 3-4 days, 5-7 days and above 7 days are 30%, 22%, 23% and 25% respectively. This indicates that, from the total service failure, about 25% takes more than seven days which could be months or a year depending on the case. Moreover, the average

number of service failure encountered in six zone office was 60% out of 411,523 connected lines in a period of nine months. However, ETC has set standards for service recovery period and service failure rate out of total connected lines during the year. A maximum of seven recovery days and 36% of service failure rate out of the connected lines during the year were set as a standard

(See annex 1 & 2).

Service failure is defined as instances where a service is either not performed or is performed poorly (Clow and Kurtz, 2003). In response to service failure, companies take actions to resolve the problem. Gronroos, 1990, cited by Cranage, 2004 stated that service recovery includes all actions taken by a service provider in order to try to resolve the problem that caused the service failure. According to Zeithmal and Bitner (2004), service recovery efforts of an organization are evaluated by a customer from three dimensions. The three dimensions are distributional justice (e.g. Fairness in compensation, repair and replacement), interactional justice (e.g. politeness, concern, honesty, an explanation and effort of the Company to resolve the problem) and procedural justice (e.g. like speed of response, accessibility and flexibility of the procedures and Company policy).

Companies need to understand what customers expect when service failure occur, and implement effective strategies for service recovery. Moreover, Slack et al., (1995) discussed that recurring service failure lower service quality and reduce productivity as time and money are wasted on correcting mistakes. Thus, prevention of service failure should be the focus in providing quality service. In order to take

such measures, an organization needs to understand first why the failure occurred and identify critical service failures which have greater impact on the operation or its customers.

Therefore, this paper identified major causes of fixed line Telephone service failures and delay in failure recovery of ETC by using cause and effect diagram.

1.2 Statement of the Problem

ETC is a state-owned and sole provider of telecom services in the country. It has the vision to see the entire country connected with state-of-the-art ICT infrastructure that provides reliable and secure communication services and that supports the development agenda of the country. In this spirit ETC has been investing in the telecommunication networks and technologies for the past century. More recently the Company has signed $1.5 billion contract of vendor financing with ZTE Corporation of China to implement Next Generation Network (NGN). Despite this fact, ETC has been criticized for poor quality of services. Company's reports have shown that there are frequent fixed line service failure and longer service recovery time. There are cases where service recovery takes a period of a month or a year. This indicates that the service quality of ETC in general and customer support services in particular are poor.

Therefore, ETC is currently facing a problem of frequent fixed line telephone service failures and longer recovery period compared to its set standard. The maximum service failure rate set by ETC was 36% out of the total number of connected lines

during a year and maximum of seven recovery days for all service failures from the day faults are reported by a customer and registered by the Company. The data have shown that the actual service failure rate and recovery period exceeded ETC's maximum set standards.

1.3 Objective of the Study

The main objective of this case study is to investigate the status of fixed line telephone service failure and recover of the Company. Under this objective the study address the following specific objectives:

- investigate the severity of service failure
- identify the major factors causing service failure
- identify how long service recovery takes, and
- Propose the possible solutions for the overall service failure and recovery problems ETC is facing.

1.4 Research questions

To achieve the objective of this project paper, the following questions have been addressed:

- What is the magnitude and frequency of fixed line service failures in six zone offices found in Addis Ababa?
- What are the major causes of recurring fixed line service failure?
- How long does it takes for fixed line service recovery?
- what do the service failure and recovery performance look like when compared against ETC's set Standard

1.5. Scope and Limitation of the Study

Although the Company provides various lines of services and operates throughout the country, the scope of this study is confined to fixed line service failures encountered and recovered in six zone offices situated in Addis Ababa. The six zone offices situated in Addis Ababa are Central Addis Ababa Zone (CAAZ), East Addis Ababa Zone (EAAZ), North Addis Ababa Zone (NAAZ), West Addis Ababa Zone (WAAZ), South Addis Ababa Zone (SAAZ) and South West Addis Ababa Zone SWAAZ).

Addis Ababa is selected based on its convenience for the researcher and fixed line telephone service failures encountered were greater compared to any city all over the country *(see annex 2 & 7).*

The limitation faced by the researcher was unavailability of documented data about the causes of service failures and delay in service recovery period for all service failures encountered *(See annex 8)*. As a result, data about the causes of service failure and delay in service recovery were collected through interview from three zone offices out of six zone offices *(for details of interview questions refer annex 9).*

1.6. Significance of the Study

This study investigated the existing status of fixed line service failure and recovery performance of ETC. It also identified the major causes of fixed line service failure and recovery delay. This would help the Company to get insight about its service provision performance which will trigger the Company to conduct further investigation and pinpoint fault areas if there is a need to improve their service provision.

In addition to the above benefit of the organization, this study will serve as an input for other research in related topics.

1.7. Organization of the Paper

The remaining part of this paper has four chapters. The second chapter review related literature. The third chapter presents the methodology of the study. The fourth chapter presents the results and discussions of data collected from primary and secondary sources. Finally, the fifth chapter presents conclusions and possible recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Service Quality

Today providing quality service is not an option but it is a requirement to survive for service giving companies. It becomes one of a competitive advantage through which companies get advantages over the other. Defining service quality is not as simple as defining product quality because of the nature of services. The well known authors, Parasuraman et al., (1985) who have developed service quality measurement tool (SERVQUAL), defined service quality as the gap between customer expectation and perception from five dimensions. The five dimensions of service quality identified by these authors are: reliability, tangibles, responsiveness, assurance and empathy.

Clow and Kurtz (2003) discussed the five dimensions of service quality. According to these authors:

- *Reliability*: refers to whether the Company is dependable in providing service as promised over time or not.
- *Tangibles*: are the physical facilities, equipment, and appearance of a service firm's employees.
- *Responsiveness*: refers to the willingness of the service firm's staff to help customers and to provide them with prompt service.
- *Assurance*: knowledge and courtesy of the service firm's employees and their ability to inspire trust and confidence in customer toward the Company
- *Empathy*: refers to the caring and personalized services provided by the firms.

Zeithaml and Bitner (2003) identified of the above five dimensions, that reliability has been the most important factor in customers' judgments of service quality. Because reliability improvements enhance service quality and unreliable service implies broken promises on the attributes that customers care about. The reliability of the core service makes the customer to assume the service provider is competent and may hinder them from switching to another service provider.

2.2 Quality of Service in Telecommunications

Oodan et al., (1996) stated that service quality in telecommunication service is expressed in terms of parameters that indicate benefits to the user. These parameters may be quantitatively or qualitatively expressed. A set of quality criteria will encapsulate the benefits of a product or a service to the user. In general Quality

of Service (QoS) in telecommunications is expressed by a unique set of parameters (qualitative and quantitative) on a service by service basis.

According to Oodan et al., (2009), providing telecommunications Service quality helps companies to overcome competitors and comply with various international standards and service obligations of local regulatory bodies. As a result telecom service providers have developed a formal specification of quality for each and every telecommunications service to protect the interest of customers, regulators, competitors and any other national or international service providers. This service specification includes issues such as the service description, service features, tariff, availability, service support and Service Level Agreements (SLAs).

2.3. Customer service

Zeithaml and Bitner (2003) defined customer service as the service provided in support of a Company's core products. Customer service is provided by various types of companies-including manufacturers, IT companies and service companies. Customer service provided by companies most often includes answering questions, taking orders, dealing with billing issues, handling complaints, and perhaps scheduling maintenance or repairs.

Customer service can occur on site, or it can occur over the phone or via internet. Many companies operate customer service call centers, often staffed around the clock. Quality customer service is essential to build customer relationships. Clow and Kurtz (2003) stated that equipment and tools should be put in place before the

support services are provided otherwise it will impact the quality of services provided.

3.4. System Failure

Slack et al., (1995) discussed that failure problems and mistakes are an inevitable and intrinsic part of operations life. There is always a chance that in making a product or providing a service thing might go wrong. Some failures are incidental and may not be noticed. The failure of one component of a system may jeopardize the whole system and hence all the failures encountered are not equally serious and attention is usually directed at those which have the most impact on the operation or its customers.

Hence, organizations need to discriminate between failures and pay particular attention to those which have the most impact on the operation or its customers. In order to do this, it needs to understand why something fails and be able to measure the impact of the failure. The operations managers need consider the cause and effects of failures, as well as being active in attempting to minimize failure.

2.5. Causes of Failure

Failures in providing products or services can occur for many different reasons. According to Slack et al., (1995) some failures happen within the operation, either because there is an overall failure in its design, because one or more of its physical

facilities breakdown, or because there is human error. Customers can also causes failures through their incompetent handling of goods and services.

The origin of all failures is some king of human failure. A machine failure might have been caused by someone's poor design or maintenance, a delivery failure by someone's errors in managing the supply schedules, and a customer mistake by someone's failure to provide adequate instruction. Failures are not the result of random chance; their root cause is usually human failure. This implies that failures can be controlled to some extent and organizations can learn from failure and modify their behavior accordingly. The realization of this has led to what is sometimes called the failure as an opportunity concept. Failures are regarded as an opportunity to examine why they occurred and to put in place procedures which eliminate or reduce the probability of them recurring.

2.6. Measuring failure

Slack et al, (1995) discussed three main ways of measuring failure: failure rate, reliability and availability. Failure rate indicates how often a failure is likely to occur over a period of time; reliability measures the chance of a failure occurring, and availability in the amount of available and useful operating time left after taking accounting of failures.

2.7. Customer Response to Service Failures

According to Colgate and Norris (2001), the three major factors that affect a customer's decision to remain or exit are customer's satisfaction with recovery efforts, their sense of loyalty to the provider and their perception of the barriers to exit.

Zeithaml and Bitner (2003) have developed a model which shows the way customers respond to service failure. The action can be of various types: customers either complain or don't complain. Those customers who choose to take action may complain in different ways. A Customer who is dissatisfied may directly complain to the service provider. This is the best case scenario for the Company because it has the second chance to satisfy the customer, keeps its business in the future and potentially avoids any negative word of mouth. Some customers choose not to complain directly to the provider but rather spread negative word of mouth about the Company to friends, relatives and coworkers. In this case the Company has no chance to recover unless the negative word of mouth is accompanied by a complaint directly to the Company. Finally customers may choose to complain to third parties such as the better business bureau, to consumer affairs arms of government, to a licensing authority, to professional association, or potentially to a private attorney.

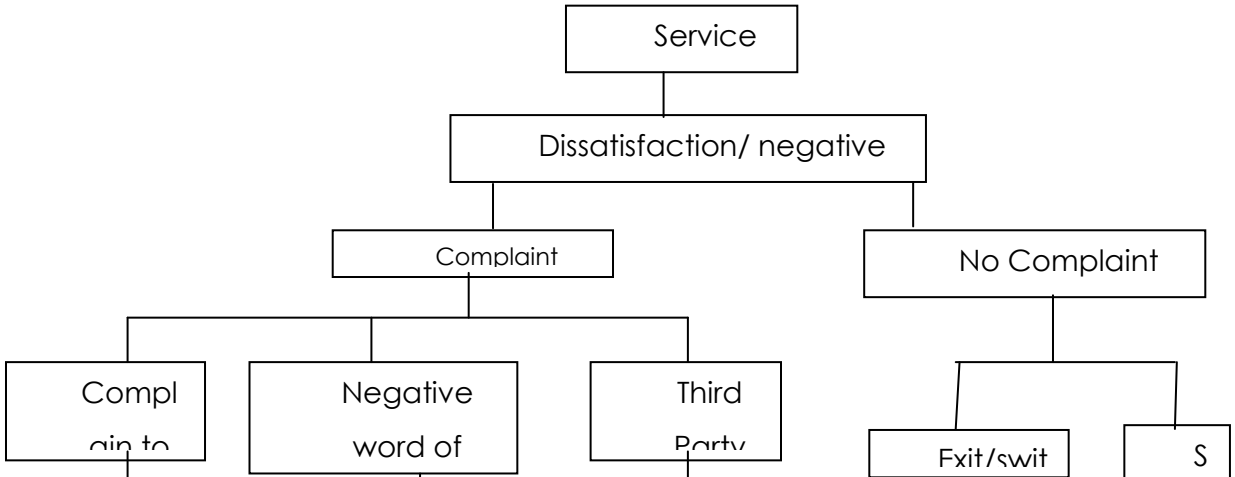


Figure 2.1. Customer behavior following service failure

2.8. Failure prevention and Recovery

Any organization has to undertake various activities to prevent and design a mechanism to recover service failure. The first task is concerned with understanding what failures are occurring in the operation and why they are occurring. Once the natures of any failures are understood, an operations manager's second task is to examine ways of either reducing the chances of failure or minimizing the consequences of failure. The third task is to devise plans and procedures which help the operation to recover from failures when they do occur (Slack et al., 1995).

2.8.1 Failure detection and analysis

Given that the failures will occur, operation managers must first have mechanisms in place which ensure that they are aware that a failure has occurred and, second have procedures in place which analyze the failure to find out its root causes.

2.8.1.1 Mechanisms to detect failure

Organizations sometimes may not be aware that the system has failed and thereby lose the opportunity both to put things right for the customer, and to learn from the experience. The system must be designed in a way to prevent the recurring service failure. Companies usually are not able to do so may be due to staff fearing that drawing attention to a problem might been seen to be a sign of weakness or lack of ability, or because there are inadequate failure identification systems, or lack of managerial support or interest in making improvements.

2.8.1.2 Failure Analysis

According to Slack et al, (1995) one of the critical activities for an organization when failure has occurred is to understand why the failure occurred. This activity is called failure analysis. There are many different techniques and approaches which are used to uncover the root causes of failures. These are accident investigation, product liability complaint analysis, critical incident analysis, failure mode and effect analysis, fault tree analysis, root cause analysis and the like. Among these, root cause analysis can be used to identify the major causes of a failure and its effect.

2.8.1.2.1 Root Cause analysis

Root-cause analysis is a method used to search for the root cause of the problems. It is used to correct or eliminate the cause and prevent the problem from recurring. The root cause analysis is presented in a diagram form and hence named as Cause-

effect Diagrams (which are also known as 'fish-bone' and 'Ishikawa' diagrams). It has become extensively used in improvement programs. The diagram is developed asking the what, when, where, how and why questions and adding some possible answers to the questions in an explicit way.

The procedure for drawing a cause-effect diagram is as follows:

- State the problem in the effect box
- Identify the main categories for possible causes of the problem. Although any categorization can be used for the main branches of the diagram; the causes are categorized into one of five groupings: equipment, people, materials, procedures, and other. The failures are also often sequential, with one problem leading to another in a different category (Heizer and Render, 2003).
- Use systematic fact finding and group discussion to generate possible causes under these categories. Anything which may results in the effect which is being considered should be put down as a potential cause.
- Record all potential causes on the diagram under each category, and discuss each item in order to combine and clarify causes (Slack et al., 1995).

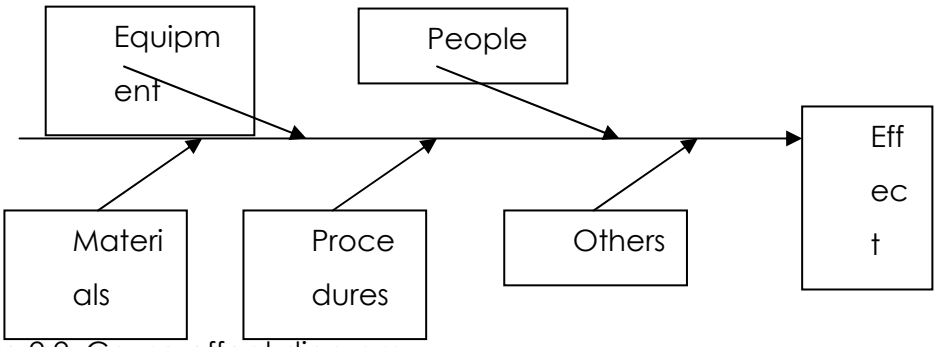


Figure 2.2. Cause-effect diagram

2.8.2. Improving the operations reliability

Once a thorough understanding of the cause and effect of failure have been established, organizations should try to prevent the failure occurring in the first place. The Company can avoid service failure by designing out the fail points in the operation, building redundancy into the operation or through proactive maintenance of the physical facilities in the operation.

2.8.2.1. Maintenance

Maintenance is the term used to cover the way in which organizations try to avoid failure by taking care of their physical facilities. It is an important parts of most operations' activities especially those whose physical facilities play a central role in creating their goods and services. Because maintenance of physical facilities enable organizations to increase reliability, reduce operation costs and achieve higher quality.

2.9. Service recovery

Service recovery includes all actions taken by a service provider in order to try to resolve the problem that caused the service failure (Gronroos, 1990 cited by Cranage, 2004). Different authors like Zeithaml and Bitner (2003) stated that service failure is inevitable in all service contexts and thus companies need to must understand what customers expect when service failure occur, and implement effective strategies for service recovery.

According to Zeithaml and Bitner (2003), resolving customer problems effectively has strong impact on customer satisfaction, loyalty, and bottom-line performance. That is customers who experience service failures, but are ultimately satisfied based on recovery efforts by the firm, will be more loyal than those whose problems are not resolved. It will also generate positive word of mouths and minimizes challenges from customers through customer rights organizations or legal channels.

A well designed, well documented service recovery strategy also provides information that can be used to improve service as part continuous improvement effort. By making adjustment to service processes, systems, and outcomes based on learning from service recovery experience, companies increase the likelihood of "doing it right the first time." In turn this reduces costs of failures and increases initial customer satisfaction.

Opposite to the above benefits, there are tremendous downsides to having no service recovery or ineffective service recovery strategies. Poor recovery following a bad service experience can lead to negative word of mouth. Further, repeated service failures without an effective recovery strategy in place can aggravate even the best employees. The costs in employee morale and even lost employees can be huge, but often overlooked, costs of not having an effective service recovery strategy.

2.10. Service recovery strategy

Service recovery strategies involve both what is done (tangible compensation) and how it is done (employee interaction with the customer), and both influence customer perceptions of the service recovery. The most common and frequently used recovery strategies are apology, assistance, or compensation, or some combination of these three (Bitner et al., 1990; Hart et al., 1990; Smith et al., 1999 cited by Cranage, 2004).

Customers expect to be compensated fairly for the loss incurred due to service failure. In the eyes of customer's, service recovery efforts are evaluated based on three dimensions of fairness. Zeithmal and Bitner (2004) have stated three types of fairness expected by customers following their complaints. These are: outcome fairness, procedural fairness, and interactional fairness.

i. Outcome fairness

Outcome fairness refers to fairness of outcomes like repairs, replacement, compensation, and apology. Customers expect equity in terms of getting compensation as much as they suffered due to service failure.

ii. Procedural fairness

In addition to fair compensation, customers expect fairness in terms of policies, rules, and timeliness of the complaint process. They want easy access to the complaint process, and they want things handled quickly, preferably by the first person they contact. Fair procedures are categorized by clarity, speed, and absence of hassles. Unfair procedures are those customers perceive as slow, prolonged, and inconvenient.

iii. Interaction fairness

On top of fair compensation and quick procedures, a customer expects to be treated politely, with care and honesty. This form of fairness can dominate the others if customers feel the Company and its employees have uncaring attitudes and have done little to try to resolve the problem.

In order to resolve the service failure and satisfy customers, service providers need to encourage and set up procedures that are simple for customers to complain, repair service failure timely and treat customers politely.

2.11. Service recovery plan

According to Lovelock and Lauren (1999), recovering from service failures requires commitment, planning, and clear guidelines. Service recovery efforts should be flexible, with employees being trained to handle complaints and empowered to develop solutions that will satisfy complaining customers.

Every firm should have service recovery plan in order to handle customer complain. However it should not be seen as substitute for doing it right the first time. Recovery procedures shouldn't be considered as a substitute for improved service reliability. When a problem is caused by controllable, internal forces, there's no excuse for allowing it to happen again. Recurring service failures lower service quality and reduce productivity as time and money are wasted on correcting mistakes. Thus

prevention of service failure should be the focus in providing quality service (Slack et al., 1995).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

For this study both primary and secondary data were collected through semi-structured interview and review of Company policy, five year annual reports, and website.

This is a case study which explored a problem of fixed line telephone service failures and recovery in Ethiopian Telecommunications Corporation. Specifically it identified factors causing service failure, investigated prevailing service failures and service recovery performance of the Company.

In the context of this study, the following technical terms are defined as follows:

Service failure: is disconnection of fixed line telephone service (a failure of fixed line telephone to receive incoming calls and making calls)

Service recovery: a service failure is considered to be recovered when ETC maintenance staff reports after undertaking repair activities

Service recovery days: are the days it takes for a service failure to recover. It is counted from the day fixed line telephone service failure is registered by ETC and reported as repaired by ETC maintenance staff.

Service recovery performance: is measured in terms of the number of days it takes to recover service failures against ETC set standard day.

Causes of service failures: are any incidents or actions of different parties which cause disconnection of fixed line telephone service. For example aging of cables, apparatus failure, and cut of cables by different parties are causes of service failure.

Connected line: refers to fixed line telephone service which is properly working (fixed line telephone which receives incoming calls and make outgoing calls).

Service failure rate: is computed by dividing the total number of faults to total number of connected lines.

$$\text{Service Failure Rate} = \frac{\text{Number of faults}}{\text{Number of connected}}$$

3.2. Target of the study

The target of this study were fixed line telephone services connected and registered in six zone offices' database as active lines. There were a total of 411,523 fixed line telephone service connected in six zone offices. In this study all the fixed line telephone service failures encountered and recovered during the past five years from the total connected lines (411,523) in six zone offices were studied. The study was conducted only from the company perspectives because frequent fixed telephone service failures and delay in recovery period were shown in the annual reports of ETC. As a result the input from customers was not incorporated in order to verify the service failure and recovery performance of ETC.

3.3. Sources of Data and Collection Instrument

Data about magnitude of service failures and service recovery performance were gathered from all six zone offices' annual reports for the past five years. The six zone offices from which these data were gathered includes: Central Addis Ababa Zone (CAAZ), East Addis Ababa Zone (EAAZ), North Addis Ababa Zone (NAAZ), West Addis Ababa Zone (WAAZ), South Addis Ababa Zone (SAAZ) and South West Addis Ababa Zone SWAAZ).

Data about the causes of delay in service recovery and causes of service failures were gathered through semi-structured interview conducted with employees and managers who have responsibilities to handle the fixed line service failure. In the six zone offices, there were maintenance deputy divisions responsible for service recovery activity. Each maintenance deputy division had 30 employees and one manager that make a total of 6 managers and 180 employees. Among 180 employees and 6 managers, 3 managers and 18 employees were interviewed from three zone offices: CAAZ, NAAZ and WAAZ. Only three zone offices were selected because the relevant information concerning to service failures and recovery of ETC can be obtained from the three offices due to the fact that all zone offices have faced service failures. And it was difficult to interview all employees and managers from all zone offices given specified time to complete this study.

The three zone offices out of six were selected due to their geographic proximity and convenience for the researcher. Six employees out of 30 employees from each

three zone offices' maintenance deputy divisions were selected randomly during the interview date. Employees were selected randomly from the three zone offices because all employees in maintenance deputy divisions were engaged in maintenance activity and can provide representative information about the causes of service failures and delay in recovery.

3.4. Method of Data analysis

The collected data through interview and secondary sources were categorized into different theme. Data from interview and document review were discussed in order to get meaningful information and presented qualitatively as well as using simple statistical tools like tables, percentages, averages, and totals.

In identifying root causes of fixed line service failures and delay in recovery, fishbone diagram was used. Because the fishbone diagram is a tool developed to identify the major causes of a failure and its effect. On the diagram the possible causes of a problem can be categorized into different groupings: Equipment, people, materials, procedures and others. The diagram can be developed by asking the what, when, where, how and why questions and adding some possible answers to the questions in an explicit way (Heizer and Render, 2003).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

The main objective of this study was to identify the status of fixed line service failures and recovery performance of ETC. To attain this objective, both the primary and secondary data were gathered. The primary data were collected through interview conducted with managers and employees working in maintenance offices. The secondary data were collected from review of secondary source like yearly report, Company policy and website. The Company background, data results and Discussions are presented as follows:

4.1. Background of the Company

Ethiopian Telecommunications Corporation (ETC) is state owned sole telecomm service operator in the country. The Company is heavily investing to develop and maintain network capable of supporting voice, data and video. ETC provides various lines of services: fixed line telephone service, mobile service, internet services

and other services like roaming services. Among these, fixed line service is the oldest service ETC has been providing since its inception.

Today the backbone network of ETC is constituted from a variety of microwave, satellite and fiber optic links. ETC is undertaking various projects to increase the network capacity of fixed telephone, mobile and internet services. More recently, ETC is executing a Next Generation Network project with 1.5 billion dollar investment. This project dramatically increases ETC's network capacity to serve large number of customers and enable ETC to provide modern telecommunications services all over the country. Upon completion of the project, mobile telecom service coverage reach more than 10 million, fixed line telephone core network capacity reach 4.4 million and provide broadband access to all major towns throughout the country (www.ethionet.et).

4.2. Results and Discussions of interview data

4.2.1. ETC's Customer Complaint handling process

ETC receives any customer enquiry in person at different zone offices or through a central 997 phone number. Each zone office also has its own call centers to receive customer enquiry. These numbers are presented in the following table:

Table 4.1. Zone offices call Center

Zone Office	ETC call center for customer enquiry
CAAZ	961
NAAZ	962
WAAZ	963
EAAZ	964

SAAZ	965
SWAAZ	966

Source: ETC call directory

Even though each zone office has their own call centers, customers usually prefer to use the central 997 call center. This call center provides information about service bill and address of a given Company or an individual. It also serves as a medium for customers to complain about the service failure. Through 997 call center, ETC provides support services for all local and foreign customers. In order to serve these customers, the Company has 38 computers and 95 employees working in four shifts. (Shift 1: 1-7 o'clock, shift 2: 7-12 o'clock, shift3:12-5 o'clock and shift 4, 5-1 o'clock). Among 38 computers, only 28 computers were working and the other 10 computers were not working on the date interview was conducted. Sometimes all employees didn't show up for work because of illness and leave. Their positions were not filled automatically and the call center was forced to work with available personnel.

According to the 997 call center supervisor, the existing resources both computers and employees are not enough to handle the incoming customer enquiries. At a time 100 customers get access to the Company for enquiry. But only 38 customers are served by the available computers provided that no employees are absent. The rest 62 customers stay online until the first 38 customers get services. While serving the 38 customers and keeping 62 customers online, there are other customers who call to get the service. This indicates that most of the time, the call center is not easily accessible for the customers in order to forward their cases.

Customer can complain either in person or through Company call center. The 997 call center provides different services for all customer enquiries. The common customer complaints are service failure, poor service quality (e.g. noise and cross talk), overbilling, and delay in installation and service recovery. Customer complaints about service failure, poor quality and overbilling are registered for further investigation. Other complains like delay in installation and recovery period are not registered but customers are told to wait till they get the service.

Number of customer and multi services provided through 997 have made difficult to get access to the Company. There is also shortage of human resource to work on the available computers and the existing computers are also not maintained timely. As a result both the human and material resources available at 997 call center are not enough to serve the customer enquiry timely and made access to the Company for customer complaint through this center to be difficult. However, many researches have shown that service providers should make their customer complaining process easy and they should welcome customer complain. Information gathered from customers help organizations to improve their service quality and satisfy customers. With this regard ETC has shown poor customer handling performance which may result in customer dissatisfaction.

4.2.2. Factors causing service failure

According to the interview conducted with maintenance deputy division managers, fixed line service failures are classified in to two categories. Based on their causes, the faults could be either normal fault or damage.

A). Normal fault

Normal faults are those failures which are caused by cable failure; line failure and apparatus failure. Majority of service failures encountered so far by ETC are categorized as normal fault. The three types of service faults under this category are:

i. Cable Failure: These types of service failure usually arise because of aging of cables on the network connected to local switches. There are two types of old copper cables used on the network. These are paper and jelly filled cables. The paper cable is vulnerable to water and cause service failure when it gets wet especially during the rainy season. The jelly filled cable don't completely cause service failure when it gets wet but results in poor service quality like unclear voices, cross talk which avoid privacy of customers and finally may cause bill exaggeration or understatement.

Service failures caused by aging of cables are difficult to repair because most of these cables were buried underground before 40 years and it is not easily repaired and needs time to recover. In addition to this, it is also difficult to get the fault location and act accordingly.

ii. Line Failure

Service failure which is categorized as line failure arises on the line from the terminal box to customers' houses. This is usually occurred because line cut or failure of the terminal boxes for various reasons. Because the line is installed across the road, it is relatively easy to locate the fault location and repair immediately unlike that of underground cables buried.

iii. Apparatus failure

There are also service failures encountered by the Company in relation to the apparatus used by customers. These failures arise due to lack of awareness about devices or apparatus which supports the service they want to get. As a result, customers buy apparatus with poor quality (low loop) and face service failure even though it is not severe as compared to aging of cables.

B). Damage

Service failures categorized as damage are caused by a number of incidents. According to the interview, the major causes of cable damage are cut of cables due to construction of road and buildings, installation of electric power lines, and water lines. These incidents are causing cable damage which results in service failure and make repair more difficult. Including ETC, different organizations expand their network both underground and through the air in the city. In such process one organization causes damage to other organizations net work. This is basically the result of poor communication and coordination among these diverse groups. This problem is expected to persist due to the expansion and development of the city is expected to progress.

In addition to the above service failure, recently ETC is also experiencing service failure caused due to power interruption. This type of failure occurs on fiber optic networks. Fiber optic cables have batteries which supply power for short period during power interruption. However, the whole system will fail if the power interruption persists. The Company is using power generator at different sites in short term and in the long term, the problem is completely avoided when there is adequate power supply.

Based on the above presentation, faults encountered are caused by aging of cables, intentional and unintentional cut of lines (by thieves, and other organizations like Ethiopian Electric corporation and water sewerage authority) and apparatus failure. Though there is no documented data for all service failures encountered, employees interviewed feel that majority of the service failures encountered are caused by aging of cables which is controllable. All these failures are caused by human error and can be avoided or at least minimized as long as it is not beyond the control of human being. Faults occurred due to aging of cables were the result of human failure in preventive maintenance activity of old networks. Apparatus failure was caused because of less customer awareness about appropriate apparatus to be used because someone has failed to inform customers. Damage of cables has been encountered by construction of roads, buildings and installation of network of water pipelines and electric power lines were due to poor communication of ETC with these groups.

From the above data presented, the following fishbone diagram is developed to identify and analyze the major causes of fixed line service failure of ETC. The diagram is shown as follows:

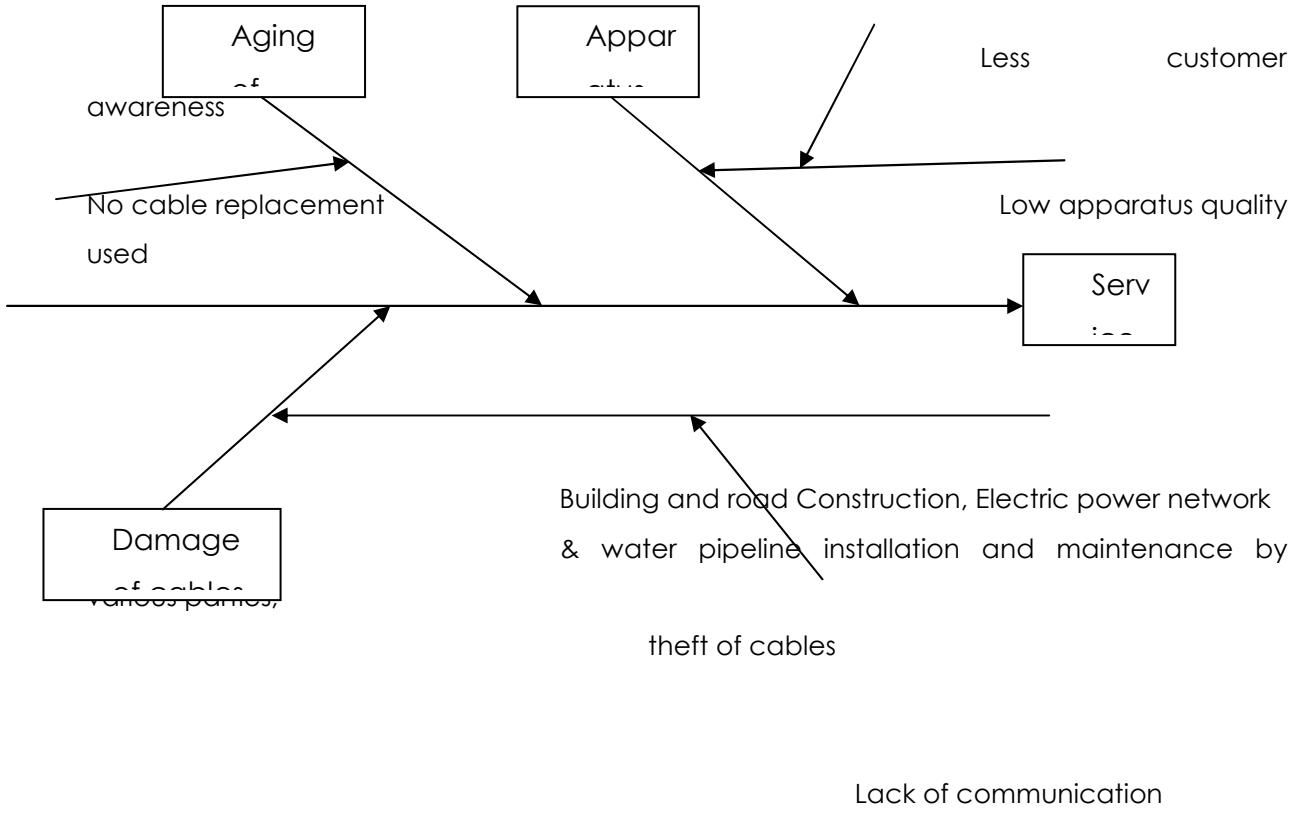


Figure 4.1 Cause and effect diagram of fixed line service failure

4.2.3. Causes of delay in service recovery

According to interview conducted with maintenance division, there are factors causing longer service recovery period. The recovery period depends on the type and the number of service failure encountered. Service failures caused by theft of cable take longer period because when such incident happens, the Company has

to first inform the police for investigation. Following the result of police investigation, the Company institute recovery effort. Hence, service failure aroused due to theft takes more than seven recovery days and longer service recovery period compared to other causes of service failure. The fault location also has an impact on the recovery effort of the Company. The other factor which cause longer service recovery period is the existence of recurring faults. There are outstanding service failures on hand and every day additional faults are registered and accumulated over time. Faults are not cleared daily. For example, outstanding faults were 601 in EAAZ during the interview conducted with the maintenance manager. When damage occurs, resources are shifted to handle the damage and repairs of normal faults are not undertaken because of limited resources: human and transport and the like. In addition to this, shortage of cables for maintenance also caused delay in service recovery.

Based on the above data, the fishbone diagram for the causes of delay in service recovery period is presented as follows:

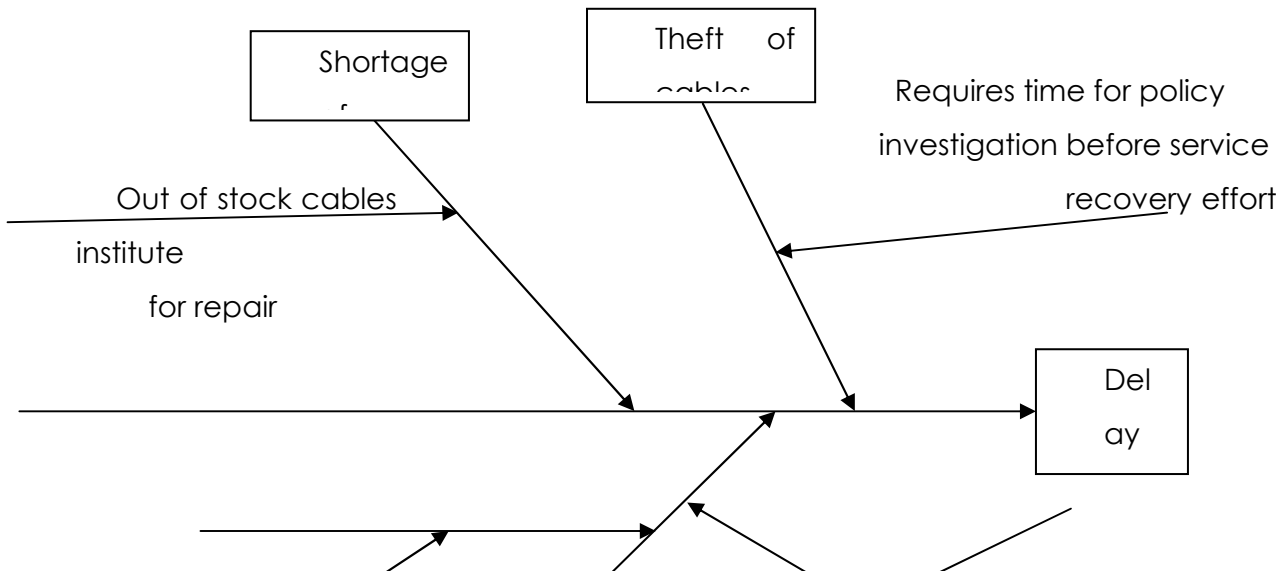




Figure 4.2. Cause and effect diagram of delay in service recovery

4.3. Results and Discussions of Document Review

4.3.1. Regulation of Telecom Service Quality[1]

Ethiopian Telecommunications Agency (ETA) was established to regulate the service giving performance of ETC to protect the consumer and get quality services. One of the powers and duties vested upon the Ethiopian telecommunications agency by article 6(3) of the telecommunication proclamation no.49/1996 is to ensure that telecommunications services conform to the specified standards of quality.

In order to discharge this responsibility, the agency has specified and approved a quality of service (QoS) standards for the telecommunications services, in June 2008. The quality of service standards set the minimum quality of service standards, and associated measurement, reporting and record keeping tasks. Based on this ETA developed a service contract(service level agreement) and requested ETC to start signing with its corporate customers as January 2010 and gradually cover all customers as required.

ETC didn't sign official service level agreement with customers which can protect the interest of both parties though it was requested by ETA. There is no information whether or not ETC will be going to make a contract with corporate customers as requested by the regulatory body of telecommunication services. This shows that

[1] ***The above discussion is made based on the letter written from ETA to ETC, on September 2010.***

customers have no right to claim the costs incurred because of poor service recovery effort of ETC.

4.3.2. ETC's set standards of maintenance performance

Besides developing and maintaining network which support the voice, data and video services, the Company has the objective to provide quality services. In order to track its service quality, the Company developed service quality standard in all of the services it provides. These standards were set for installation of new services and maintenance of existing service faults. According to the Company's key performance indicators (KPI) for fixed line service, the time required for installation of new services and recovery of service failure are summarized as follows:

Table 4.2. Service maintenance standards

No.	Parameters	ETC's KPI
1	Faults incidents per 100 subscriber/month	< 3
2	Fault recovery: within 2 days within 4 days within 7 days	 > 60% > 90% > 100%
3	Response time to customer for assistance(%age of calls answered): within 40	 > 90% > 100%

	seconds within 60 seconds	

Source: ETC 2002 performance report

4.3.3. Service Failure and Recovery Performance of ETC

I. Service faults

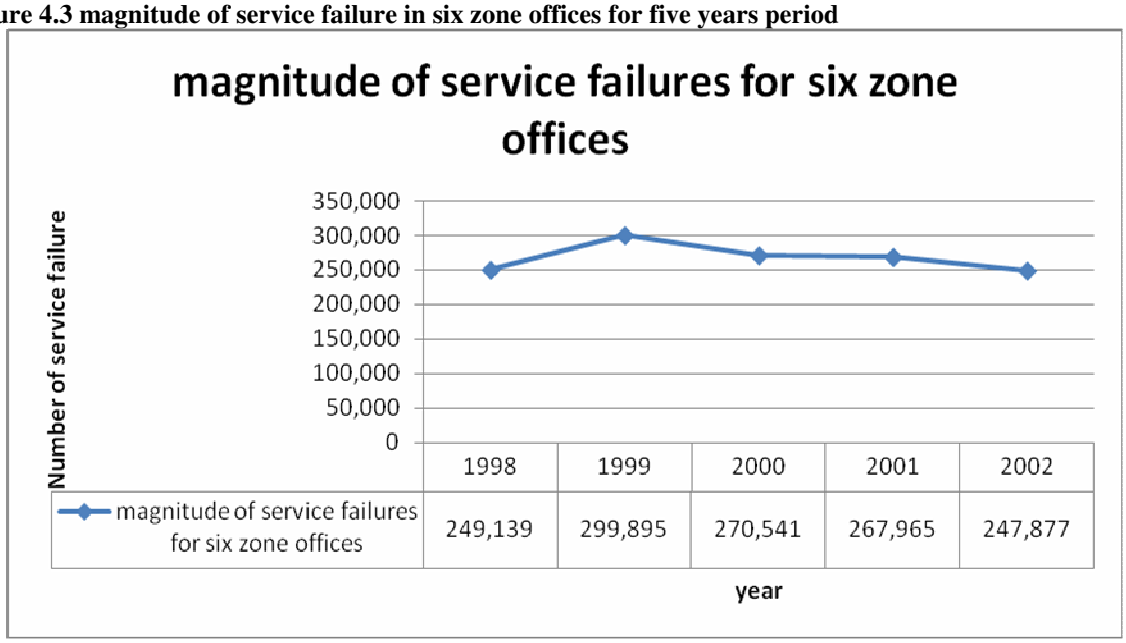
The magnitude of service faults registered at each zone office for the last four years and nine months are summarized on the table below. The total faults reported for the year 2002 E.C shows only a nine month faults reported and doesn't include faults registered from March 2010 onwards. During the four years and nine months period, the total zone faults were 249,139; 299,895; 270,541; 267,965 and 247,877 from 1998 to 2002 respectively.

Table 4.3. Number of service failure in six zones for the past five years

Year	CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	ZONE TOTAL
2002*	33,300	48,341	57,665	40,130	25,002	43,439	247,877
2001	47,628	46,921	53,137	44,466	26,836	48,977	267,965
2000	48,327	63,496	51,563	35,663	23,521	47,971	270,541
1999	47,765	81,506	57,594	38,702	27,252	47,076	299,895
1998	53,501	51,398	42,674	41,363	28,760	31,443	249,139

*****_shows only nine month fixed telephone failure rate;_ Source: ETC five years performance report

Figure 4.3 magnitude of service failure in six zone offices for five years period



Source: ETC's five years annual report from the year 1998-2002 E.C

As indicated on the above figure, the maximum number of service failures encountered during the last five years in the six zone offices were 299,895 in the year 1999 E.C. since then the magnitude of service failure encountered has declined for the three consequentive years. However the magnitude of the service failure exceeded ETC's set failure rate standard.

Table 4.4. Fixed line service Failure Rate

Year	Failure Rate						
	CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	Average failure rate/yr
2002*	**0.7**	**0.58**	**0.73**	**0.61**	**0.42**	**0.55**	**0.6**
2001	**0.96**	**0.56**	**0.67**	**0.67**	**0.45**	**0.61**	**0.64**
2000	**0.97**	**0.79**	**0.65**	**0.55**	**0.42**	**0.61**	**0.66**
1999	**0.96**	**1.07**	**0.72**	**0.60**	**0.48**	**0.60**	**0.74**
1998	**1.11**	**0.78**	**0.61**	**0.73**	**0.59**	**0.50**	**0.71**
Average failure rate/zone	**0.94**	**0.764**	**0.676**	**0.634**	**0.47**	**0.574**	**0.672**

**shows only a nine month fixed line failure rate;* Source: ETC five years performance report.

As indicated on the above table, the minimum service failure rate was 0.47 for SWAAZ and the maximum service failure rate was 0.94 for CAAZ. This shows that the service frequency rate were highest at CAAZ. The average service failure rate for all zone office was 0.672 during the last five year period. When this is compared with the Company set service failure frequency rate, there is recurring service failure at

each zone. The standards of service failure rate set by ETC was three failures out of 100 subscribers per month which means only 36% failure rate is expected to occur in a year. From this perspective the Company is not in a position to meet its set standard and this shows that there is recurring fixed line service failure which results in customer dissatisfaction and high maintenance costs.

II. Service Recovery Performance

The office responsible to undertake any maintenance activity was organized at deputy division level in each zone offices. During the last five years, service failure has occurred at all zone offices operating in Addis Ababa. The magnitude and fault frequency rate varies among the offices.

To handle any service failure, ETC has developed standard period within which the recovery should takes places. Standards were set for different lines of services the Company provides. According to the standard, for fixed line service failure encountered 40%, 90% and 100% of the failures are expected to be repaired (recovered) within 2 days, 4 days and 7 days respectively.

For the last five years, the faults repaired within two days, four days, and seven days and those which took longer days were reported for all zone offices and presented in the tables which follow.

Table 4.5. service recovery performance of six zone for the year 2002 E.C

No	Fault		CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	ZONE TOTAL
1	Beginning Balance of fault		449	208	900	144	59	155	1,915
2	Reported Fault during the period		32851	48133	56765	39986	24943	43284	245,962
3	Total Reported Fault		33,300	48,341	57,665	40,130	25,002	43,439	247,877
4	Repaired faults Within:	2 days	9853 (29.59%)	31932 (66.06%)	26606 (46.14%)	26003 (64.80%)	12158 (48.63%)	38,803 (89.33%)	145,355 (58.64%)
5		4 days	17015 (51.10%)	39323 (81.35%)	39948 (69.28%)	32461 (80.89%)	18614 (74.45%)	41,798 (96.22%)	189,160 (76.31%)
6		7 days	24547 (74.66%)	47308 (99.13%)	49801 (86.65%)	40027 (99.94%)	22671 (90.97%)	42,798 (98.87%)	227,152 (92.21%)
7		Abov	8233	413 (0.8	7,670	25 (0.0	2,235 (8.94	487 (1.1	19,063

		e 7 Days	(24.72%)	5%)	(13.30%)	6%)	%)	2%)	(7.69%)
8		Total	32,780 (98.44%)	47,721 (98.72%)	57,471 (99.66%)	40,052 (99.81%)	24,906 (99.62%)	43,285 (99.65%)	246,215 (99.33%)
9	**Faults left on hand at the end of the year**		**520**	**620**	**194**	**78**	**96**	**154**	**1658**
15	Connected Line		46,820	82,932	77,574	65,936	58,954	79,307	411,523
16	**Fault Frequency**		**0.71**	**0.58**	**0.73**	**0.61**	**0.42**	**0.55**	**0.6**

Source: ETC 2002 E.C. performance report

The above table shows, service failure recovery period took minimum of two days and there were also service faults which took more than seven recovery days. The total faults recovered in the year 2002 in six zone offices were 245,962 out of 411,523 connected lines. During this period, 58.64%, 76.31% and 92.21% of faults were recovered within two, four and seven days respectively. The rest 7.79% of faults (19,160 faults) took more than seven recovery days. When we look at each zone office separately:

CAAZ

Total faults reported in CAAZ were 33,300 out of 46,820 connected lines. Out of the total faults 29.59%, 51.10% and 74.66% were recovered within two, four and seven

days respectively. The rest 25.36% (8,753 faults) took more than seven recovery days in this zone.

EAAZ

Faults registered in EAAZ were 48341 out of 82932 connected lines. Out of the total faults 66.06%, 81.35% and 99.13% were recovered within two, four and seven days respectively. The rest 1.87% (1033 faults) took more than seven recovery days in EAAZ.

NAAZ

Faults reported NAAZ were 57,665 out of 77,574 connected lines. Out of the total faults 46.14%, 69.28% and 86.65% were recovered within two, four and seven days respectively. The rest 13.35% (7,864 faults) took more than seven recovery days in this zone.

SAAZ

Total faults registered in this zone were 40,130 out of 65,936 connected lines. Out of the total faults 64.80%, 80.89% and 99.94% were recovered within two, four and seven days respectively. The rest 0.06% (103 faults) took more than seven recovery days in SAAZ.

SWAAZ

Faults reported in this zone were 25,002 out of 58,954 connected lines. Out of the total faults 48.63%, 74.45% and 90.97% were recovered within two, four and seven days respectively. The rest 9.03 %(2,331 faults) took more than seven recovery day in SWAAZ.

WAAZ

Faults reported in WAAZ were 43,439 out of 79,307 connected lines. Out of the total faults 89.33%, 96.22% and 98.87% were recovered within two, four and seven days respectively. The rest 1.13% (641 faults) took more than seven recovery day in this zone.

To sum up, EAAZ, SAAZ, and WAAZ has shown good recovery performance within the seven days set standard. Whereas CAAZ has shown very poor recovery performance (74.66%) compared against the set 100% standard. NAAZ and SWAAZ recovered about 86.65% and 90.97% respectively. The total faults which took more than seven recovery period from all zone offices were 19,309. This indicates that zonal offices were not able to meet the set standard and there were considerable faults which took more than seven recovery days. According to Zeithmal and Bitner(2003), customers evaluate whether or not they are treated fairly during service recovery effort from three dimensions: outcome fairness, procedural fairness, and interactional fairness. According to their findings, to resolve the service failure and satisfy customers, service providers need to repair service failure timely and treat customers politely. With this regard, the longer recovery period reported in ETC shows customers were not fairly treated and resulted in customer dissatisfaction in service recovery process.

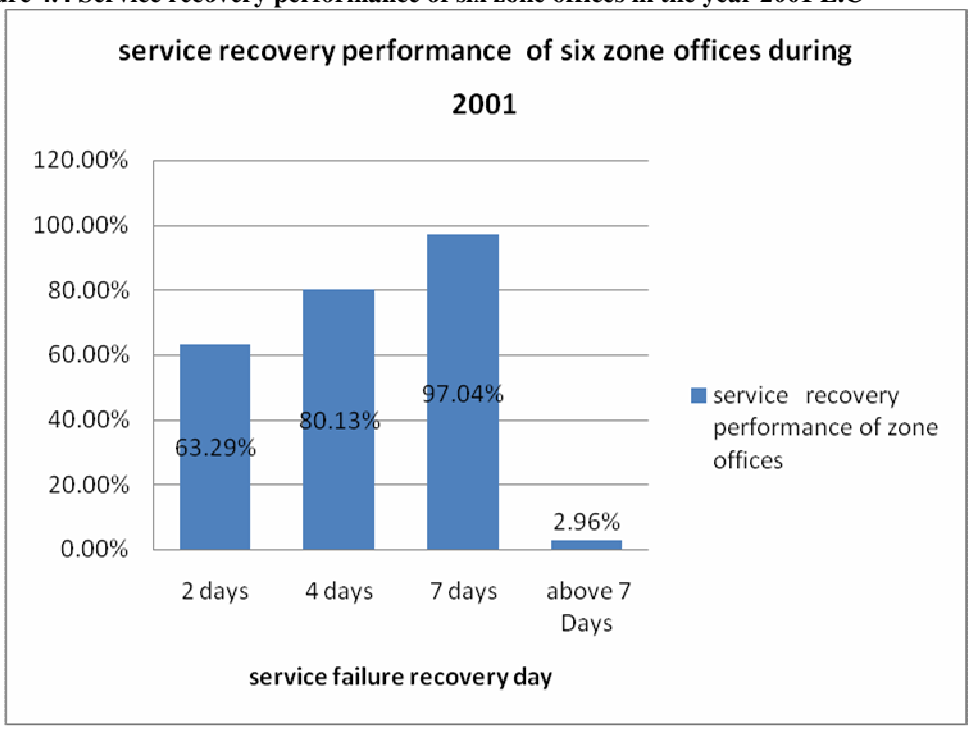
Table 4.6. Service recovery performance of six zone office for the year 2001 E.C

No	Fault		CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	ZO TOT
1	Beginning Balance of fault		583	203	0	36	181	134	1
2	Reported Fault during the period		47045	46718	53137	44430	26655	48843	266
3	Total Reported Fault		**47,628**	**46,921**	**53,137**	**44,466**	**26,836**	**48,977**	**267**
4	Repaired faults Within	2 days	10612 (22.28%)	34118 (39.01%)	37253 (70.11%)	34923 (78.54%)	11012 (41.03%)	41,670 (85.08%)	169 (63.2
5		4 days	18304 (38.43%)	45132 (96.19%)	44998 (84.68%)	40004 (89.97%)	18568 (69.19%)	47,711 (97.41%)	214 (80.1
6		7 days	43434 (91.19%)	46530 (99.61%)	50809 (97.27%)	43006 (97.00%)	26006 (97.12%)	48,494 (99.01%)	258 (97.0
7		Above 7 Days	3745 (7.86%)	49 (0.10%)	1,428 (2.69%)	1,316 (2.96%)	771 (2.87%)	328 (0.01%)	7 (2.8
8		Total	47,179 (99.06%)	46,579 (99.27%)	52,237 (98.31%)	44,322 (99.68%)	26,777 (99.78%)	48,822 (85.08%)	265 (99.2
9	**Faults left on hand at the end of the year**		**449**	**342**	**900**	**144**	**59**	**155**	**2**
15	Connected Line		48,866	84,043	79,203	66,324	52,681	79,576	416
16	**Fault Frequency**		**0.96**	**0.56**	**0.67**	**0.67**	**0.45**	**0.61**	

Source: ETC 2001 E.C. performance report

During the year 2001, the faults reported were 267,965 for all zone offices out of 416,693 connected lines. From these faults the service failures recovered were presented in the following figure.

Figure 4.4 Service recovery performance of six zone offices in the year 2001 E.C



Source: ETC 2001 E.C. performance report

Among the faults 63.29% 80.13% and 97.04% were recovered within two, four and seven days respectively. The rest 2.96 %(11,686 faults) took more than seven recovery day(see figure 5). Individual service recovery performance of each zone shows:

- In CAAZ out of 47,628 service faults; 22.28%, 38.43% and 91.19% were recovered within two, four and seven days respectively. The rest of 8.81 %(3194 faults) took more than seven recovery days.
- In EAAZ out of 46,921 service faults; 39.01%, 96.19% and 99.61% were recovered within two, four and seven days respectively. The rest of 0.39 %(391 faults) took more than seven recovery days.

- In NAAZ out of 53,137 service faults; 70.11%, 84.68% and 97.27% were recovered within two, four and seven days respectively. The rest of 2.73 %(2328 faults) took more than seven recovery days.
- In SAAZ out of 44,466 service faults; 78.54%, 89.97% and 97.00% were recovered within two, four and seven days respectively. The rest of 3.00 %(1460 faults) took more than seven recovery days.
- In SWAAZ out of 26,836 service faults; 41.03%, 69.19% and 97.12% were recovered within two, four and seven days respectively. The rest of 2.98 %(830 faults) took more than seven recovery days.
- In WAAZ out of 48,977 service faults; 85.08%, 97.41% and 99.01% were recovered within two, four and seven days respectively. The rest of 0.99 %(483 faults) took more than seven recovery days.

In general, during the year 2001, EAAZ, NAAZ, SAAZ, SWAAZ and WAAZ have shown relatively good recovery performance. Among the six zone offices, CAAZ has shown poor service recovery performance which falls below the set standards. All zone offices were able to recover more than 97% of failures within the seven day set standard (100%) except CAAZ which were able to recover 91.19% of failure within seven days. The total faults which took more than seven recovery days were 7, 931. This shows that ETC was not able to meet the set standards and provide quality services to all customers.

Table 4.7. Service recovery performance of six zones for the year 2000 E.C

	Fault		CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	ZONE TOTAL
	Beginning Balance of fault		617	289	708	168	410	320	2,512
	Reported Fault during the period		47,710	63207	50855	3495	23111	4765 1	268,029
	Total Reported fault		48,327	63,496	51,563	35,663	23,521	47,971	270,541
	Repaired faults Within	2 days	17,658 (36.54%)	37525 (4.33%)	36051 89.72%	29940 83.95%	18971 80.66%	29282 61.04%	169,427 62.63%
		7 Days	25,611 (53.00%)	47252 (74.42%)	42415 82.26%	34711 97.33%	21398 90.97%	46950 97.87%	218,337 80.70%
		15 Days	46,260 (95.7	63201 (99.72%	50347 97.64	35625 99	23240 99.57	47790 99	266,463

			2%)	)	%	.99%	%	.90%	98.89%
		Above 15 Days	1,484 (3.07%)	92 (0.15%)	1216 97.64%	20.01%	100 0.43%	470.10%	2,941 1.09%
		Total	47,744 (98.79%)	63,293 (99.68%)	51,563 100.00%	35,627 99.90%	23,340 99.23%	47,837 99.72%	269,404 99.58%
	Faults left on hand at the end of the year		583	203	-	36	181	134	1137
	connected line		49,320	80,139	79,443	65,217	54,839	78,950	410,909
	Fault frequency		0.97	0.79	0.65	0.55	0.42	0.61	0.66

Source: ETC 2000 E.C. performance report

As shown on the above table, during 2000E.C, total faults in six zone offices were 270,541 and out of these 62.63% and 80.70% were recovered within two and seven days. The rest 19.30% (52,204 faults) took more than seven recovery days.

When we look at service recovery performance of each zone offices; SAAZ, SWAAZ and WAAZ were able to recover 97.33%, 90.97% and 97.87% of the faults within the

set maximum seven recovery days respectively. CAAZ and EAAZ were able to recover 53% and 74% of the faults encountered within the set maximum seven recovery days respectively. With this regard CAAZ and EAAZ has shown poor service recovery performance which was below the set 100% recovery of all faults within seven days. Only NAAZ were successful in meeting ETC set service recovery standard.

Table 4.8. Service recovery performance of six zones for the year 1999

No	Fault		CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	Zone Total
1	Beginning Balance of fault		539	53	381	124	425	385	1,907
2	Reported Fault during the period		47,226	8145 3	5721 3	38578	26827	4691	297,988
3	**Total Reported fault**		**47,765**	**81,506**	**57,594**	**38,702**	**27,252**	**47,076**	**299,895**
4	Repaired faults Within	2 days	14,835 31.06%	44197 54.23%	34052 59.12%	15026 38.82%	10687 39.22%	25001 53.11	143,798 47.95
5		7 Da	21,921 45.8	6754 0	4374 6	27298 70.	16195 59.	4343 1	220,131 73.4

		ys	9%	82.87%	75.96%	53%	43%	92.26	
6		15 Days	42,26590.36%	7887297.34%	5408894.66%	38390 99.47%	24725 92.42%	46279 99.09	284,61995.83
7		Above 15 Days	4,5089.44%	21572.66%	30465.33%	2040.53%	2026 7.57%	3700.79	12,31114.15
8		Total	46,77397.92%	81,02999.41%	57,13499.20%	38,59499.72%	26,75198.16%	46,64999.09	296,93099.01
9	**Faults left on hand at the end of the year**		992	477	463	108	501	427	2965
15	Connected Lines		49775	76,235	79683	64111	56997	78325	405,126

16	Fault frequency	0.96	1.07	0.72	0.60	0.48	0.60	74.03

Source: ETC 1999 E.C. performance report

During the 1999E.C, the total faults reported in all zone offices were 299,895. Out of these 73.4% of faults were recovered within seven recovery days. When compared with ETC's set standard of recovery period (which is 100%), about 17.6% of faults (79,764 faults) were not repaired within the maximum standard period.

From specific zone office perspective, CAAZ, EAAZ,NAAZ,SAAZ,SWAAZ & WAAZ, recovered 45.89%, 82.87%, 75.96%, 59.43% and 92.26% respectively in spite of the 100% recovery standard set by ETC. These shows all the offices were not met the set fault recovery standard and especially CAAZ & SAAZ has shown extremely poor recovery performance during the period.

Table 4.9. Service recovery performance of six zones for the year 1998

No	Fault	CAAZ	EAAZ	NAAZ	SAAZ	SWAAZ	WAAZ	ZONE TOTAL
1	Beginning Balance of fault	440	376	1260	119	136	256	2,587
2	Reported Fault during the period	53,061	51,022	41,414	41,244	28,624	31,187	246,552
3	**Total Reported Fault**	**53,501**	**51,398**	**42,674**	**41,363**	**28,760**	**31,44**	**249,1**

								3	**39**
4	Repaired faults Within:	2 days	8,922 16.68%	23710 46.13%	25462 59.67%	17499 42.31%	4047 14.07%	21,780 69.27%	13 7,843 55.33%
5		7 Days	26,115 48.81%	42012 81.74%	36453 85.42%	27066 65.44%	17853 62.08%	29,519 93.88%	17 9,018 71.85%
6		15 Days	45,651 86.20%	47392 92.49%	41281 97.57%	41131 99.74%	26653 94.01%	31,197 100.00%	23 3,305 94.34%
7		Above 15 Days	7,311 13.80%	3848 7.51%	1,021 2.41%	1080 2.26%	1,682 5.93%	0 0.00%	13,970 5.65%
8		**Total**	52,962 98.99%	51,240 99.69%	42,302 99.13%	41,239 99.70%	28,335 98.52%	31,197 99.22%	247,275 99.25%
9	**Faults left on hand at the end of the**		**539**	**158**	**372**	**124**	**425**	**246**	**1,864**

	year							
15	Connected Line	48,352	66,251	69,621	56,892	48,420	63,280	352,816
16	Fault Occurred Against Connected Line(fault frequency)	1.11	0.78	0.61	0.73	0.59	0.50	0.71

Source: ETC 1998 E.C. performance report

During the 1998E.C, the total faults reported in all zone offices were 249,139. Out of these 71.85% of faults were recovered within seven recovery days. When compared with ETC's set standard of recovery period (which is 100%), about 28.15% of faults (70,121 faults) were not repaired within the maximum standard period.

From specific zone office perspective, CAAZ, EAAZ,NAAZ,SAAZ,SWAAZ & WAAZ, recovered 48.81%, 81.74%, 85.42%, 65.44% , 62.08% and 93.88% respectively in spite of the 100% recovery standard set by ETC. These shows all the offices were not met the set fault recovery standard and especially CAAZ, SAAZ and SWAAZ has shown extremely poor recovery performance during the period.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Based on data collected from document review and interview conducted with maintenance deputy division managers and employees; the following conclusions and recommendations are presented.

5.1 Conclusions

Based on the results and discussions presented in the previous chapter, the following conclusions are drawn.

- The existing telecommunications regulatory body is unable to enforce the service provider to deliver quality services and protect customers.ETC didn't sign the service level agreement with customers which shows that customers have no right to claim the costs incurred because of poor service recovery effort by ETC and low level of service quality below the minimum required.
- Customer services delivered by ETC through the central call center (997) are poor because of inadequate human resources assigned and computers available. This made access to the Company for customer enquiry more difficult.
- The Company reports indicated that the cause of each service failure was not registered. As a result it is not possible to know exactly how much service failures are encountered due to a given factor. This will make it difficult for ETC to prioritize action to be taken to minimize service failure.

- The major causes of service failures encountered in ETC are aging of cables, intentional and unintentional cut of lines (by thieves, and other organizations like Ethiopian Electric corporation and water sewerage authority) and apparatus failure. Among these more faults are caused by aging of cables. All these failures are caused by factors which are not beyond the control of human beings and can be avoided or at least minimized.

- The magnitude of service failure encountered in all zone office was very high compared against ETC's set failure rate which was 36% out of connected lines.

- The service failure rate was especially severe in CAAZ when compared with other zone offices and ETC was not able to meet its set standard of service failure rate(36%) and there were recurring fixed line service failure which results in customer dissatisfaction and high maintenance costs.

- With regard to service recovery, ETC was not able to recover fully the service failure encountered during the last five years as per the standard. All zonal offices were not able to meet the set standard and there were considerable faults which took more than seven recovery days. Among the zone offices CAAZ has shown poor service recovery performance in relation to the six zone offices and against the set standard.

5.2 Recommendations

Based on the conclusions made, the following recommendations are forwarded in order to reduce fixed line telephone service failures and improve recovery performance of Ethiopian Telecommunications Corporation.

- Ethiopian Telecommunications Corporation should sign the service level agreement with customers which forces the Company to be efficient and protects the customers from loss incurred due to poor service recovery effort. However the Company should thoroughly assess whether the standards which will be incorporated in the agreement can be achieved given the companies situations.

- Providing customer service through call centers make customers to easily communicate with the service provider without the need to go to Company premises. In order to achieve this objective, the Company should put in place adequate resources both computers and personnel capable of handling complaints through 997 call center. The Company should also advertise the six call centers for all zone offices which are instituted to serve respective customers. These call centers are: 961 for CAAZ, 962 for NAAZ, 963 for WAAZ, 964 for EAAZ, 965 for SAAZ and 966 for SWAAZ.

- In order to take proactive measures which minimize fixed line telephone service failures, ETC needs to record the causes of each service failures in a database.

This will help the Company to identify the major causes of recurring fixed line service failures and take appropriate action accordingly.

- Recurring service failures lower service quality and reduce productivity as time and money are wasted on correcting mistakes. Thus, prevention of service failure should be the focus in providing quality service. With this in mind, to minimize or avoid the fixed line service failure in Addis Ababa, ETC should:
    - Make preventive maintenance of old networks especially those connected through paper and jelly filled cables;
    - Make the public aware of appropriate devices (in terms of quality) through different communications media so that customers act proactively in order to avoid costs incurred due to service failure arising from poor apparatus. In addition to this, ETC should give an input and work with Ethiopian Quality and Standard Authority to tackle the problem of poor quality imported apparatus.
    - Should develop a mechanism to communicate and share information with Electric Power Corporations, water and sewerage authority and Addis Ababa municipality to take proactive measures to reduce services failure caused by these organizations.
    - Try to discuss with Addis Ababa Police in order to get priority and prompt investigation services during theft of cables which resulted in longer service recovery period.

Annexes

Interview Questions

1. What mechanism does an ETC use to accept customer complain about the service failure?
2. What are the major causes of service failure? (What type of failure you encounter frequently in relation to fixed line telephone service?)
3. Do you think customers get immediate service recovery?
    - How long it takes for service recovery?
    - Is there a situation where customers should wait for weeks or months to get service recovery?
    - How do you see service recovery performance from set company policy?
    - What do you think is the reason for delay? If there is any delay

4. What major attempts have been made to avoid or minimize the service failure rate? What preventive mechanism has been taken?
5. How successful was the action taken, if any? Is there any problem which is not resolved yet? Why?