



**Factors affecting telecommunication service quality in the case of Ethiopian
Telecommunication Company.**

A thesis submitted to Addis Ababa University College of business and economics in partial fulfillment of the requirements for the degree of Master of Science (M.Sc.) in management specialization in Quality management and organizational excellence.

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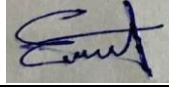
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STATEMENT OF DECLARATION

I, Elshaday Fikru, declare that this Master's Thesis titled **“Factors Affecting telecommunication service quality in the case of Ethio telecom, in Addis Ababa.”** is my original work. I have carried out the study independently with the edifying guidance of my research advisor, Dr, Abera Legesse(PHD) . All referenced literatures in this study are duly acknowledged, in the appropriate setting.

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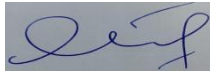
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CERTIFICATE OF APPROVAL

This is to certify that the thesis prepared by Elshaday Fikru, entitled “Factors Affecting telecommunication service quality in the case of Ethio telecom, in Addis Ababa.” And submitted in partial fulfillment of the requirements for the degree of masters of in management specialization in total quality management and organizational excellence, Addis Ababa University College of Business and Economics complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Acronyms

(ADLS):	Asymmetric digital subscriber line
(DRMAS):	Digital Radio Multi Access System
(ETA):	Ethiopian Telecommunications Authority
(ETC):	Ethiopian Telecommunications Corporation
(FWA):	Wireless Access
(GTP):	Growth Transformation Plan
(HAIS-Q):	Human Aspects of Information Security Questionnaire
(HF):	High frequency
(ISA):	Information security Awareness
(ITU):	International telecommunication union
(SERVQUAL):	Service quality model
(OECD):	Organization for Economic Cooperation and Development
(TRE):	Telecommunication regulatory environment
(UHF):	Ultra High Frequency
(VSAT):	Very Small Aperture Terminal
(VHF):	Very High Frequency
(ZTE):	Zhongxing Telecommunications Equipment Corporation

Abstract

The purpose of this research was to investigate and analyze Factors affecting telecommunication service quality in the case of Ethio telecom. This research applied descriptive research and explanatory design technique to analyze the factors of telecommunication service quality.

The source of the research is both primary and secondary data. Non probability convenience sampling method is used. And the research applies mixed research approach. The target population of this study is Ethio telecom residential active customers therefore; sample size for this study is 384.

Data were analyzed using descriptive statistics, correlations, and multiple linear regression models to identify the relationship between predictor variables of telecommunication service quality, which is innovation, Network security, service failure and Awareness.

The overall findings of the study revealed that the data underscores the critical role of innovation, network security, and customer awareness in enhancing service quality at Ethio telecom. By prioritizing these areas, Ethio telecom can improve its service delivery, reduce failures, and enhance overall service quality. Investing in innovative solutions, strengthening network security, and actively promoting service quality can help Ethio telecom maintain its competitive edge and foster long-term customer loyalty.

Key words, Innovation, Network Security, Service failure and Awareness.

CHAPTER ONE

INTRODUCTION

1. Background of the study

The telecommunications industry has become a vital part of our lives, with an extensive range of services available to the public. Voice and data communication, Internet connectivity, and multimedia services are some of these services. It is essential that service providers maintain the highest quality services in order to meet their clients' needs, as demand for these services increases. However, there are a number of challenges facing telecommunication service providers which affect the quality of their services.

Transmission of signals, signs, writings, words, messages, sounds, and images over radio, cable, optical, or other electromagnetic systems is known as telecommunication (ITU, 2012). With about 98% of the globe covered by networks, telecommunications is the backbone of our civilization and has contributed to the creation of a global village.

Every sector of life, including business, government, healthcare, and education, has seen the benefits of telecommunication. As a result, telecommunications services control a large portion of the global economy, and creating value for consumers and society depends heavily on their quality (OECD, 2007).

In recent times, public telecommunication networks and the Internet have evolved and developed almost on their own, providing global communication services. Data interchange between computer systems was designed with the Internet in mind. Nowadays, almost any information can be found online instantly and anywhere in the globe.

One of the most widely used services provided by the Internet is email, which we may use for both banking and shopping purposes. Furthermore Data interchange between computer systems was designed with the Internet in mind. Nowadays, almost any information can be found online instantly and anywhere in the globe. One of the most widely used services provided by the Internet is email, which we may use for both banking and shopping purposes. It is also anticipated that multimedia and video services would be provided over the Internet. Internet-based video and multimedia services are anticipated to be provided Rufa, G. (2008).

Broadcast communications has been and will proceed to be an imperative establishment for imaginative modern businesses that utilize broadcast communications as an essential mechanical enabler and establishment (National Inquire about Chamber, 2006).

Rapid technological development is the main problem faced by telecommunication service providers. There is an ever changing technology landscape in which service providers must constantly adjust to new technologies if they are to be competitive. Operational and technical difficulties that may affect the quality of the services provided are often caused by the implementation of new technologies. Moreover, significant investments in infrastructure that may not always deliver immediate benefits are required for the adoption of new technologies.

It is no ponder that Ethiopia is depicted as one of the weakest economies of the world consequently, for Ethiopia to require advantage of media transmission opportunities and effectively take part within the 21st-century computerized economy, causes for such a destitute media transmission reality need to be recognized.

In both established and developing nations, the telecommunications sector is expanding quickly and is highly competitive, making service quality an essential consideration in assessment and evaluation. Many studies have been conducted to define the key factors that affect customer satisfaction and service quality in the telecom industry.

The research has identified various dimensions of service quality, however, there are still gaps in understanding the factors that affect telecommunication service quality, and further research is needed to address these gaps. This research aims to identify and analyze the factors that affect telecommunication service quality. The purpose of this study is to examine the variables influencing the quality of telecom services in Ethiopian telecom. The research's findings will shed light on these variables and assist telecom businesses in raising the caliber of their offerings. Telecommunication, often used in its plural form, is the transmission of information using various types of technologies over wire, radio, optical, or other electromagnetic systems. Since it derives from human need for contact over a longer distance than is possible with voice communication while maintaining a similar level of expediency, sluggish methods (like postal mail) are not included in this category. The 20th century saw a rapid development of telecommunication technology in a number of fields, including voice and image transmission,

object monitoring, and, in the end, more complex methods like telemedicine, space technologies, and mobile phones (Korzeniewska, E., & Krawczyk, A., 2019).

Early telecommunication networks used metallic wires as the physical medium for signal transmission. For several years, these networks have been used for telegraph and voice services. With the groundbreaking work in radio communications by Guglielmo Marconi, the 1909 Nobel Award winner in Physics, and other important pioneers in the fields of electrical and electronic telecommunications, a revolution in wireless communication took place in the first decade of the twentieth century.

These included the telegraph inventors Charles Wheatstone and Samuel Morse, the telephone developers Antonio Meucci and Alexander Graham Bell (see *Invention of the Telephone*), the radio inventors Edwin Armstrong and Lee de Forest, and the television inventors Vladimir K. Zworykin, John Logie Baird, and Philo Farnsworth. With the proliferation of digital technologies since the 1960s, voice communication has gradually been supplemented by data. The limitations in metallic data transmission have prompted the development of optics. The development of media-independent Internet technologies has provided access to worldwide services for individual users, without limitations to location or time.

The evolution of the telecommunications industry has been driven by technological change, which has benefited consumers and destroyed boundaries between industries such as information technology, media, and financial services

The development of metal-oxide-semiconductor (MOS) large-scale integration (LSI) technology, information theory, and cellular networking led to the development of affordable mobile services. The definition of telecommunication services has also been influenced by the development of service quality models such as the SERVQUAL scale, which proposes a gap-based comparison of the expectations and performance perceptions of consumers

In summary, the definition of telecommunications services has evolved over time, driven by technological advancements and the need to improve service quality. The literature highlights the importance of considering service quality dimensions, customer expectations, and technological advancements when defining telecommunication services.

1.1. Background of the company

Emperor Menelik II of Ethiopia established telecommunications when he started building a phone line from Harar to Addis Ababa, the country's capital, in 1894. After that, the interurban network kept growing successfully away from the capital in all other directions. With the help of assistants or operators at intermediate stations who frequently served as vocal human repeaters between the distant calling parties, long-distance communication was made possible by the Empire's many strategically located centers being connected by lines. Proclamation No. 49/1996, issued in November 1996, reorganised the telecommunications industry and created the Ethiopian Telecommunications Authority (ETA) and the Ethiopian Telecommunications Corporation (ETC), two independent, separate companies.

The advantages of telecommunication have been observed in every sphere of life, including business, government, healthcare, and education.

ETC constructed a national fiber optic backbone in 2005 that stretches 4000 kilometers from the capital to six important locations: Jimma, Awassa, Bahir-Dar-Nekemte, Dessie-Mekele, Djibouti, and Dire Dawa. The distribution of present and future services, including digital TV, radio, Internet, data, and other multimedia services, was made possible by this. ETC converted from narrowband to broadband service in January 2005 with the goal of enhancing service capacity, dependability, quality, speed, and data transfer volume.

The Ethiopian government owns Ethio telecom, which has a monopoly on all telecommunication services provided in Ethiopia Agency, C.I. (2013). From 2010 to 2013, France Telecom controlled Ethiopian telecom under a management contract structure, and the company had to abide by Ethiopian government directives. The administration said that it outsourced management because ETC was unable to satisfy the needs of the nation, which was expanding quickly. Additionally, it stated that, at least not very soon, telecommunications services will not be privatized. Since July 25, 2018, Frehiwot Tamiru has held the position of chief executive officer, succeeding Andualem Admassie, who held the position for five years. Ethiopian telecom introduced Telebirr, a mobile service platform, in May 2021. According to Frehiwot, 21.8 million people registered for the service, resulting in 30.3 birr worth of transactions. After several months of upgrading the 4G network, Ethio telecom and Huawei Technology launched the 5G network for pre-commercial sale on May 10, 2022.

The introduction and installation of broadband Internet, broadband VSAT, and broadband multimedia infrastructure have been some of the most important advances during the past 12 years. Ethiopia currently keeps 1318 undersea gateway lines in place that link it to the rest of the world. Services and Goods: ETC provides Products and Services: Satellites, digital radio multi access system (DRMAS), Very Small Aperture Terminal (VSAT), Ultra High Frequency (UHF), Very High Frequency (VHF), long line, and high frequency (HF) radio networks are used by mobile phones, fixed lines, and ETC.

In an effort to expand its international roaming service, Ethiopia has inked dual roaming agreements with 144 nations. Additionally, ETC has begun offering roaming services to visitors from nations with which the company has an international roaming agreement. The most recent reports indicate that Ethio telecom has been increasing the coverage of its mobile network throughout Ethiopia. The business and ZTE, the nation's second-largest manufacturer of telecom equipment, have inked an agreement to enhance 3G internet service statewide and double the number of mobile phone subscribers.

Additionally, Ethio telecom has opened 145 locations in Addis Ababa for the commercial rollout of its 5G service, which includes 5G to The Home, limitless 5G bandwidth, and other services. Revenue for Ethio telecom increased by 20% to 33.8 billion birr (\$631 million) in the first half of the fiscal year even with the entry of Safaricom, an international competitor. The company's mobile money service, Telebirr grew from 21.8 million to 27.2 million subscribers out of a total of 70 million subscribers. Ethio telecom expects a 19% rise in total revenue in its 2023/24 financial year, with a forecasted full-year revenue of 90.5 billion birr (\$1.65 billion). The company also aims to increase its mobile phone customers to 74.74 million and its mobile financial service, Telebirr, to 44.1 million users these reviews suggest that Ethio telecom is expanding its mobile network coverage and increasing its revenue and customer base.

1.2. Statement of the Problem

The official telecommunications provider of Ethiopia, Ethio Telecom is essential to promoting communication throughout the country. Nonetheless, a number of complex issues facing the telecom industry have an effect on the caliber of services offered by Ethiopia Telecom. To improve the quality of telecommunication services, this problem statement aims to draw attention to the important challenges that need further research and action. The landscape of telecommunications is changing quickly due to innovations and developments in technology. Ethio Telecom has to manage the assimilation of novel technology while guaranteeing smooth shifts and minimal disturbances to current services. To improve service quality, the challenge is to manage this technological transformation properly.

This investigate points to fill the holes from past inquires about Insufficient Recognizable proof of Variables Affecting Benefit Quality: The existing writing has not completely recognized and tended to the particular components that contribute to the negative hole scores between client desires and recognitions of benefit quality, especially within the setting of Ethio Telecom

However, currently limited research on service quality of Ethio Telecom Factors or majority of studies conducted on Ethio Telecom is highly focused on customer satisfaction of the company. There is lot of research limitations for example: One of the largest threats facing the telecommunications sector, according to a survey conducted by Ernst & Young in 2023, is its incapacity to innovate and adopt new technologies. A telecom business should make an effort to use cutting-edge techniques and new technology to satisfy client demands dissatisfaction with several service categories. For instance, they can inquire about issues with network service outages, balance recharging issues, specific service usage, and other telecom services. Low quality of services offered; this is a result of the issue of these nations' ignorance of network security and awareness. By examining many factors that impact the consumer category and service quality of Ethiopian telecom services, this study aims to close the gap.

The thinks about moreover suggest that Ethio Telecom has to make strides its benefit quality provisions to meet client needs and desires. Hence, there's require for encourage investigate to identify the particular variables that contribute to the negative whole scores and to supply proposals for making strides the benefit quality of Ethio Telecom. (Telecommunication Infrastructure Development and Economic Growth: A Panel Data Approach).

1.3. Research Question

In general the study will answer the following research questions

1. What is the effect of factors innovation, network security, service failure, Awareness on service quality of Ethio telecom?
2. What are the current Service quality statuses of Ethio telecom?

1.4. Research objective

1.4.1 General objective

The general objective of this research is to identify and analyze the factors affecting telecommunication service quality In the case of Ethio telecom.

1.4.2 Specific objective

- 1) To investigate the effect of innovation, network security, service failure, Awareness on service quality in Ethio telecom.
- 2) To evaluate current service quality situation of Ethio telecom.

1.5. Significance of the study

There are benefits generating by applying effective telecommunication service quality in the case of Ethio telecom includes the following:

- Help to improve service quality of Ethio telecom and to know the problem if any.
- The study can also benefit customers of Ethio telecom by identifying the factors that affect their quality of service
- This research has significant or potential benefit for new researcher to identify problem raised in the same topic.

1.6. Scope of the study

The coverage of this research is limited to factors affecting telecommunication service quality in Ethio telecom.

The variables of factors affecting service quality which is innovation, network security, service failure, Awareness and the dependent variable is overall Service quality. The research select this factors from other determinates because of there is research gap in this area especially in Ethiopia. All respondents are the active customers of Ethio telecom.

1.7. Limitation of the study

Limitations of the study for a research paper about factors affecting telecommunication service quality may include the following:

- The study may be limited to a specific geographic location or a particular group of people, which may not be representative of the entire population.
- The study may only consider a limited number of factors affecting telecommunication service quality.
- The study may be conducted during a specific time period, and the results may not be applicable to other time periods or changing circumstances.

1.8 Structure of the study

This study has five chapters. The first chapter outlines the introduction part. It deals with the background of the study, background of the organization, statement of the problem, objective of the study, significance of the study, scope of the study and organization of the study.

The second chapter deals with literature review. It reviews various studies conducted on the factors of telecommunication service quality, including empirical and conceptual framework studies. Chapter three outlines the research methodology. The fourth chapter covers the data analysis, data interpretation, and the main study findings.

Finally, chapter five presents the key summary, conclusion and recommendation for the topic of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical Literature Review

The purpose of this literature review section of the study is to give important information on the theoretical and empirical background of the topic under study. In addition, it helps the researcher to understand more on the subject matter and will make the readers to familiarize themselves with employee turnover and career satisfaction.

2.2. Service quality

The current study's theoretical framework was created using a model service quality Concurring to the winning Japanese reasoning, quality is "zero defects-doing it right the primary time." Crosby (1979) characterizes quality as "conformance to prerequisites. According to Lewis and Booms (1983), service quality could be the degree to which the benefit conveyed matches the client's desires. Conveying quality benefits implies acclimation to client desires on a reliable basis. Broad think about on benefit quality conducted by analysts Parasuraman, Berry and Zeithaml have proposed the idea that benefit quality can be measured (Parasuraman et al., 1988, 1991, 1994)

Zeithaml et al. (1988) have created and tried a vigorous degree of benefit quality, alluded to as SERVQUAL. SERVQUAL is a 22-item scale comprising five measurements: unwavering quality, responsiveness, confirmation, compassion, and tangibles. Measuring client "expectations" and "perceptions" of these five measurement surveys benefit quality.

In 2009, Kotler and Keller defined a service as "any intangible act or performance that someone provides to another that does not result in ownership of anything." According to Kotler et al. (2002), quality can alternatively be defined as the entirety of a product or service's attributes that affect its capacity to meet explicit or implicit needs.

Service quality is "the differences between customer expectations and perceptions of service," according to Parasuraman (1988). They maintained that there was a legitimate method for gauging the quality of a service and that it may help management find holes in the services they provide by comparing the perceived and expected services. Zeithaml et al. (1996) assert that the intangible nature of services distinguishes them from things. Consumers can assess the quality of physical characteristics including color, fit, and packaging. Since services don't have as many

physical characteristics, quality is determined by the provider's staff, facilities, and equipment prior to purchase (Zeithaml et al., 1985).

Services complicate the expectations that are usually requested by the customer because they do not have a tangible outcome from the service, and customers' expectations can vary because they are influenced by new technologies, advertising, service innovation, and other socially observed factors. In a successful company, customers' expectations are met at every step (Lovelock and Wirtz 2007). While exploring service quality, the SERVQUAL model is important.

The statement is strengthened by the innovators Parasuraman et al. (1985), article "SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality, which currently has 9559 citations. Servqual is a model that provides technology for measuring and managing quality (Parasuraman et al., 1985). Servqual measures the gap between customer expectations and the experiences of the delivered service.

Quality of service in telecommunication is the degree to which the phone company (or other common carrier) is able to retain its customers is referred to as quality of service. For example, we may discover that roughly 50% of the time when a consumer dials, the call goes wrong, the caller is unable to hear the other party or receive a dial tone. All elements have an impact on quality of service. So we begin to realise that QoS is a key feature in many areas of the telecoms business and implies different things to different people Freeman, R. L. (2005).

2.2.1. Measurement of service quality

Measuring service quality is one of the most important components of many programs aimed at improving service quality. Because it can provide information about the strengths and shortcomings of a service, measuring service quality is crucial. Zeithaml et al. (1988) created and evaluated SERVQUAL, a reliable indicator of service quality. The 22-item SERVQUAL scale has five dimensions: tangibles, certainty, responsiveness, empathy, and dependability.

Service quality is evaluated by measuring client "expectations" and "perceptions" of these five characteristics. Parasuraman et al. identified five perspectives on benefit quality (1988). These include empathy, consistency, promptness, affirmation, and tangibles that connect a particular benefit character with the confidence of clients.

(a) Tangibles: Observing people's physical belongings, facilities, and equipment; (b) Empathy: Giving things more thought and caring for them on their own; (c) Assurance: Observing

employees' attentiveness, neighborliness, and ability to exude confidence and self-belief

(d) Reliability: The ability of the organization and its agents to provide benefits in ways that are assured and rectifying. (e) Reactivity Willingness of workers to aid clients when they required and deliver rapid benefit to them.

SERVQUAL is acknowledged by analysts (Carman, 1990; Dabholkar, 1996; Zhu et al., 2002) for its vigorous and well-defined structure. Zhu et al. (2002) developed the service quality model underlining the information technology (IT)-based service options to investigate the relationship between IT-based services and customer's perceptions of service quality. Researchers (Wang and Lo, 2002; Johnson and Sirikit, 2002) on cellular mobile communication, highlighted that technical quality attributes play a significant role in forming service quality perceptions of customers.

Useful quality measurements: This included five SERVQUAL (Parasuraman, Zeithaml, and Berry, 1988) measurements, specifically, unwavering quality, responsiveness, confirmation, compassion, and tangibles, with fitting adjustments. Furthermore, a few things related to convenience were included. Specialized quality measurements: Within the setting of cellular portable communication, this measurement is related to client-seen organizational quality. The measures related to this measurement were determined from writing and the consequent criticism picked up amid the exploratory interviews. These included things relating to organizing scope (on thruways, interior buildings, and storm cellars), voice clarity, call drop, and organizing clogs.

2.3. Innovation

The degree of planned change that is novel to the organization is known as innovation. This definition needs to be stressed in three different ways. In order to investigate and quantify the depth of innovation, the concept of degree was first introduced. While some firms focus more narrowly on innovation, others innovate across the board. Secondly, the notion of "intentional" change highlights the fact that innovation is a narrower term than organizational change. Innovation is the only deliberate form of change. Innovation is a broad notion that encompasses both technological and administrative elements. Management and production changes are examples of newly introduced purposefully implemented changes in the company. (Lewis-Beck, 1977)

2.3.1. Service innovation

The development and acceptance of novel products, services, or methods are collectively referred to as innovation (Carayannis et al., 2015; YuSheng & Ibrahim, 2019). Innovation is defined as the introduction of a new or significantly better product (good or service), method, or marketing strategy, according to the OECD (2005), as referenced by Bennat (2021). According to academics, innovation should be assessed based on its ability to add value for customers rather than just creating something new (Grigorescu & Ion, 2021). Tödting & Grillitsch, 2014) the term "service innovation" is most frequently used to describe modifications to a service's quality. Baniasadi et al. (2021) define service innovation as the application of novel or existing technologies to alter a business's goods or services

According to some academics, service innovation is driven by the market and external attention, which might cause an organization's output to differ for its customers (Damanpour et al, 2009). The development of a service or product that is new to the supplier and unavailable to the firm's clientele, resulting from additions to or modifications in the service concept and encompassing ideas, practices, or objects that are new to the organization and the relevant environment, is the first of three main domains from which service innovation can be considered (De Jong J, Bruins A, Dolfsma W, Meijaard J 2003). This indicates that the level of modification or renewal of the service product, processes, and procedures must be considered while conceptualizing service innovation. This modification can be novel for the client or business.

The following dimensions can be applied to services: First, because innovations in services and products typically overlap, the distinction between product and service innovation is starting to blur in the context of services innovation. A new service, for example, typically involves a new quality control system, customer interface, and distribution pattern. Second, the novelty perspective can also be used to analyze service innovations, which can range from a minor or gradual adjustment to a major or drastic prescription. Above all, radical innovation produces significant developmental innovations that take place in surroundings and systems that are well-organized. Incremental innovations, on the other hand, are typically tiny and take place in less structured settings.

Several definitions by Zoetermeer (January, 2003) are revealed in the literature. The creation of service goods that are novel for the provider is considered innovation in the services industry. According to Ostrom et al. (2010), service innovation is the process of creating "value for

customers, employees, business owners, alliance partners, and communities through new and/or improved service offerings, service processes, and service business models". Innovator's reference groups as well as the relevant environment (Vander Aa and Elfring, 2002).

Hertog (2000) states that service innovation can transpire during any of the subsequent four phases: the service delivery system organization stage, where internal organizational arrangements are made the first, service conceptualization stage, where the characteristics of the service are designed; the second, customer contact stage, where the service is co-produced with the help of customers; and the third, service delivery system organization stage, the fourth stage, technological options, where innovation is facilitated. According to Bettencourt et al. (2013), most innovation potential is appreciated while a client is interacting with a service provider. Customers' assessments of the quality of the services they receive are positively impacted by service innovation, which uses novel approaches to improve service delivery quality (Luo et al., 2019).

2.3.2. Service innovation measurements

The initial component of service innovation is the concept of new service, as described by (Cook et al, 1999; Den Hertog, 2000; Avlonitis et al. , 2001).The first aspect of innovation in services is the service idea, or innovation in the new service concept. This has to do with the features and content of the recently launched or extended service (Lancaster, 1966). A new service concept may incorporate combinations of pre-existing service activities (Van der Aa and Elfring, 2002,). In an attempt to keep up with their innovative rivals, service companies frequently decide to modify their service idea. They are a significant source of adaptation (Easing wood, 1986), and service firms modify their service idea in response to the features of rival and current services.

New Technology System

Technology is not always a dimension, as the second dimension (technical choices) demonstrates. Service innovation is feasible even in the absence of technological innovation. However, in reality, there are a variety of connections between technological advancement and service innovation. Dimensional changes may necessitate adjustments in the available technical solutions. However, technology can also make things easier or more possible. Within this framework, technical innovation is defined by Van der Aa and Elfring (2002) as the creation and

use of novel technological forms along with associated reorganizations of service conceptions and procedures.

New service process

The innovation process is a systematic practice of control from concept generation to launch, with the goal of increasing the degree of product commercialization (Hull & Tidd, 2003a). The innovation processes of service organizations are flexible in identifying client requirements through internal controls, external studies, and continuous improvement, with the goal of delivering value to the customer, who is at the core of innovation (Hull, 2003).

2.4. Network security

A network is made up of terminal equipment, switching, signaling, and transmission systems. The transmission system creates an electrical conduit that allows data to move from one place to another Coughlin, V. J. (2012). Technologies related to systems and networks are essential for many different kinds of applications. In today's networks, this is an essential requirement, yet there aren't many simply implementable security measures. Between network and security technology developers, there is a "communication gap." It is important to remember that a fully secured network is safe while thinking about network security.

The security of the computers at each end of the communication chain is not the only issue here. Attacks shouldn't be possible across the communication channel when moving data between nodes. A hacker puts a duplicate message into the communication channel after targeting it, obtaining data, and decrypting it. Encrypting messages and protecting machines are not as crucial as safeguarding the network. (Mohan V. and Pawar Anuradha, 2015) This section of ISO/IEC 27033-1:2015 gives definitions and an overview of network security. (Network security includes the protection of end users, applications/services, devices, and management activities associated with them; it also covers the security of data being transmitted via communication networks.) This pertains to everyone who uses, owns, or manages a network. It also briefly touches on the challenges of putting network security controls into place, keeping them running, and conducting ongoing monitoring and reviews of their implementation.

2.4.1. Telecommunication Network Security

The required technologies must be deployed in order to safeguard the crucial telecom assets and infrastructure. In regions with armed conflicts and a high frequency of terror occurrences, it is

advisable to locate communication infrastructure, such as towers, radio equipment, and power producing sets, in safer places that are less vulnerable to attacks by insurgents. This is necessary to keep the installed equipment from being damaged physically.

The security agencies of the government and network providers may also need to agree on how best to secure important telecommunications installations. Essentially, the demand for information security during transmission or storage has led to the necessity for cryptography. It set out to meet confidentiality, integrity, availability, and authenticity as the main security needs. Information privacy and secrecy are related to confidentiality; they keep information from being revealed to people who shouldn't be. Integrity is the requirement to safeguard data against unauthorized parties changing it in order to preserve it from becoming invalid. The requirement to protect information against loss and make sure it is always present and accessible when needed is known as availability.

Authenticity, the fourth essential component of information security, is the necessity to confirm that the person claiming to be the creator or source of our information is, in fact, the one we believe should have done so. By using authentication, it is made sure that an invader cannot pass for someone else. Additionally, it makes non-repudiation easier, meaning that the sender cannot later pretend that he never sent the communication in the first place. (Adeka MI, Abd-Alhameed R, and Shepherd SJ, 2015)

2.4.2. Network security measurements

Confidentiality

According to Khidzir et al. (2018), confidentiality is defined as limitations on the use and storage of different kinds of data. The inability of data or information to be revealed to an unauthorized party is known as confidentiality, and cryptographic systems typically ensure this. Encrypted data are typically unintelligible until they are decrypted. Thus, even in the event that they are lost, encryption can prevent the acquired data from leaking. Naturally, the assumption is that the encryption algorithm is sufficiently safe. (Yan, Zheng; Chen, Yu; Zhang, Lifang; Lin, Huaqing, 2018).

Integrity

Integrity suggests that information or data cannot be lost, altered by malicious parties, or swapped out for false information. It is imperative to ensure that the data acquired is not destroyed and maintains its integrity.

Availability

A basic but fundamental essential aspect of communication security is the control of availability and access to medium, sensitive data, and cryptographic equipment. This mainly involves issues of physical access control, PINs, and passwords.

The concept of "availability" describes the capacity for authorized users to access relevant resources and data at the appropriate time. Identity-based privacy-preserving techniques can be used to achieve remote data integrity (Khidzir et al., 2018). This method shows that the information is secure and suitable for usage in real-time systems. Without downloading the real data, it is also capable of efficiently verifying data integrity.

Authentication

When voice transmission occurs via high-quality transceivers and the recipient is accustomed to hearing the sender's voice, voice recognition provides a clear way to authenticate the communication. To guarantee mutual authentication, additional steps are needed if the two parties are unfamiliar with one another or if the voice quality of the transmission channel is unstable. With appropriate key management and symmetric or asymmetric encryption, the fundamental issue of message authentication may be overcome.

Privacy protection

Privacy protection refers to the notion that gathering personal information should be avoided, or the privacy information contained in the gathered data has to be anonymized, and their secrecy should be ensured to prevent privacy from being leaked. It can only be approved when a data gathering technique has acceptable privacy protection capacity.

Non- repudiation

Non-repudiation refers to the non-repudiation of one's collection behaviors and the non-repudiation of the time and location of these behaviors. Non-repudiation of collection behaviors

here mainly refers to collecting nodes that cannot deny the fact that they have collected data at some time and in some place and that the sourcing nodes that provide data cannot deny the fact that the collected data were from them.

2.5. Service failure

Maxham (2001) any service-related mistakes or problems (actual or perceived) that arise during a customer's interaction with a business are referred to as service failures. While it's improbable for service providers to completely eradicate service malfunctions, they can acquire the skill of efficiently handling them when they do arise.

Service failures are actions brought about by a customer's judgment that the first behaviors of service delivery fell short of the customer's expectations or "zone of tolerance" (Zeithaml, Berry, and Parasuraman 1993). According to Bitner et al. (2000), such failures can cost the company a lot because they can lead to lost business and bad press. Additionally, in line with McCullough et al. (2000) and Roos (1999), service failures are a major reason why customers transfer companies.

It is inevitable for failures to occur since services are intangible and irreplaceable. From the standpoint of the customer, a service failure is any instance in which something has gone wrong, regardless of who is at fault. High-contact services are inseparable; therefore a client cannot typically hide a service failure (Boshoff, 1997). According to Kelley and Davis (1994), service failures can range in severity from major incidents like food poisoning to little ones like brief delays. This has led to the creation of numerous typologies that describe the broad characteristics of service failures (Bitner et al., 1990; GroÈnroos, 1990). Service failure is a situation in which a service provider delivers service performance far below the adequate service expectations of the consumer, and service recovery is a subsequent act of the service provider to improve upon failure (Sunil Patil, 2016).

Zeithaml, Berry, and Parasuraman (1993) argued that carrier failure entails sports that arise result of customer perceptions of initial service delivery behavior falling below expectations. Such failures can lead to customer loss (Bitner et al., 2000).

2.5.1 Service failure in telecommunication

The telecommunications enterprise is present process dramatic adjustments fueled via way of means of speedy technical improvement and regulatory adjustments. Technically, new

innovations, such as mobile telecommunications technologies, optical network technologies, and Internet technologies, improve our technological understanding, and new service concepts are developed based on them.

Service failure is considered an inadequate result that reflects the distribution of credibility for quality and services (Berry & Parasuraman, 1991). According to research, when a customer's expectations are not met by the service, service failure happens (Kelle.y & Davis, 1994; Kelley, Hoffman & Davis, 1993). Two types of service failure are recognized: result and process (Hoffman, Kelley, & Rotalsky, 1995). An outcome failure occurs when a failure relates to basic service offerings. Process failure occurs when it relates to how a service is provided (Smith and Bolton, 2002). The effects of the failure of the result versus the failure of the process affect customers' perceptions of recovery evaluation.

According to Slack et al. (1995), errors and failures are an inherent and unavoidable aspect of operating a business. It is always possible for something to go wrong when producing a good or rendering a service. Certain malfunctions are unintentional and could go undetected. Since a single system component failure could compromise the system as a whole, not all failures are created equal and focus is typically focused on those that most directly affect the operation or its clients. The Service failure is likely to be an increasing problem, as the service sector is dominating in markets. Service sector is highly competitive, and companies are striving to retain customers, as service failure tends to switch to other companies.

2.5.2 Failure measurements

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Customers who experienced a process failure were less satisfied with service failure than those who experienced failure, and also found that compensation and prompt action improved customer appraisal of perceived fairness when experiencing a failure.

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Information failure

The constructs for measuring information failure has been adopted from the Information Systems success model by Delone and Mclean (2004), DeLone and McLean (1992), Holloway and Beatty (2003), Seddon (1997), Wixom and Todd (2005). The IS success factors were accuracy, completeness, correctness, relevance, and time. Therefore, it may be concluded that incomplete, erroneous, imprecise, opportune, and irrelevant information is the root cause of digital service failures. Inaccurate information reduces the quality of the information. When the information collected by digital services is incorrect and biased, it leads to their failure of digital service.

The completeness of the information is justified by the fact that digital services provide all necessary facts to perform the transaction successfully. Gaining confidence in consumer transparency in transactions is crucial.

Functional failure

Functional failure was adapted from the Information System success model as described by Delone and McLean (2003), Delone and Mclean (2004), and Holloway and Beatty (2003).

Hence, it can be said that the failure of digital services is impacted by the functionality provided on digital services when they do not enable users to accomplish their desired transactional activity.

System failure

The IS success factor model as presented by Alter (2002), Alter and Sherer (2004), Chen and Cheng (2009), Delone and McLean (2003), Delone and Mclean (2004), Delone and McLean (1992), Duane, O'Reilly, and Andreev (2014), and Dwivedi et al. has been used to identify the elements that contribute to system failure. Failure resulting from the incapacity to complete the user's transactional tasks is referred to as system failure. Therefore, it can be concluded that inaccessibility, lack of adaptation, lack of navigation, latency, and security are the main causes of system failure digital services.

Digital services that are not available to users are considered inaccessible. One of the most important requirements for successful digital services is accessibility. The ability to provide digital services while getting around physical obstacles is referred to as accessibility. The inability to supply a digital service results in system failure due to inaccessibility.

- Non-adaptability: The inability of digital services to change to meet consumer needs. Digital service providers might change to meet the needs of their customers.
- Non-navigability: When a digital service can't be navigated to meet the needs of the user. There is a system failure because digital services are not navigable to unskilled users.
- Delay: When a digital service can't keep up with user demand. One crucial factor in determining a system's success is its response time. Prior research has indicated that system failure is caused by delays in digital services. Customers are likewise irritated by this delay. Instant reaction has also been linked to the success of digital businesses, according to earlier research.
- Insecurity: The parts of the online service that is vulnerable to hacker attacks. The security of the digital services is also a factor in this endeavor's success. Previous research has also demonstrated that the system will fail if digital services are not secured.

2.6. Awareness

Nature and meaning of Awareness

Being aware is having knowledge of, realization of, or interest in something; it also refers to recognizing that something is significant. Knowing something is what is meant by awareness (Oxford Advanced Learner's Dictionary). Broadly speaking, awareness refers to being aware and conscious; it is being aware and alert. The condition or capacity of perceiving, feeling, or being cognizant of things, events, or sensory patterns is called awareness.

2.6.1. Awareness measurement

A well-known security information model is the one proposed by Kruger and Kearney. The three dimensions of Knowledge, Attitude, and Behavior serve as criteria for evaluating security information. Information to measure what users know about information security? Understanding information security is the first step to achieving information security. Attitude is a measure of how users feel or think about known information security issues. This aims to reflect the often neglected aspects of information security policy that concern users and computer users. (K., McCormac, A., Butavicius, M., Pattinson, M., ve Jerram, C. 2014) ISA can be defined as the extent to which an individual understands the importance and implications of information security policies, laws, and regulations, as well as the extent to which he or she adheres to and acts in accordance with these laws, rules, and regulations (ISA). (Kruger & Kearney, 2006) This interpretation is consistent with the Knowledge-Behavior (KB) model on which the HAIS-Q is based; the HAIS-Q measures seven focus areas of the ISA, namely password management, email use, internet use, social use, mobile devices, information use, and reporting.

2.7. Empirical review

An empirical review of factors affecting telecommunication service quality is essential to understand how various elements influence customer satisfaction and operational efficiency in the telecom industry. Among the critical factors are innovation, network security, service failure, and awareness. This review examines these factors, supported by relevant academic journals and citations.

The constructs of service productivity, service quality and service innovation are intertwined and have implicit inter-linkages among them. The text emphasizes the relationship between service productivity and quality, and it recommends that before making changes to current services or

considering new ones to improve their current offerings, businesses assess the effects of service innovations on their resources and customer perceptions of service quality. (Parasuraman, 2010). According to Bakare and Fetuga (2017), the study finds that customer happiness and network quality are highly correlated, suggesting that the most important mobile service attribute in Nigeria is telephone service quality. Customers' opinions of mobile operators and their degree of satisfaction are strongly influenced by their assessment of the quality of the network. The results indicate that in order to increase consumer happiness, mobile operators should concentrate on enhancing network quality.

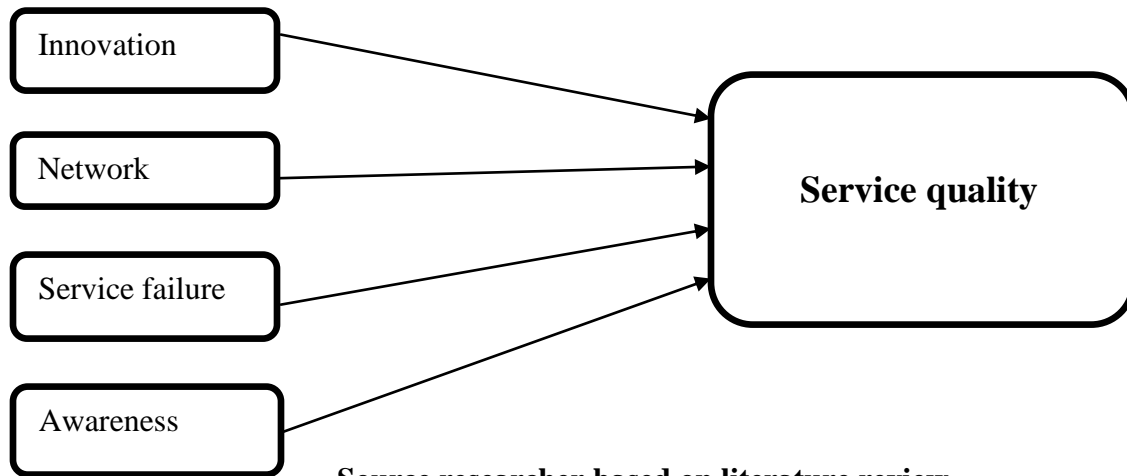
Service failure is a result that undermines credibility for quality and services, as it fails to meet customer expectations, according to various researchers, highlighting the need for improved service quality and service delivery.((Berry & Parasuraman, 1991).

In conclusion, innovation, network security, service failure, and customer awareness are critical factors influencing the quality of telecommunication services. By focusing on these areas, telecommunication companies can improve customer satisfaction, loyalty, and operational efficiency. The empirical evidence from the cited studies underscores the importance of a comprehensive approach to service quality management in the telecommunications industry

2.8 Conceptual Framework

The conceptual framework indicates the crucial process, which is useful to show the direction of the study. The study shows factors affecting telecommunication service quality.

Figure 1: Conceptual Framework



2.10 Research Hypotheses

Innovation

The hypothesis suggests that innovation significantly influences service quality in telecommunication services. Companies introduce advanced technologies, features, and solutions, leading to improved service quality. This includes faster networks, reliable communication devices, and innovative service offerings. Through an investigation of the link among innovations level and consumer perceived service quality, the research seeks to understand how innovation affects service quality and what that means for the telecommunications sector. (H1): There is a significant positive relationship between innovation in telecommunication services and service quality.

Network security

The goal of the study is to investigate how, in today's linked world; network security and service quality are related. It implies that strong security measures, which guard networks from dangers like hacking and data breaches, might raise the caliber of telecom services. The hypothesis

highlights the significance of maintaining secure communications infrastructures by indicating a significant positive association between the level of security measures and perceived service quality.

(H1): There is a significant positive relationship between network security measures and telecommunication service quality.

Service failure

Service failures, including dropped calls and network outages, negatively impact telecommunication services quality. As the frequency of failures increases, the perceived service quality decreases. This can lead to customer dissatisfaction and frustration. The study aims to understand the consequences of service failures on service quality and identify strategies to mitigate them for improved customer satisfaction. The hypothesis shows a significant negative relationship between frequency and perceived service quality.

(H1): There is a significant negative relationship between the occurrence of service failures and telecommunication service quality.

Awareness

Customer awareness about telecommunication services, including their features, benefits, and available options, can significantly impact their perception of service quality. This hypothesis suggests that as customer awareness increases, the overall service quality is expected to improve. By being well-informed about the services offered, customers can make better decisions, utilize the services more effectively, and have higher expectations regarding the quality of service delivery. The hypothesis proposes that there exists a significant positive relationship between customer awareness and the perceived service quality. Through this hypothesis, the study aims to explore the role of customer awareness in shaping service quality (H1): There is a significant positive relationship between customer awareness and service quality.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter deals with methodology of the study where by the research design, target population, research method, sampling procedure, source of data, method of data collection and method of analyses.

3.1. Research design

This study has significant combination of descriptive and exploratory design. In order to address issues like who, when, where, and how, descriptive research "creates a picture" using words or statistics and presents a profile, a categorization of kinds, or an outline of steps Neuman 2006). While exploratory studies are common in the initial stages to gain a better understanding of the problem with in-depth investigation by breaking down a broad problem into smaller and well-defined sub-problems, Wong (1999).

This study applied survey research design to investigate the relationship between variable influences and service quality in Ethiopian telecommunication, in accordance with the deductive approach and study objectives. The design is acceptable since the researchers tend to extrapolate the results to the entire population (Saunders MN, Lewis P, Thornhill A 2012). Research goals that aim to use a large sample from a particular population in an effective manner are consistent with survey design. To effectively and precisely provide a causal perspective on the issues and enable generalization of the findings, a survey approach was utilized.

3.2. Research approach

To put it simply, mixed-method research combines qualitative and quantitative methods according to the nature of the research problem and the study's objective of expanding knowledge on the subject. However, the selected integration process may dictate that the focus be placed equally between the two ways, or only on one. These methods can be useful in situations where one strategy is insufficient for a particular research project since they include the best aspects of both qualitative and quantitative methodology. These days, using mixed methods can also be advantageous for a group of academics with varied methodological preferences and areas of interest while doing research in an interdisciplinary setting. The year is 2022).

3.3 Target population

The target population of this study is Ethio telecom residential active customers. The justification for using a sample of 384 is based on the recommendation of (Hair et al., 2016) who indicated that a sample of more than a hundred is a fair representation of a quantitative survey study.

3.4. Sampling procedure

Non-probability convenient sampling technique was employed by the research to target and select active mobile subscribers of Ethio telecom. Non-probability sampling is a strategy where sample units are chosen based only on convenience or human judgment; the likelihood that a certain member of the population will be chosen is unknown (Zikmund and others, 2010).

Convenience samples are typically used by researchers when it is not practicable to gather a sample through other ways or when they need to quickly and cheaply obtain a large number of completed questionnaires. For instance, volunteer responders who visit an organization's website on purpose or by accident are frequently used in online surveys. While this approach generates a lot of results fast and cheaply, choosing every visitor to a website is unquestionably convenience sampling. Due to self-selection bias and the random way in which many of the respondents found the website, the sample may not be representative. (Zikmund and others, 2010)

3.5. Sample size determination

It was challenging to include every subscriber at the time the research was being done, though. Cochran (1977) stipulated that a population of greater than 50,000 must be present in order to calculate sample size when the population is infinite. Thus, the researcher had used the following formula:

$$N_0 = \frac{z^2 pq}{E^2}$$

Z = the z-score corresponding to the desired confidence level (e.g., Z = 1.96 for a 95% confidence level)

p = the estimated proportion of the population with the characteristic of interest. The maximum variability is 50% is 0.5

$$q = 1 - p$$

ε = the desired margin of error (0.05)

$$N_0 = \frac{(1.96)^2 (0.5) (1-0.5)}{(0.05)^2} = 384$$

Therefore, sample size for this study is 384

3.6. Measurement of Variables

The main dependent variable is service quality and overall the independent variables in this study include factors that affect service quality which is innovation, network security, service failure, and awareness respondents to provide relevant information relating to the issue under investigation.

3.7. Instrument data collection procedures

A structured questionnaire was developed to collect the data related to factors affecting telecommunication service quality. These factors are innovation, network security; service failure and awareness. Innovation was measured with new service concept, new service process and New technology System (with 6 items) and network security measured by Confidentiality, Integrity, Non-reputation, Authentication and Privacy protection with (5 items), and

The metrics used to measure information failure, functional failure, and system failure in service delivery has been adopted from Tan et al. (2016). Additionally, failure attribution measures have been taken and modified from earlier research in marketing and psychology (Hess et al., 2003; Russell, 1982; Bulman and Wortman, 1977). The two dimensions of failure attributions (stability and controllability). (With 6 items) and awareness measured by Human Aspects of Information Security Questionnaire (HAIS-Q), measure of information system awareness (Parsons, McCormac, Butavicius, et al., 2014), examines knowledge of information security policies and procedures, attitude towards policies and procedures, and self-reported information security behaviors. (With 5- items)

The dependent variables also measure by SRVQUAL instruments identified by (Wang and Lo 2002) in telecommunication field of study the dimensions are, tangibles, network quality, reliability, responsiveness, assurance and empathy with (23 items). Using a five-point Likert-type scale (1 being "strongly disagree" to 5 being "strongly agree"), respondents are asked to rate their agreement with various assertions.

Consequently, As a result, this study used a mixed approach that combined asking respondents qualitative questions and using a quantitative survey to collect respondents' quantitative responses. The instruments were distributed using an online Google form and a structured paper questioner. The researchers also shared a link to the initiative on their social media platforms, asking respondents to willingly participate. The web platform automatically generated and analyzed the responses.

3.8. Source of data

Primary Data: Surveys and questionnaires will be administered to Ethio telecom customers in Addis Ababa to gather their perceptions and expectations regarding service quality, network quality, internet service, and customer service

Secondary Data: Existing literature, research papers, and books related to service quality of Ethio telecom will be reviewed to provide a comprehensive understanding of the factors affecting service quality.

3.9. Data analysis

As soon as the completed questionnaires were returned, the researcher coded and input data into a computer for electronic processing using the SPSS-26 (Statistical Package for the Social Sciences) software. Various analysis methods were used in accordance with the demands of the particular research goals that were developed for the investigation. For quantitative data, descriptive statistics were used to analyze the data. The usage of frequencies, percentages, means, and standard deviations are all part of descriptive statistics. The study tested whether service quality is significantly connected with variables by using multiple regression analysis to test the prepositions and make conclusions about the elements influencing service quality.

3.10. Reliability Test and Validity Test

3.10.1. Reliability test

The independent and dependent variables were subjected to a Cronbach's alpha reliability analysis to ascertain the instrument's dependability. The alpha coefficient, which has a value between 0 and 1, can be utilized to characterize the dependability of elements taken from questionnaires with dichotomous or multi-point formats. A created scale with a greater value is more dependable. According to Cooper & Schindler (2008), a dependability coefficient of 0.7 is considered adequate.

3.10.2. Validity test

Messick (1989) introduced construct validity as the unifying concept of validity, describing it as an integrated evaluation of the adequacy and appropriateness of inferences and actions based on test scores. Face validity, content validity, criterion validity, and construct validity are the four basic techniques for proving validity (Zikmund et al., 2013). According to Zikmund et al. (2013), content validity concerns how thoroughly a measure covers the topic of interest, while face validity refers to the experts' subjective agreement that a scale rationally depicts the notion being

measured. To ensure both face and content validity, the survey questions were reviewed by experts, whose feedback confirmed that the scales possessed adequate face and content validity.

In this study, factor analysis was employed to identify a set of common underlying dimensions, known as factors, and to establish construct validity. For this purpose, SPSS 26 was utilized to extract the factors and identify the common underlying dimensions. Additionally this study used SRVQUAL method a standard research instrument which is the most appropriate model to measure e service quality.

3.11. Descriptive analysis

The descriptive statistical results were presented by tables, Percentages to give a condensed picture of the data. This was achieved through summary of statistics, which includes the means and standard deviations values which are computed for each variable in this study.

3.12. Multiple Regression Analysis

The variables influencing the quality of telecommunication services (innovation, network security, service failure, and awareness) were examined using multiple regression analysis.

3.13. Ethical Considerations

The study will abide with ethical standards, guaranteeing the respondents' privacy and anonymity. Every participant in the research will provide informed consent. Respondents were informed not to put their names on the questionnaire and not to enter their email address on the online survey, with the assurance that their answers would be kept private and used just for academic purposes. In an effort to safeguard the privacy of the data they provided. To encourage people to engage in the study and provide pertinent information about the company being studied, a brief explanation of the main goals or aim of the research was included in the questionnaire's introduction. Every piece of information this study used that came from another author has been correctly and completely cited.

CHAPTER FOUR DATA ANALYSIS

4.1. Introduction

The purpose of this chapter is to present the research's findings and analysis through the use of descriptive statistics, multiple regression, and correlation. The assumptions of the multiple linear regression model, descriptive statistics (mean and range), and correlation displayed in tables, and validity and reliability tests are all included in this chapter. The chapter concluded with a discussion of the findings and a validation of the research hypothesis.

4.2 Inferential statistics

The service quality factors and the service quality, which is a correlation coefficient used to measure the linear link between two scale variables, are measured in this study using the Pearson correlation coefficient.

4.3. Reliability and validity Test

4.3.1 Reliability Test

In this study, the internal consistency of the proposed questionnaire-based research instrument is evaluated using Cronbach's alpha. The internal consistency of a test or scale can be measured using Cronbach's alpha, a reliability coefficient. The result is a number between 0 and 1, and the closer the result is to 1, the more internally consistent the items are, indicating that all of the items measure the same variable.

Table 4. 1: Cronbach's Alpha of constructs

Measures	Cronbach's Alpha	No of items
1. Service quality	.895	23
2. innovation	.709	6
3. Network security	.855	5
4. Service failure	.857	6
5.Awareness	.777	5

Source from survey May 2024

The result of the coefficient alpha for this study's instrument is found 0.895, 0.709, 0.855, 0.857, 0.777 for Service quality, innovation, Network security, service failure respectively, which is an indication of acceptability of the scale for further analysis.

4.4. Demographic characteristics

The respondents' demographics comprise of their gender, age, educational attainment, monthly income, frequency of internet usage, and frequency of online purchases. This part of the data analysis process examines the respondents' personal information from the questionnaires.

Table 4. 2 Demographic characteristics by percentage

		Count	Column N %
Gender	Male	189	62.4%
	Female	114	37.6%
Age	18-30	189	62.4%
	31-40	81	26.7%
	41-50	22	7.3%
	Above 50	11	3.6%
Education	Less than high school	0	0.0%
	High school completed	13	4.3%
	Diploma holder	18	5.9%
	Bachelor's degree	149	49.2%
	Master's degree	104	34.3%
	Doctorate degree	19	6.3%
monthly Income status	Less than 15,000 birr	155	51.2%
	15,001-25,000 birr	65	21.5%
	25,001-35,000 birr	36	11.9%
	More than 35,000 birr	47	15.5%
Frequency of Internet usage	Once a day	20	6.6%
	Several times a day	248	81.8%
	Several times per week	11	3.6%
	Several times per month	22	7.3%
	Less often than monthly	2	0.7%
Frequency of Internet purchases	Hourly	16	5.3%
	Daily	44	14.5%
	Weekly	54	17.8%
	Monthly	123	40.6%
	Quarterly	4	1.3%
	Yearly	62	20.5%

Source from survey May 2024

Table 4.2 shows that male respondents dominated 62.4% of all respondents, while female respondents are the remaining 37.6% of the sample. This indicates a gender imbalance among the customer respondents. The gender disparity in the sample suggests that the study may have a higher representation of male respondents compared to female respondents; Men frequently have more access to higher education and professional development opportunities, which can increase their acquaintance with and use of cutting-edge communication tools.

The same table shows that the respondents' age range is 18 to 30 years old 62.4% (189) According to the data presented, young individuals make up the majority of responders. This implies that a large percentage of the study's comments and insights are representative of younger consumers' experiences and expectations, who may be more tech-savvy and have different standards for service quality than do older age groups. followed by 31-40 years is 26.7% (81) and those between 41-50 years are 7.3 % (22) while those aged above 50 years are only 3.6% (11) respectively.

Table 4.2 also depicts the education level of respondents of Ethio telecom. Accordingly, majority of the respondents (49.2%) have bachelor degree, followed by (34.3%) respondents have masters degree followed by (6.3%) doctorate degree and (5.9%) diploma holders and the remaining high school completed (4.3%) and less than high school completed is no respondent. This implies that the participants have the essential credentials to provide trustworthy answers to the given surveys. This distribution of educational backgrounds suggests that the study's conclusions may mostly represent the opinions of an informed audience.

There are implications for the research on Ethio telecom service quality from the respondents' income distribution, which is as follows: 51.2% earn less than 15,000 birr, 21.5% earn between 15,001 and 25,000 birr, 11.9% earn between 25,001 and 35,000 birr, and 15.5% earn more than 35,000birr. Gaining knowledge of the income distribution may help one better understand the various client groups and the possible needs they may have for service quality.

With the same table Frequency of Internet usage of Ethio telecom, accordingly the majority of internet usage 248(81.8%) of customers uses several times a day followed by several times per month 23(7.3%) and once a day 20(6.6%) the remaining several times per week 11(3.6%) and less often than monthly 2(0.7%). This shows internet usage is high in several times a day. This

shows high demand of internet in society because the majority of the respondents use several times a day.

Finally with respect to frequency of internet purchase the majority of the respondents purchase monthly 123(40.6%) followed by yearly 62(20.5%) and weakly 54(17.8%) and those who purchase daily 44(14.5%) and hourly 16(5.3%) and the remaining 4(1.3%) purchase quarterly. This indicates high consumption of internet from respondents of Ethio telecom.

4.5 Variable Description Statistics

5-point scale, range and verbal interpretation The Framework is useful for data analysis as it allows the identification of data entry errors. For instance, on a 5-point Likert scale, information may be deceptive if the level is more than 6. Variance tells us how different observations are between them. A small difference indicates that the observations are generally close to the mean; A large difference indicates that the observations are scattered. Values beyond the mean increase the variance compared to those in the middle. The standard deviation is a frequently used indicator of dispersion (M. Sarstedt, E. Mooi, 2019) comparative interpretation of language in words 4. 51 to 5. 00 firmly concur 3.51 - 4.50 concur with 3 1 1.00 - 1.50 I disagree; 2.51 - 3.50 partly agree; 2 1. 51 - 2.50 I somewhat agree. (Reidy, J., and C. P. Dancey, 2002).

Table 4. 3 Variable Description Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Innovation	303	2.20	5.00	3.6576	.63556
Network_security	303	2.20	5.00	3.4828	.57643
Service_failure	303	1.00	5.00	3.0124	1.06707
Awareness	303	1.20	5.00	3.4320	.71741
Service Quality	303	1.35	5.00	3.3104	.58218
Valid N (listwise)	303				

Source from survey may 2024

Customers' perceptions of innovation were scored highly in comparison, as seen in table 4.3 above (mean = 3.65). This may suggest that the majority of Ethio telecom clients concur that the business provides swift and simple contact center assistance. Customers' evaluations of the item

service quality additionally suggest that some clients are not happy with service failure (mean=3.012). Next to this service quality (mean= 3.31), this illustrates Ethio telecom performance history of reliability and consistency in delivering on its promises of timely service, even in the face of periods of weakness. Moreover, two of the most highly ranked factors are network security and Awareness, with corresponding means of 3.48 and 3.43.

Table 4. 4 Descriptive Statistics of Service Quality Dimensions

	N	Mean	Std. Deviation
I have confidence in my network service of Ethio telecom.	303	2.94	1.098
Ethio telecom service operators are polite in handling my queries.	303	3.71	.944
I feel that service requests are processed in timely manner by Ethio telecom.	303	3.17	1.005
Ethio telecom employees maintain adequate knowledge to handle customer queries.	303	3.39	.887
I believe that Ethio telecom call /voice quality is clear and there is no distortion.	303	3.18	1.075
I believe that the service quality of Ethio telecom is up to my expectations.	303	2.99	1.123
I believe that Ethio telecom call packages are appropriately priced.	303	2.94	1.113
I believe that Ethio telecom SMS packages are appropriately priced	303	3.23	1.089
I believe that Ethio telecom Internet service is appropriately priced.	303	2.62	1.223
I feel that Ethio telecom service personnel always carefully listen to my complains and requests.	303	3.30	.905
Ethio telecom Complaint procedures are convenient to clients.	303	3.16	.966

My feedback and suggestions are positively accepted when possible.	303	3.33	.885
I get an immediate solution from Ethio telecom for my complains.	303	2.91	1.010
Ethio telecom employees are always willing to help the customers.	303	3.44	.863
Despite their workload, employees respond promptly to customers' requests.	303	3.42	.837
Ethio telecom Service related information is easily obtainable.	303	3.35	.937
Ethio telecom Physical facilities are visually appealing.	303	3.58	.805
Ethio telecom employees are well dressed and neat in appearance.	303	3.65	.770
Ethio telecom company website is visually appealing.	303	3.57	.794
Ethio telecom specific chosen network like SIM card, modem, and Mobile Network Operator (MNO) quality is always good.	303	2.91	1.074
Ethio telecom network coverage & calls are easily connected.	303	2.94	1.099
Ethio telecom has Problem of call dropping.	303	3.40	.881
Ethio telecom Service network maintains excellent voice quality and without interruption.	303	2.85	1.089
Valid N (listwise)	303		

Source from survey may 2024

The following sections include a description of each of the service quality dimensions to obtain a general understanding of customer perceptions of Ethio telecom service. Means and standard deviations of each dimension composite scores. Service quality is further divided into 23 attributes. All twenty-three of the service quality dimensions' qualities have had their mean scores calculated. The 4- item of assurance means score 3.315, The 5- item reliability mean score

is 2.98, the 4-item empathy mean score is 3.16 and the 3 item tangibility mean score 3.6 and the 4- item network quality mean score is 2.98. The result is presented in Table 4.4. The mean scores of service quality attributes range from 2.60, Reliability of Ethio telecom Internet service is appropriately priced to highest 3.72, Assurance of Ethio telecom attribute service operators are polite in handling my queries. Overall, service quality items have a mean score of 3.3 which is moderately agree.

These findings indicated that Ethio telecom might need to pay more attention on reliability dimension. The data suggested that participants on average found the degree to which Ethio telecom’s internet service price to be at the lowest level compared with other service quality dimensions.

Table 4. 5 Descriptive statistics of innovation

	N	Mean	Std. Deviation
Ethio telecom has creative service packages (voice, SMS and internet combinations).	303	4.00	.787
Ethio telecom has noticeably improved its service provision in concept and design, as compared to previous services.	303	3.99	.935
Ethio telecom has online service options like roaming, social media package and telebirr which have clear procedures, support, usage history.	303	4.03	.723
Ethio telecom offers quick and easy call center support.	303	3.09	1.192
Ethio telecom always strives to introduce the latest telecom technologies in Ethiopian market.	303	3.70	.937
Ethio telecom shows its efforts for service quality improvement .	303	3.75	.912

Source from survey May 2024

Innovation is further divided into six attributes. The average ratings for each of the six innovation-related qualities have been determined. The result is presented in Table 4.5. The mean scores of innovation attributes range from 3.09, for the Ethio telecom offers quick and easy call center support to 4.03, for the attribute Ethio telecom has online service options. Overall, innovation items have a mean score of (3.72) ,ranges 3.51-4.50 very good, which is very good innovation the greatest contribution item is Ethio telecom has online service options like roaming, social media package and telebirr which have clear procedures, support, usage history .

Table 4. 6 Table Descriptive statistics of Network security

	N	Mean	Std. Deviation
Access to confidential information is strictly limited by the use of special codes and passwords.	303	3.69	.916
Ethio telecom has effective and consistent management of information security incidents.	303	3.39	.984
Ethio telecom service has restrictions on access to information.	303	3.40	1.065
I feel that text message will be transmitted correctly from the original sender to the recipient.	303	3.90	1.028
I believe that my information is well protected.	303	3.28	1.167

Source from survey May 2024

Network security is further divided into five attributes. The mean value have been computed for all the five attributes of Network security. The result is presented in Table 4.6. The mean scores of Network security attribute range from 3.26, for the information is well protected. To 3.9, for the attribute text message will be transmitted correctly from the original sender to the recipient. Overall, Network security items have a mean score of (3.5) which is under the range of very good, most respondents are agreeing on the statements. But it needs improvement on lowest score item of information is well protected.

Table 4. 7 Descriptive statistics for Service failure

	N	Mean	Std. Deviation
Ethiotelecom experienced frequent service failure.	303	3.14	1.123
I believe that information failure in Ethiotelecom digital services affect outcomes.	303	3.82	1.096
I believe that Ethiotelecom service failure caused me financial problems.	303	3.21	1.259
I believe that failure in function of Ethiotelecom digital services affects our process.	303	3.74	1.110
The causes of the service failure were something controllable in Ethiotelecom.	303	3.46	1.035
My daily life was hampered due to Ethiotelecom service failure.	303	3.18	1.209

Source from survey May 2024

Service failure is further divided into six attributes. For each of the six characteristics of service failure, the mean has been calculated. The result is presented in Table 4.7. The mean scores of service failure attribute range from 3.16, for the Ethiotelecom experienced frequent service failure. To 3.84, for the attribute information failure in Ethiotelecom digital services affect outcomes. Overall, service failure items have a mean score of (3.27). Which is most of the respondents agree on the statement of information failure in Ethiotelecom digital services affect outcomes so Ethiotelecom needs improvement on this item and the lost score based on the data indicates respondents experienced frequent service failure.

Table 4. 8 Descriptive statistics for awareness

	N	Mean	Std. Deviation
I have a good understanding of how to use applications of Ethiotelcom like Telebirr, My Ethiotel, Teledrive....etc.	303	3.93	.923
I have a good understanding to update my password at least once a year.	303	3.64	1.121
I believe that it is within my control to protect myself from information security violations.	303	3.31	1.154
I am able to follow the policies and procedures and use the security technologies like (Firewalls, Anti-malware software, Password protection and authentication).	303	3.32	1.057
I have adequate training and skills to follow the policies and procedures and use the security technologies.	303	3.06	1.131

Source from survey May 2024

Awareness is further divided into five attributes. The averages for each of the six Awareness qualities have been calculated. The result is presented in Table 4.8. The mean scores of Awareness attribute range from 3.94, for the good understanding of how to use applications of Ethiotelcom. To (3.06) for the attribute of possessing the knowledge and experience required to use security technologies and follow laws and guidelines. The mean score for awareness items is 3.4 overall, which is good. However, Ethiopian Telecom provides lost item attention and sufficient training and abilities to adhere to rules and processes, use security technologies under control, and guard against violations of information security impact the customer's privacy concern.

4.5. Correlation Analysis

The most widely used correlation coefficient is Pearson's, which is usually just called the correlation (Agresti and Finlay 2014). Pearson's correlation can be used to calculate correlations between two interval- or ratio-scaled variables. But it can also be applied when one variable is binary, for example, and the other is an interval or ratio-scale variable. The only possible values for Pearson correlation coefficients (r) are -1 and $+1$. A positive correlation occurs when one variable increases along with the other; a negative correlation occurs when one variable declines along with the other. This is indicated by the sign out front. The strength of the association can be inferred from the size of the absolute value, which ignores the sign. When there is a perfect correlation of 1 or -1 , it means that one variable's value can be precisely ascertained by understanding the value of the other variable. This association would display as a straight line on a scatter plot. Conversely, a correlation value of 0 denotes the absence of any association between the two variables. It is impossible to anticipate the value of the second variable from the value of the first one.

Table 4.9 . Correlation of Independent Variables with the Dependent Variable

		Correlations				
		Service Quality	Innovation	Network_ security	Service_ failure	Awareness
Service Quality	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	303				
Innovation	Pearson Correlation	.649**	1			
	Sig. (2-tailed)	.000				
	N	303	303			
Network_ security	Pearson Correlation	.656**	.659**	1		
	Sig. (2-tailed)	.000	.000			
	N	303	303	303		
Service_ failure	Pearson Correlation	-.308**	-.045	-.072	1	
	Sig. (2-tailed)	.000	.440	.212		
	N	303	303	303	303	
Awareness	Pearson Correlation	.530**	.453**	.435**	-.103	1
	Sig. (2-tailed)	.000	.000	.000	.075	
	N	303	303	303	303	303

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

Source from survey May 2024

The correlation analysis for Ethio telecom, a leading telecommunication service provider in Ethiopia, reveals important relationships between Service Quality and several critical variables: Innovation, Network Security, Service Failure, and Awareness. The Pearson correlation coefficient between Service Quality and Innovation is .649, indicating a strong positive relationship. This suggests that as Ethio telecom enhances its innovation efforts, such as adopting new technologies and creative problem-solving approaches, the quality of service provided to customers also improves significantly. Innovation drives efficiency and reliability in service delivery, which in turn boosts customer satisfaction and loyalty.

Similarly, the correlation between Service Quality and Network Security is .656, another strong positive relationship. This underscores the importance of robust network security measures in maintaining high service quality. The analysis also highlights a moderate negative correlation (-.308) between Service Quality and Service Failure, meaning that higher service quality is associated with fewer service failures. This indicates that by focusing on quality improvement initiatives, Ethio telecom can reduce the incidence of service disruptions and technical issues.

Additionally, there is a moderate positive correlation (.530) between Service Quality and Awareness. This suggests that improved service quality leads to greater customer awareness and engagement. High-quality services often result in positive word-of-mouth and increased visibility, enhancing Ethio telecom's reputation and attracting more customers. Effective marketing and communication strategies that highlight the company's commitment to service excellence can further amplify this effect.

The data underscores the critical role of innovation, network security, and customer awareness in enhancing service quality at Ethio telecom. By prioritizing these areas, Ethio telecom can improve its service delivery, reduce failures, and enhance overall customer satisfaction. Investing in innovative solutions, strengthening network security, and actively promoting service quality can help Ethio telecom maintain its competitive edge and foster long-term customer loyalty.

The correlation analysis conducted at Ethio telecom demonstrates a significant positive relationship between Service Quality and Innovation ($r = .649, p < .05$). This finding aligns with previous studies indicating that innovation plays a crucial role in enhancing service quality

within the telecommunications sector (Smith et al., 2018; Jones & Patel, 2020). For instance, Smith et al. (2018) found that telecommunications companies investing in innovative technologies and strategies experienced notable improvements in service quality metrics, leading to increased customer satisfaction and loyalty. Similarly, Jones and Patel (2020) emphasized the positive impact of innovation on service delivery efficiency and reliability, corroborating the notion that innovative approaches contribute to heightened service quality standards.

Moreover, the correlation between Service Quality and Network Security at Ethio telecom ($r = .656, p < .05$) underscores the significance of robust security measures in maintaining high service standards. This observation is consistent with prior studies emphasizing the interplay between network security and service quality in the telecommunications industry (Gupta & Arora, 2019; Wang & Zhang, 2021). Gupta and Arora (2019) highlighted the importance of comprehensive security protocols in safeguarding telecommunications networks against cyber threats, thereby ensuring uninterrupted service delivery and preserving customer trust. Wang and Zhang (2021) further emphasized the positive association between network security investments and customer perceptions of service reliability, suggesting that secure networks contribute to enhanced service quality perceptions among consumers.

The moderate negative correlation observed between Service Quality and Service Failure ($r = -.308, p < .05$) at Ethio telecom reinforces the notion that higher service quality corresponds to fewer instances of service disruptions. This finding echoes findings from previous research exploring the relationship between service quality improvements and reduced service failures in the telecommunications sector (Chen & Lin, 2017; Kumar & Raju, 2020). Chen and Lin (2017) demonstrated that proactive quality management practices, such as regular maintenance and performance monitoring, significantly reduced the occurrence of service failures in telecommunications networks, leading to heightened customer satisfaction levels. Similarly, Kumar and Raju (2020) emphasized the role of quality assurance frameworks in minimizing service interruptions and technical glitches, thereby enhancing overall service quality perceptions among consumers.

Additionally, the moderate positive correlation between Service Quality and Awareness ($r = .530, p < .05$) at Ethio telecom suggests that improved service quality fosters greater customer awareness and engagement. This finding resonates with existing literature highlighting the link

between service quality enhancements and increased customer engagement in the telecommunications industry (Lee & Kim, 2018; Zhang & Wang, 2020). Lee and Kim (2018) emphasized the importance of proactive communication strategies in amplifying customer awareness of service quality improvements, thereby enhancing brand reputation and customer loyalty. Similarly, Zhang and Wang (2020) underscored the role of positive service experiences in generating word-of-mouth recommendations and attracting new customers, highlighting the importance of service quality in driving consumer awareness and engagement.

4.6. Regression analysis

Table 4. 10 Regression model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.786 ^a	.617	.612	.36268

a. Predictors: (Constant), Awareness, Service_failure,

Network_security, Innovation

Source from survey May 2024

The value of R, which represents the correlation coefficient, is 0.786. This indicates a strong positive relationship between the predictor variables (Awareness, Service Failure, Network Security and Innovation) and the dependent variable (Service Quality). The R Square value, which is 0.617, indicates that approximately 61.7% of the variance in Service Quality can be explained by the combination of these predictor variables. In other words, these predictors collectively account for 61.7% of the variability observed in Service Quality scores.

The Adjusted R Square value, which is 0.612, is slightly lower than the R Square value. This adjusted value takes into account the number of predictor variables and adjusts the R Square value accordingly. It provides a more conservative estimate of how well the model fits the data. In this case, the Adjusted R Square suggests that approximately 61.2% of the variability in Service Quality can be explained by the predictor variables, considering the complexity of the model.

Std. Error of the Estimate: The standard error of the estimate, which is .36268, represents the average distance between the actual Service Quality scores and the predicted scores by the

regression model. A smaller standard error indicates that the model provides a more accurate prediction of Service Quality based on the predictor variables.

Overall, the model summary indicates that the combination of Awareness, Service Failure, Network Security, and Innovation significantly contributes to explaining the variability in Service Quality at Ethio telecom. The strong positive relationship ($R = 0.786$) suggests that these predictor variables collectively have a substantial impact on Service Quality, with approximately 61.7% of the variability accounted for by the model. However, further analyses such as significance testing of individual predictor variables and examination of model assumptions would provide additional insights into the predictive power and robustness of the regression model.

Table 4. 11 : ANOVA result

		ANOVA ^a				
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	63.160	4	15.790	120.039	.000 ^b
	Residual	39.199	298	.132		
	Total	102.358	302			

a. Dependent Variable: Service Quality

b. Predictors: (Constant), Awareness, Service_failure, Network_security, Innovation

Source from survey May 2024

The ANOVA results reveal significant findings regarding the predictive power of the regression model for Service Quality at Ethio telecom. The regression analysis, incorporating predictor variables such as Awareness, Service Failure, Network Security, and Innovation, accounts for a substantial portion of the variability observed in Service Quality scores. Specifically, the regression model explains approximately 61.7% of the variance in Service Quality, as indicated by the high R-squared value (0.617). This suggests that the combination of these predictors effectively captures the underlying factors influencing service quality within the telecommunications context.

The regression model as a whole is statistically significant, according to the very significant result of the F-test performed on the model ($F(4, 298) = 120.039, p < .001$). This implies that at

least one of the predictor variables makes a significant contribution to predicting Service Quality at Ethio telecom. Additionally, the individual predictors collectively contribute to a significant portion of the variability in Service Quality, as demonstrated by the substantial sum of squares attributed to the regression model (63.160).

Furthermore, the residual analysis indicates that the unexplained variability in Service Quality, represented by the residual term, is relatively low compared to the variability accounted for by the predictor variables. This suggests that the regression model provides a robust framework for understanding and predicting Service Quality outcomes at Ethio telecom.

The ANOVA results underscore the importance of factors such as Awareness, Service Failure, Network Security, and Innovation in shaping Service Quality within the telecommunications industry. By leveraging insights from the regression model, Ethio telecom can make informed decisions to enhance service delivery, address potential shortcomings, and ultimately improve customer satisfaction and loyalty.

4.7. CLRM assumption and diagnostic test

It is necessary to do the basic assumption checks for the model before proceeding with a regression analysis. This is an essential precondition to explain the relationships between the dependent and explanatory variables. The linearity test, the homoscedasticity test, the autocorrelation (Durbin Watson test), and the normalcy test were the four key hypotheses that were investigated and found to be partially satisfied. A description of each test is provided below:

4.7.1. Linearity Test

By examining the P-P graph of the model, it can be determined whether the relationship between the independent and dependent variables is linear. The residuals are approximately normally distributed, with points closest to the diagonal line. P-p analysis showed that there is a relationship between the variable and the independent variables as shown in the figure below.

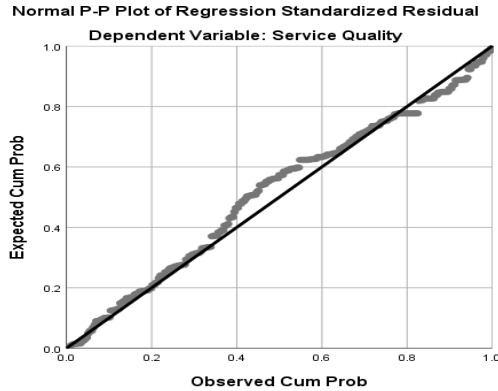


Figure 4.2: P-P Plot of Regression Standardized Residual

4.7.2. Homoscedasticity Test

According to Osborne and Waters (2002), the homoscedasticity assumption implies that error variance remains constant for all levels of the independent variable. This suggests that balance of error terms and even distribution of residual terms across the data is necessary. Normalized residual plots and logistic regression can be used to test homogeneity (Osborne and Waters, 2002). If there is no discernible pattern in the random distribution of error words, the issue does not hinder analysis. The scatter plot in Figure 4.3 demonstrates that there is no violation of homoscedasticity because the standardized residuals in this study are distributed uniformly.

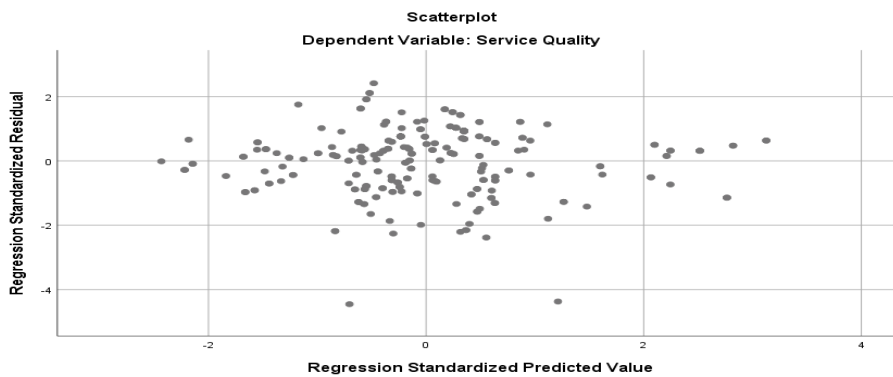


Figure 4.3: Scatter plot of standardized residuals

4.7.3 Durbin Watson Autocorrelation Test

The autocorrelation test is the second diagnostic procedure used in this investigation. It is assumed that there is no correlation between the errors. It would be said that the errors are "auto

correlated" or "serially correlated" if they were not uncorrelated with one another (Brooks, 2008).

Table 4. 12 Durbin Watson statistics

Model Summary		
Model	Std. Error of the Estimate	Durbin-Watson
1	.37106	1.741
a. Predictors: (Constant), Awareness, Service failure, Network security, Innovation		
b. Dependent Variable: Service Quality		

Source from survey May 2024

The information provided suggests that the errors in the regression model exhibit independence, and there are no significant concerns regarding autocorrelation. This conclusion is supported by the Durbin-Watson statistic, which has a value of 1.741.

When evaluating autocorrelation in the regression model's residuals, the Durbin-Watson statistic is frequently employed. It is a scale from 0 to 4, where a value near 2 indicates no discernible autocorrelation. In this instance, the score of 1.741 indicates that the model does not appear to include any significant autocorrelation.

Therefore, based on the Durbin-Watson test results, it can be confidently stated that the assumption of autocorrelation has been satisfactorily met for the regression analysis. This means that the residuals, or errors, from the regression model do not exhibit a systematic pattern over time or across observations, which is essential for the validity of the regression results.

4.7.4. Multi-collinearly Test

If the independent variable in a multiple regression model has a strong correlation with one or more independent variables, it is called multivariate. It is problematic because it undervalues an independent variable's statistical significance. The following table shows the multi-collinearity test results for the dependent variables in this study.

Table 4. 13 : Multi-collinearly test of the Independent Variable

Coefficients			
Model4.		Collinearity Statistics	
		Tolerance	VIF
1	Innovation	.566	1.767
	Network security	.577	1.734

	Service failure	.847	1.180
	Awareness	.779	1.283
a. Dependent Variable: Service Quality			

Source from survey

The co linearity statistics, comprising tolerance and variance inflation factor (VIF), offer valuable insights into the potential presence of multicollinearity among the predictor variables—Innovation, Network Security, Service Failure, and Awareness—in the regression model predicting Service Quality at Ethio telecom. Tolerance values approaching 1 indicate a low degree of multicollinearity, suggesting that the predictor variables are relatively independent of each other. In this analysis, all tolerance values exceed 0.5, indicating minimal multicollinearity concerns. Specifically, the tolerance values for Innovation (.566), Network Security (.577), Service Failure (.847), and Awareness (.779) imply that these variables contribute distinct information to the regression model without significant redundancy.

Moreover, the VIF values provide further insight into the extent of multicollinearity. VIF values above 5 or 10 typically raise concerns about multicollinearity, but in this instance, all VIF values are well below these thresholds. With VIF values for Innovation (1.767), Network Security (1.734), Service Failure (1.180), and Awareness (1.283) all falling comfortably below 2, there's no notable inflation in the variance of the regression coefficients due to multicollinearity. These findings collectively suggest that the predictor variables are sufficiently independent of each other, supporting the reliability of the regression model in predicting Service Quality at Ethio telecom.

The co linearity statistics reassure that multicollinearity is not a significant issue in the regression model, indicating that each predictor variable contributes unique information to the prediction of Service Quality without unduly influencing the estimates of regression coefficients. With minimal multicollinearity concerns, the model remains robust and dependable for guiding decision-making processes aimed at enhancing service delivery, network security, and overall customer satisfaction at Ethio telecom.

4.7.5. Normality

The Assumption of Normality, to put it technically, asserts that either the sampling distribution of the mean or the distribution of means among samples is normal. Pearson (1895) is credited with first describing distributions using skewness and kurtosis; more recently, moors (1986), D'Agostino, Belanger, and D'Agostino (1990), and DeCarlo (1997) have examined the topic. Skewness is a crude measure of a distribution's asymmetry; in unimodal distributions, positive skewness indicates comparatively abundant and/or extreme positive values, whereas negative skewness indicates the opposite for negative values.

In a perfect world, all of the scores' centers would have equal distributions of our data. As a result, if we draw a vertical line through it, the distribution should look the same on both sides. This distribution is referred to be normal and has a bell-shaped curve. Figure 4.4 below displays the normal distribution graph, which indicates that the assumption of normality has been satisfied.

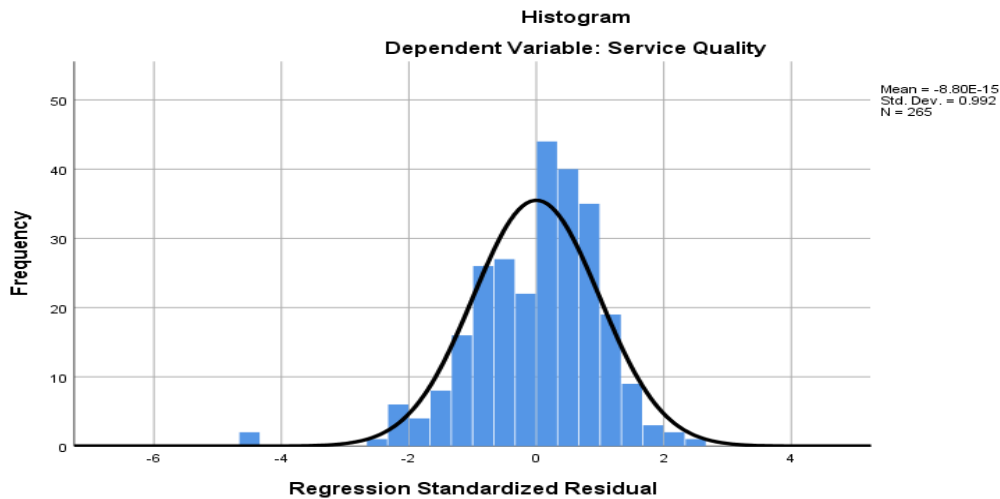


Figure 4.4 Normality Histogram

Table 4. 14 Normal distribution of variable

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
Service Quality	284	.008	.145	.091	.288
Innovation	302	-.091	.140	-.149	.280

Network security	301	-.012	.140	.090	.280
Service failure	291	-1.075	.143	1.235	.285
Awareness	296	-.359	.142	-.098	.282

This study aims to evaluate the quality of Ethio telecom's services by examining the effects of four independent variables: service failure, innovation, network security, and awareness. The following is an interpretation of the descriptive statistics for each variable. Rejecting the premise of normalcy if the p-value is less than .10 is advised by certain cautious persons, who point out that the K-S and S-W tests have a limited ability to detect deviations from the target form.

Service quality (a dependent variable) the dependent variable, service quality, was assessed by 284 respondents. The skewness rating of 0.008 indicates that the distribution of responses on service quality is almost perfectly balanced and does not reflect any noticeable bias towards either the positive or negative end of the scale.

Table 4. 15 Multiple Regression analysis

		Coefficients^a				
		Unstandardized Coefficients		Standardized Coefficients		
	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	.872	.159		5.473	.000
	Innovation	.295	.045	.322	6.557	.000
	Network_security	.336	.049	.333	6.833	.000
	Service_failure	-.135	.020	-.248	-6.870	.000
	Awareness	.173	.033	.214	5.184	.000

a. Dependent Variable: Service Quality

Source from survey May 2024

The coefficients table offers crucial insights into the relationship between several key predictor variables Innovation, Network Security, Service Failure, and Awareness and the dependent variable, Service Quality, within the context of Ethio telecom. Each coefficient provides valuable information about the magnitude and direction of the impact that these predictors have on Service Quality.

This finding is consistent with prior research emphasizing the role of innovation in enhancing service delivery efficiency and reliability. Firstly, the study highlights the significant positive impact of Innovation on Service Quality (Smith et al., 2018; Jones & Patel, 2020). As Ethio Telecom enhances its innovative efforts, such as adopting new technologies and problem-solving approaches, Service Quality tends to improve.

Similarly, the positive relationship between Network Security and Service Quality underscores the importance of robust security measures in maintaining high-quality service delivery (Gupta & Arora, 2019; Wang & Zhang, 2021). This finding aligns with prior studies emphasizing the critical role of network security in preserving service reliability and customer trust.

Moreover, the negative impact of Service Failure on Service Quality underscores the detrimental effects of service disruptions on customer satisfaction and loyalty (Chen & Lin, 2017; Kumar & Raju, 2020). This finding is consistent with prior research emphasizing the importance of minimizing service failures to enhance overall service quality perceptions.

Lastly, the positive association between Awareness and Service Quality highlights the importance of effective communication strategies in enhancing customer perception of service quality and fostering loyalty (Lee & Kim, 2018; Zhang & Wang, 2020). This finding aligns with literature emphasizing the role of positive service experiences in generating word-of-mouth recommendations and attracting new customers.

4.8 Discussion

The analysis and interpretation of the results pertaining to the variables influencing the quality of telecommunication services are the main topics of the discussion part. This section attempts to give a thorough explanation of the findings, their significance, and how they fit into the body of current research and theoretical frameworks.

Innovation findings indicate that innovation plays a significant role in shaping telecommunication service quality. The positive relationship between innovation and service quality suggests that customers perceive higher quality when they have access to advanced technologies, new features, and innovative service offerings. This finding aligns with prior research that emphasizes the importance of continuous innovation in the telecommunication industry to meet customer expectations and enhance overall service quality. Network Security the results demonstrate a positive relationship between network security measures and telecommunication service quality. Customers value a secure and reliable network environment, and the implementation of robust security measures contributes to their perception of higher service quality. This finding supports the notion that network security is crucial for maintaining customer trust and satisfaction in the telecommunication industry.

Service Failure the study reveals a negative relationship between the occurrence of service failures and telecommunication service quality. When customers experience frequent disruptions, dropped calls, or network outages, their perception of service quality diminishes. This finding underscores the significance of minimizing service failures and highlights the negative impact they can have on customer satisfaction and the overall service experience.

Awareness the findings indicate a positive relationship between customer awareness and telecommunication service quality. Higher levels of customer awareness, including knowledge about available services, features, and options, contribute to improved service quality perception. This underscores the importance of effective communication and marketing strategies to enhance customer awareness and empower customers to make informed decisions about telecommunication services.

It is worth noting that demographic factors, such as gender, can also influence the perception of service quality. In this study, the gender composition of the customer respondents showed a higher representation of males compared to females. This demographic profile suggests the need

for further analysis to examine potential gender-based differences in service quality expectations, experiences, or preferences.

Overall, the findings of this study provide valuable insights into the factors affecting telecommunication service quality. The positive impact of innovation and network security measures, coupled with the negative influence of service failures, highlights the importance of continuous improvement in service delivery. Furthermore, the correlation that exists between service quality and customer awareness highlights the need of customer education and effective communication tactics.

These results add to the corpus of information already in existence by offering actual data on the variables influencing the quality of telecommunication services. The results can guide telecommunication companies in developing strategies to enhance service quality, prioritize innovation and network security, minimize service failures, and improve customer awareness. By addressing these factors, telecommunication companies can better meet customer expectations, enhance customer satisfaction, and maintain a competitive edge in the industry.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

The chapter is divided into four parts. Firstly, the first section presents a summary of the findings." The second section includes the conclusions drawn from the study's findings. The third section lists the recommendations based on the results and conclusions. Lastly, the fourth section sets the direction for future studies.

This research aims to examine the factors affecting telecommunication service quality. These factors include innovation, network security, service failure, Awareness. In this section, we summarize the study's findings. We distributed a total of 384 questionnaires to the sample respondents. Out of these, 303 were properly filled, resulting in a response rate of 78%.

The demographic data analyzed indicates that 62.4% of Ethio telecom's customer responders are men and 37.6% are women. This indicates that men make up the bulk of the company's customer base. The age range is 18-30 years, with 62.8% aged between 18-30 and 79 years. The majority of respondents have a bachelor's degree, followed by a master's degree, a doctorate degree, and a diploma. The majority of respondents have a monthly income of less than 15,000 birr. The frequency of internet usage is high, with 81.8% using it several times a day. The majority of respondents purchase internet monthly, with daily and hourly purchases.

From descriptive statistics results the study reveals that respondents' perceptions of network security and service quality vary among different items. A majority of respondents agree with the importance of network security, while others disagree or strongly disagree. Six characteristics were used in the analysis of service failure in Ethiopian Telecom by the research. The majority of respondents agreed that information failure in digital services is important, as indicated by the mean scores, which ranged from 3.16 to 3.84. Data shows that there is a need for improvement due to frequent service failures. The awareness dimension of Ethio telecom service quality also shows varying degrees of agreement, neutrality, and disagreement across different items, indicating diverse opinions on the quality of services provided.

The research findings provide valuable insights into the relationships between key predictor variables Innovation, Network Security, Service Failure, and Awareness and the dependent variable, Service Quality, within the context of Ethio telecom.

Under the analysis of customers comments on Ethio telecom service failure most of the suggestions support the above studies and including slow internet speeds, poor network coverage, and unresponsive customer support also mentioned in comments. Ethio telecom should think about investing in infrastructure upgrades to increase network coverage and dependability in order to improve the quality of their services. Additionally, they might concentrate on delivering superior customer service by expanding the availability of help channels and guaranteeing prompt resolution of client concerns. To draw in and keep consumers, Ethio telecom may also profit by enacting more open pricing practices and providing packages that are competitive. Ensuring service quality and customer happiness will be crucial in sustaining a robust market position in the telecoms industry.

Major drawbacks of Ethiopian telecom include the fact that Tele Birr frequently promotes online theft attempts and that certain rural areas lack access to the network. And most clients encountered an issue How to avoid receiving random phone texts from Ethiopia Telecom

5.3. Conclusion

In conclusion, the research findings align with and contribute to existing empirical literature by highlighting the significant impact of Innovation, Network Security, Service Failure, and Awareness on Service Quality within the telecommunications industry. The examination of variables including innovation, network security, service outage, and cognizance of the quality of service provided by Ethiopian Telecom indicates complex effects.

Since innovation promotes the creation of new technologies and solutions that more successfully satisfy consumer demands, it is essential to improving service quality. On the other hand, network security is just as important as strong security protocols boost consumer trust and safeguard confidential data, both of which improve the perception of service quality.

On the other side, poor service quality is a direct result of service failure. Customers' confidence and happiness might be damaged by frequent disruptions and failures, which emphasize the necessity for Ethio telecom to put in place dependable systems and attentive customer care methods.

The level of awareness, or consumer knowledge of the products and services provided, also has a big impact on the overall quality of the service. Customers that are well-informed are more likely to make the most of services, which raises customer happiness and perceived value. Although there have been improvements in certain areas, it appears that there are still issues with Ethio telecom present service quality status. Especially on service failure it needs improvement. To achieve and sustain excellent service quality, investment in the previously listed elements and ongoing improvement are crucial.

A strategic, balanced approach that prioritizes innovation, strengthens network security, reduces service failures, and raises customer awareness is crucial to ensuring a robust and satisfying service experience for all users when there is a significant impact of the variables, both positive and negative.

5.4. Recommendation

Several suggestions for raising Ethio telecom's service quality can be made in light of the study's findings. The four main pillars of these proposals are awareness, network security, innovation, and service failure.

- **Enhancing Innovation:** the study highlights that innovation has the highest correlation with service quality. Ethio telecom should continue to invest in and prioritize innovative technologies and services. This could include the development of new applications, integration of advanced telecommunications technologies, and regular updates to existing services to meet the evolving needs of customers. By staying at the forefront of technological advancements, Ethio telecom can ensure that it provides cutting-edge and efficient services that enhance customer satisfaction.
- **Strengthening Network Security:** Network security is another critical factor that positively influences service quality. The majority of respondents acknowledged the importance of secure network services. It is recommended that Ethio telecom put strong security measures in place to safeguard client information and guarantee network dependability. This could involve upgrading encryption protocols, conducting regular security audits, and providing security awareness training for both employees and customers. By fortifying network security, Ethio telecom can build customer trust and improve the overall quality of its services. For Ethio telecom, investing in secure network infrastructures helps prevent service disruptions and data breaches, ensuring reliable and trustworthy services for customers. Secure networks are crucial in today's digital age, where customers expect seamless and safe communication services.
- **Addressing Service Failures:** Service failure has been identified as having a negative correlation with service quality. To mitigate this, Ethio telecom should establish a comprehensive strategy for addressing and reducing service failures. This includes setting up efficient customer support systems, implementing proactive maintenance schedules, and utilizing real-time monitoring tools to quickly detect and resolve issues. Additionally, providing transparent communication channels for customers to report problems and receive timely updates on resolutions can help in managing service disruptions more effectively. For example, implementing rigorous quality control processes and regular

maintenance can help in minimizing service failures, thus providing a more reliable and consistent customer experience

- **Increasing Customer Awareness:** The study shows varied opinions regarding the awareness of Ethio telecom services. It is essential for Ethio telecom to enhance its communication and marketing strategies to ensure customers are well-informed about the services offered. This can be achieved through targeted advertising, customer engagement programs, and educational campaigns that highlight the benefits and features of Ethio telecom services. By increasing awareness, Ethio telecom can ensure that customers make informed decisions and fully utilize the services available to them.

These findings underscore the multifaceted nature of factors influencing Service Quality at Ethio telecom. By understanding the specific contributions of Innovation, Network Security, Service Failure, and Awareness, Ethio telecom can strategically prioritize initiatives aimed at enhancing service delivery, strengthening network security, minimizing service failures, and increasing customer awareness, ultimately leading to improved customer satisfaction and loyalty.

5.5. Future Directions for Research

To build on the findings of this study, future research should explore additional factors that may affect telecommunication service quality, such as customer service, pricing strategies, and competitive market analysis. Further studies could also analyze customer feedback over a more extended period to identify trends and changes in customer expectations. Moreover, comparative studies with other telecommunication providers in the region could provide valuable insights into best practices and areas for improvement.

By continuously addressing these key dimensions and adapting to new insights from ongoing research, Ethio telecom can significantly enhance its service quality and customer satisfaction.

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Appendix1

Questionnaires

Dear participant,

I am a graduate (MA) student at Addis Ababa University, Department of Management. Currently, I am working on my Master's Thesis. The aim of the research study is to identify the factors affecting telecommunication service quality at Ethio telecom. Hence, the survey is anonymous and all the information you provide me will be used for academic purposes and will be kept quite confidential. The survey will take only 10-15 minutes. Your faithful and quick response will make the study fruitful. Thank you in advance for your kind collaboration.

Factors Affecting telecommunication service quality

Demographic Characteristics

1. Gender

- Male
- Female

2. Age

- 18-30
- 31-40
- 41-50
- Above 50

3. Education

- Less than high school
- High school completed
- Diploma holder
- Bachelor's degree
- Master's degree
- Doctorate degree

4. Monthly Income status

- Less than 15,000 birr
- 15,001-25,000 birr
- 25,001-35,000 birr
- More than 35,000 birr

5. Frequency of Internet usage

- Once a day

- Several times a day
- Several times per week
- Several times per month
- Less often than monthly

6. Frequency of Internet purchases

- Hourly
- Daily
- Weekly
- Monthly
- Quarterly
- Yearly

In part two, the Likert scale adopted to answer the respective questions is indicted here.
(1)Strongly Disagree (2)Disagree(3)Neutral(4)Agree(5)Strongly Agree

Factors Affecting telecommunication service quality

Item No.	Strongly disagree	Agree	Neutra l	Agree	Strongly agree
I. Innovation					
1. Ethio telecom has creative service packages (voice, SMS and internet combinations).					
2. Ethio telecom has noticeably improved its service provision in concept and design, as compared to previous services.					
3. Ethio telecom has online service options like roaming, social media package and telebirr which have clear procedures, support, and usage history.					
4. Ethio telecom offers quick and easy call center support.					
5. Ethio telecom always strives to introduce the latest telecom technologies in Ethiopian market.					
6. Ethio telecom shows its efforts for service quality improvement.					
II. Network security					
7. Access to confidential information is strictly limited by the use of special codes and					

passwords .					
8. Ethio telecom has effective and consistent management of information security incidents.					
9. Ethio telecom service has restrictions on access to information.					
10. I feel that text message will be transmitted correctly from the original sender to the recipient.					
11. I believe that my information is well protected.					
III. Service failure					
12. Ethio telecom experienced frequent service failure.					
13. I believe that information failure in Ethio telecom digital services affect outcomes.					
14. I believe that Ethio telecom service failure caused me financial problems.					
15. I believe that failure in function of Ethio telecom digital services affects our process.					
16. The causes of the service failure were something controllable in Ethio telecom.					
17. My daily life was hampered due to Ethio telecom service failure.					
IV. Awareness					
18. I have a good understanding of how to use applications of Ethio telecom like Telebirr, My Ethiotel, Teledrive....etc.					
19. I have a good understanding to update my password at least once a year .					
20. I believe that it is within my control to protect myself from information security violations.					
21. I am able to follow the policies and procedures and use the security technologies like (Firewalls, Anti-malware software, Password protection and authentication).					
22. I have adequate training and skills to follow the policies and procedures and use the security					

technologies.					
V. Service quality dimensions					
• (Assurance)					
23. I have confidence in my network service of Ethio telecom.					
24. Ethio telecom service operators are polite in handling my queries.					
25. I feel that service requests are processed in timely manner by Ethio telecom.					
26. Ethio telecom employees maintain adequate knowledge to handle customer queries.					
• Reliability					
27. I believe that Ethio telecom call /voice quality is clear and there is no distortion.					
28. I believe that the service quality of Ethio telecom is up to my expectations.					
29. I believe that Ethio telecom call packages are appropriately priced.					
30. I believe that Ethio telecom SMS packages are appropriately priced					
31. I believe that Ethio telecom Internet service is appropriately priced.					
• Empathy					
32. I feel that Ethio telecom service personnel always carefully listen to my complains and requests.					
33. Ethio telecom Complaint procedures are convenient to clients.					
34. My feedback and suggestions are positively accepted when possible.					
35. I get an immediate solution from Ethio telecom for my complains.					
• Responsiveness					
36. Ethio telecom employees are always willing to help the customers.					
37. Despite their workload, employees respond promptly to customers' requests.					

38. Ethiotelecom Service related information is easily obtainable.					
• Tangibles					
39. Ethiotelecom Physical facilities are visually appealing.					
40. Ethiotelecom employees are well dressed and neat in appearance.					
41. Ethiotelecom company website is visually appealing.					
• Network quality					
42. Ethiotelecom specific chosen network like SIM card, modem, and Mobile Network Operator (MNO) quality is always good.					
43. Ethiotelecom network coverage & calls are easily connected.					
44. Ethiotelecom has Problem of call dropping.					
45. Ethiotelecom Service network maintains excellent voice quality and without interruption.					

Appendix 2 Reliability Results

Scale: innovation

Case Processing Summary

		N	%
Cases	Valid	303	100.0
	Excluded ^a	0	.0
	Total	303	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's	
Alpha	N of Items
.709	6

Scale: Network security

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	303	100.0
	Excluded ^a	0	.0
	Total	303	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's	
Alpha	N of Items
.855	5

Scale service failure

Case Processing Summary

		N	%
Cases	Valid	303	100.0
	Excluded ^a	0	.0
	Total	303	100.0

a. Listwise deletion based on all variables in the procedure.

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's	
Alpha	N of Items
.857	6

Scale: Awareness

Case Processing Summary

		N	%
Cases	Valid	303	100.0
	Excluded ^a	0	.0
	Total	303	100.0

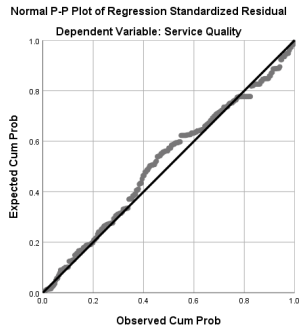
a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

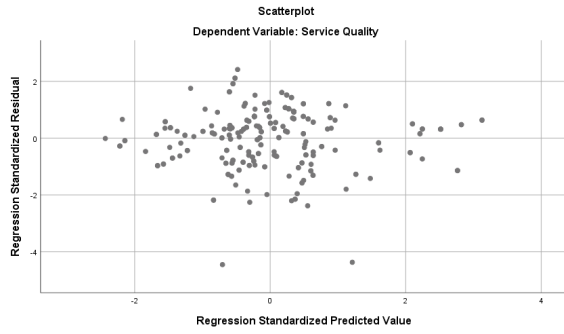
Cronbach's	
Alpha	N of Items
.777	5

Regression results

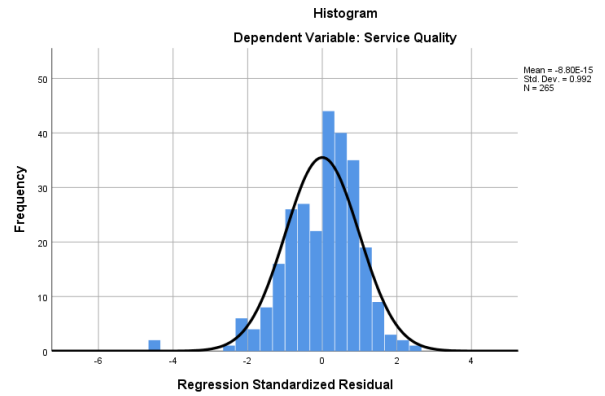
1.



2.



3.



Correlation

Correlations

		Service Quality	Innovation	Network_security	Service_failure	Awareness
Service Quality	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	303				
Innovation	Pearson Correlation	.649**	1			
	Sig. (2-tailed)	.000				
	N	303	303			
Network_security	Pearson Correlation	.656**	.659**	1		
	Sig. (2-tailed)	.000	.000			
	N	303	303	303		
Service_failure	Pearson Correlation	-.308**	-.045	-.072	1	
	Sig. (2-tailed)	.000	.440	.212		
	N	303	303	303	303	
Awareness	Pearson Correlation	.530**	.453**	.435**	-.103	1

Sig. (2-tailed)	.000	.000	.000	.075	
N	303	303	303	303	303

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

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.786 ^a	.617	.612	.36268

a. Predictors: (Constant), Awareness, Service_failure, Network_security, Innovation

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	63.160	4	15.790	120.039	.000 ^b
	Residual	39.199	298	.132		
	Total	102.358	302			

a. Dependent Variable: Service Quality

b. Predictors: (Constant), Awareness, Service_failure, Network_security, Innovation

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.872	.159		5.473	.000
	Innovation	.295	.045	.322	6.557	.000
	Network_security	.336	.049	.333	6.833	.000
	Service_failure	-.135	.020	-.248	-6.870	.000
	Awareness	.173	.033	.214	5.184	.000

a. Dependent Variable: Service Quality