



**AN ASSESEMENT OF THE CHALLENGES AND OPPORTUNITIES  
ON THE IMPLEMENTATION OF E-TOP UP SERVICE PROJECT;  
THE CASE OF ETHIO TELECOM.**

**BY  
GEZAHEGN KETEMA TSEGAYE**

**June, 2018  
Addis Ababa, Ethiopia**

**AN ASSESEMENT OF THE CHALLENGES AND OPPORTUNITIES ON  
THE IMPLEMENTATION OF E-TOP UP SERVICE PROJECT; THE  
CASE OF ETHIO TELECOM.**

**BY**

**GEZAHEGN KETEMA TSEGAYE**

**ADVISOR: WUBESET BEKALU (PhD)**

**A Research Project Submitted to Addis Ababa University school of  
Commerce in Partial fulfillment of the Requirement for Master of Arts in  
Project Management (MAPM)**

**June, 2018**

**Addis Ababa University**

**ADDIS ABABA UNIVERSITY**  
**GRADUATE STUDIES PROGRAM**  
**MASTER OF ARTS IN PROJECT MANAGEMENT**

**AN ASSESEMENT OF THE CHALLENGES AND OPPORTUNITIES  
ON THE IMPLEMENTATION OF E-TOP UP SERVICE PROJECT;  
THE CASE OF ETHIO TELECOM.**

**BY**  
**GEZAHEGN KETEMA TSEGAYE**

**Approved by: Board of Examiners**

Examiner \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Examiner \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Advisor \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

## **CERTIFICATE**

This is to certify that this project work, **“An Assessment of the challenges and opportunities on the implementation of E-top up service project in ethio telecom”** undertaken by Gezahegn Ketema in Partial fulfillment of the award of Master ‘s degree in Project Management at Addis Ababa University graduate school, is an Original work and not submitted earlier for any degree either at this University or any other University.

---

Wubeshet B. (PhD)

Project Work Advisor

## DECLARATION

I declare that the research project work named “*An Assessment of the challenges and opportunities on the implementation of E-top up service project in ethio telecom*” is my own work and that all the sources that I have been indicated and acknowledged by means of complete references.

-----  
Gezahegn Ketema Tsegaye

-----  
Date

## **ACKNOWLEDGMENTS**

First and foremost, I would like to thank the Almighty God who gave me the courage through his endless love and blessings that helped me in finalizing the study. Next to him, I thank his mother Saint Mary. She prays, bless, protect and intercede for us.

Secondly, I would like to thank my Advisor, Doctor Wubeshet Bekalu, who took a chance on me, guided and motivated me with wisdom, patience, kindness and care; I would also like to thank Ato. Eyob Ketema (E-top up project Manager at ethio telecom) who was kind enough to read through my drafts and review the work over and over again,

I would like also to express my gratitude to my friends, for their unlimited comment as well as moral support starting from the beginning up to the end. Finally, I would like to thank all people involved directly or indirectly for the accomplishment of this paper.

**List of Tables**

Table 4.2 Questionnaire distribution and Response Rate .....31

Table 4.3 Demographic Profile of the respondents.....32

Table 4.4 Test of Normality .....33

Table 4.5 Descriptive Statistics challenges that affect development of E-top up.....34

Table 4.6 Frequency Statistics benefits that expected to realized from adoption of E-top up service project .....35

Table 4.7 Frequency Statistics- Driving forces for adopting of E-top up services.....37

Table 4.8 Frequency Statistics -existing opportunities that initiates the adoption of E-top up service .....39

**List of Figures**

Figure 4.6.1-1 Histogram Operational Benefit ..... 36

Figure 4.6.1-2 Histogram Service Benefit ..... 36

## ACRONYMS & ABBREVIATIONS

<b>ET</b>	<b>Ethio Telecom</b>
<b>Pre-TUPS</b>	<b>Prepaid Top Up System</b>
<b>M Comviva</b>	<b>Mahindra Comviva</b>
<b>MSISDN</b>	<b>Mobile Station International Subscriber Directory Number (Mobile Number)</b>
<b>HTTP</b>	<b>Hypertext Transfer Protocol</b>
<b>USSD</b>	<b>Unstructured Supplementary Service Data</b>
<b>XML</b>	<b>Extensible Markup Language</b>
<b>SMSC</b>	<b>Short Message Service Center</b>
<b>E-banking</b>	<b>Electronic banking</b>
<b>POS</b>	<b>Point of sale</b>
<b>PIN</b>	<b>Personal identification number</b>
<b>NBE</b>	<b>National Bank of Ethiopia</b>
<b>ERCA</b>	<b>Ethiopian Revenue and Custom Authority</b>

## **Abstract**

*The study evaluated the adoption and implementation of E-top up service project in ethio telecom. The study was conducted based on the data gathered from six zones in Addis Ababa those are currently providing E-top up service. The total sample size for the study is 110 employees from selected six zones found in Addis. Descriptive research design was employed to conduct this study by using questionnaire. The result of the study indicated that, the major challenges faced in the adoption and development of E-top up services are, Lack of technical and managerial member's awareness with E-top up , lack of technical and managerial skills to implement, lack of legal frame work related to the service, lack of customer awareness, business partners low level of technology adaptation and lack of adequate interaction and cooperation between ethio telecom departments and other decision making centers in the company. The study identified operational and services benefits from adopting and implementation of E-top up such as to enhance foreign currency generation, reduced paper work, reduced transaction cost, increased reliability and reducing errors as operational benefits and overcome geographical limitation, enhance accessibility of the telecom's services (in terms of place), improve customer service, Create better relationship among distributors and Encourages tariff, commission, & incentive transparency as services benefits. The study recommended ethio telecom to facilitate proper and continuous training for their employees, increasing security to gain trust from customers on E-top up usage, create deep awareness about E-top up technology to the community.*

**Keywords:** - E-top up, Benefits, Opportunities, Challenges, ethio telecom

## Table of Contents

<b>ACKNOWLEDGMENTS</b> .....	VI
<b>List of Tables</b> .....	VII
<b>List of Figures</b> .....	VII
<b>ACRONYMS &amp; ABBREVIATIONS</b> .....	VIII
<b>Abstract</b> .....	IX
<b>CHAPTER ONE: INTRDUCTION</b> .....	1
<b>1.1 Introduction</b> .....	1
<b>1.2 Background of the Study</b> .....	1
<b>1.3 Background of the Project</b> .....	2
<b>1.4 Statement of the Problem</b> .....	3
<b>1.5 Research Questions</b> .....	4
<b>1.6 Objective of the study</b> .....	4
<b>1.6.1 General Objective</b> .....	4
<b>1.6.2 Specific Objectives</b> .....	4
<b>1.7 Significance of the Study</b> .....	5
<b>1.8 Scope and Limitation of the Study</b> .....	5
<b>1.9 Organization of the Paper</b> .....	5
<b>CHAPTER TWO; LITERATURE REVIEW</b> .....	6
<b>2.1 Introduction</b> .....	6
<b>2.2 E-top up platform (Virtual Air time for prepaid telecommunication service)</b> .....	6
<b>2.2.1 Definition of E-top up</b> .....	6
<b>2.2.2 Virtual Airtime</b> .....	8
<b>2.3 Benefit from the Operator’s point of View</b> .....	10
<b>2.4 Benefit from the channel user and subscribers point of View</b> .....	11
<b>2.5 Benefit from the channel</b> .....	11
<b>2.6 Challenges of E top up</b> .....	11
<b>2.7 E-top up Risks</b> .....	12
<b>2.8 Typical Security Technologies Applicable to Control System Networks</b> .....	12
<b>2.9 Airtime Transfers in Africa</b> .....	15
<b>2.10 Conceptual Framework</b> .....	15
<b>A. Technology- Organization- Environment (TOE) Framework</b> .....	15

<b>B.</b>	<b>Technology Acceptance Model (TAM)</b> .....	16
<b>C.</b>	<b>Theory of Planned Behavior (TPB)</b> .....	17
<b>D.</b>	<b>Innovation Diffusion Theory (IDT)</b> .....	18
<b>E.</b>	<b>Theory of Reasoned Action (TRA)</b> .....	19
<b>2.11</b>	<b>Empirical Literature review</b> .....	20
<b>2.12</b>	<b>Challenges of E-services</b> .....	22
<b>2.13</b>	<b>Drivers of virtual Air time Adoption</b> .....	24
<b>CHAPTER THREE: RESEARCH METHODOLOGY</b> .....		25
<b>3.1</b>	<b>Introduction</b> .....	25
<b>3.3</b>	<b>Research design</b> .....	25
<b>3.4</b>	<b>Data Source</b> .....	25
<b>3.5</b>	<b>Sampling Technique</b> .....	26
<b>3.5.1</b>	<b>Target population, Sampling frame and Sampling technique</b> .....	26
<b>3.6</b>	<b>Instruments of Data Collection</b> .....	28
<b>3.7</b>	<b>Data collection instruments</b> .....	29
<b>3.8</b>	<b>Data analysis and presentation</b> .....	29
<b>3.9</b>	<b>Ethical Consideration</b> .....	30
<b>CHAPTER FOUR; RESULTS &amp; DISCUSSION</b> .....		31
<b>4.1</b>	<b>Introduction</b> .....	31
<b>4.2</b>	<b>Description of Sample</b> .....	31
<b>4.3</b>	<b>Background characteristics of the respondents</b> .....	32
<b>4.4</b>	<b>Normality test</b> .....	33
<b>4.5</b>	<b>Descriptive Statistics challenges that affect development of E-top up project</b> .....	33
<b>4.5.1</b>	<b>Interpretation of the result</b> .....	34
<b>4.6</b>	<b>Descriptive statics -benefits that expected to realize from adoption of E-top up service</b> .....	34
<b>4.6.1</b>	<b>Interpretation of the result</b> .....	37
<b>4.7</b>	<b>Descriptive statistics - Driving forces for adopting of E-top up services project</b> .....	37
<b>4.7.1</b>	<b>Interpretation of the result</b> .....	38
<b>4.8</b>	<b>Descriptive Statistics - existing opportunities that initiates the adoption of E-top up service</b> .....	38
<b>CHAPTER FIVE-SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS</b> .....		40

<b>5.1</b>	<b>Introduction.....</b>	<b>40</b>
<b>5.2</b>	<b>Summary of Findings .....</b>	<b>40</b>
<b>5.3</b>	<b>Conclusion .....</b>	<b>41</b>
<b>5.4</b>	<b>Recommendations.....</b>	<b>42</b>
	<b>References .....</b>	<b>44</b>
	<b>Annex I Questioner Distributed to Respondents.....</b>	<b>47</b>
	<b>Annex -II Descriptive Statistics.....</b>	<b>53</b>
	<b>Annex-III Frequencies .....</b>	<b>54</b>
	<b>Annex-IV Frequency Tables.....</b>	<b>55</b>
	<b>Annex-V Frequency Tables .....</b>	<b>57</b>

# **CHAPTER ONE: INTRODUCTION**

## **1.1 Introduction**

This chapter presents an overview of the entire thesis. It covers the Background of the Study, Statement of the Problem, Research Questions, Aim and Objectives, Significance, Scope, Limitations and Plan of the study.

## **1.2 Background of the Study**

The Global System for Mobile (GSM) was first introduced in 1992 with approximately 23 million subscribers; rising to almost half the population of the earth now uses mobile communications. A billion mobile subscribers were added in the last 4 years to leave the total standing at 3.2 billion (Kearney 2013). The aim was to provide a global mobile telephone network that could be implemented using standard building blocks not tied to specific hardware vendors.

Now a day, mobile service providers are still faced with the challenges of inefficient bandwidth utilization and congestion in the transmission channel. One of the main reasons for this congestion is the toll placed on the network by the need to reload/recharge phone credits in order to enable calls. ethio telecom has introduced an electronic recharge solution. The Pre-TUPS solution which provided by mobility solutions specialist Mahindra Comviva, and allows ethio telecom's 53 million customers to top up their phones electronically. The Pre-TUPS is a widely acclaimed electronic recharge solution that handles around three billion recharge transactions annually in the African country (ET FSD).

The Electronic Top-up solution is a distribution mechanism to replace physical prepaid top-up vouchers with virtual voucher-less airtime. The solution implements a hierarchical distribution model for distributors, sub-distributors and retailers and moves virtual airtime value between these entities in real-time (Pre- Tups 6.2 manual).

ethio telecom defines the business rules including the distribution hierarchy, pricing, discounts and commissions. The commission structure is flexible, and all commissions are calculated

automatically in real-time. All transactions are secure and are verified before being committed. A transaction can be reversed at any stage prior to being committed.

Due to the immergence of this technology, the technology offers a huge benefit to operator's side, user's side and subscriber side as well.

### **1.3 Background of the Project**

Ethio Telecom (ET) has plans of replacing their Voucher Cards (physical scratch cards) with an Electronic system. E-top up solution is required to replace the existing Voucher (scratch) cards mode of recharge, as it is far less expensive and positions the company favorably in terms of preparing it for Mobile Financial Services integration the new system would be deployed nation-wide and will follow the same business model as the existing Distribution Strategy defined. It will allow for significant cost reduction and pave a way for commission decrease and potentially make change of the Distribution Strategy possible. Also, system reliability and agent network availability will help increase overall transaction volume that will in turn boost overall company's revenue.

The project requires involvement of various divisions and departments within the organization, including IT Services, Sales and Marketing, Finance, Customer Service, Legal, Regulatory, Procurement. Initial analysis identified that RFP (Request for Proposal) process has been completed, and that Vendor was selected. The aforementioned has influenced the next stage of the project (analysis) in a way that some frames have to be recognized (regulatory and procurement processes, existing distribution model, customer habits, long term strategic plans...).

The project Scope describes a basic statement of the main elements covered under the project's mandate as agreed to by all stakeholders. The following project phases have been defined for ET E-top up deployment:

- ☞ Release 1: Deployment of only the mobile and internet channels for E-top up transaction (Agents/Retailers) utilizing the Comviva USSD GW platform, the ET SMSC platform, the ET IN/OCS platform, and the Comviva Pre-TUPS and Flares solutions. Also ET Back Office and Distributors/Agent Portal.

- ☞ Release 2: Deployment of additional channel access, functionality and business solution elements, including the ATM and POS functionality, that will mean Bank CBS (Core Banking System) or Bank Switch integration. Also, integration of Comviva's Pre-TUPS and Flares with ethio's USSD GW.

#### **1.4 Statement of the Problem**

Since ethio-telecom is being operating telecommunication service throughout the country as a sole telecom operator. The company has been trying to keep a strong customer satisfaction through delivering P&S. throughout Ethiopia. However, there are factors to hinder the deliverance of excellence service to satisfy customers. Some of the challenges briefly faced by ethio telecom now with respect to physical vouchers are the huge cost on logistics of physical vouchers, high cost per transaction, lack of Flexible Top Up denominations, theft, damage and in secured transactions, difficulty of geographical penetration and hard to distribute talk time to prepaid subscribers through distribution channels. In order to tackle the above mentioned challenges ethio telecom has entered in to a contractual agreement with worldwide known company Comviva Mahindra.

Though the project was launched April 4, 2017 which is three years later than the time plan set initially. Different factors in the adoption of E-top up can be taken as the main factors of the adoption of new technology by different researchers such as environmental factors (like lack of suitable legal and regulatory framework for electronic transactions, poor ICT infrastructure, lack of competitive pressure in the industry), organizational factors (Lack of skilled man power, resistance to changes in technology among staff, fear of losing their jobs ) and technological factors (security risk and functionality).

However, despite the importance of these adoptions and development of E-top up , no research has been done so far on the challenges and opportunities of E-top up in developing countries like Ethiopia considering the project being the first of its kind in Ethiopia telecommunication sector while more of the available research's focused on the challenge and adoption of E-Payment in Ethiopian banking sector (Tekabe & Gadise 2016; Gardachew,2010) Therefore, it is necessary to study and investigate the challenges and opportunities faced related to the virtual airtime project in Ethiopian telecommunications sector which is the main leading project towards the digital banking and payment services in Ethiopia.

## **1.5 Research Questions**

The company's E-top up project section was established on November, 2012 after the management contract signed by France Telecom. Before November 2012, the company is new for the technology and it faces management that the physical card distribution difficulties with logistics side, quality of cards, geographical penetration, and poor customer experience and security issues. Hence the management decided to immense a new technology to enhance customer satisfaction. Accordingly, the research questions of the study will be;

- ❖ What are the challenges faced in the implementation of E-top up in the ethio telecom?
- ❖ What benefits gained by the ethio telecom in the implementation of E-top up service?
- ❖ What are the driving forces towards the adoption and development of E-top up service in the telecom industry?

## **1.6 Objective of the study**

### **1.6.1 General Objective**

The main objective of the study will be to assess what challenges does ethio telecom faced in implementing E-top up project and what are the opportunities in the adoption and development of E-top up.

### **1.6.2 Specific Objectives**

The specific objectives of the study will be:

- To explore the challenges encountered in the adoption and development of E-top up in ethio telecom.
- To find benefits gained by the ethio telecom in the adoption of E-top up project to complement its service delivery channel.
- Identify the benefits of E-top up service from customer perspective
- To identify the driving forces towards the adoption and development of E-top up service in ethio telecom.

## **1.7 Significance of the Study**

The purpose of the study will be to assess the challenges and opportunities (driving forces) for the adoption and development of E-top up service in ethio telecom. In general, the study will be expected to have the following significance.

- Identification of opportunities and challenges for the adoption of E-top up can impact positively on the performance of ethio telecom that adopt and/or have adopted E-top up service.
- Provide an opportunity for decision-makers and managers of the ethio telecom to consider and evaluate the opportunities and problems observed in the existing practices.
- The findings of this work are useful as an input for the company managers and policy makers to understand the impact of the new technology on the performance of the company moreover to outline the major challenges faced in undergoing the electronic recharge project.

## **1.8 Scope and Limitation of the Study**

Since ethio telecom is the sole telecom operator all over the country and it has twelve regional and six zonal distribution boundaries, the scope of the study will be delimited within Addis Ababa, with in the six zonal office of ET boundary of direct channel distribution because of the service has currently launched partially throughout 214 ET shops found in Ethiopia.

## **1.9 Organization of the Paper**

This paper consists of five chapters with different sections and sub-sections. The first chapter includes background of the study, statement of the problem, basic research questions, objectives of the study, significance of the study, and delimitation and /scope of the study. The second chapter has the literature review followed by the third chapter method of the study describing type and design of the research. The fourth chapter shows the result or finding of the study and discussions of findings. And the last chapter presents the summery, conclusion and recommendation part of the study.

## **CHAPTER TWO; LITERATURE REVIEW**

### **2.1 Introduction**

This chapter reviews the literature which has formed the theoretical background for the research articles. The purpose here is not to go through each underlying theory in detail, since this is done in the research articles. Rather, this chapter concentrates on justifying the theoretical choices made during the research. The chapter discusses various theoretical viewpoints, i.e. viewpoints that have been selected to shed light on the main questions of this research. The literature review itself is presented in three major sections; these deal with theories which have wide currency at the present time, and which provide a solid foundation for the chosen constructs and variables, and for the empirical investigations of the present study. The chapter ends with setting out the overall framework of the study.

### **2.2 E-top up platform (Virtual Air time for prepaid telecommunication service)**

#### **2.2.1 Definition of E-top up**

**E-top up** Solution is critical for the growth of any prepaid service provider to offer many quick and easy ways for its customers to **recharge** their prepaid accounts. Voucher Less **E-top up**: Most advanced and easy way for subscribers, channel partners and service providers to manage the **top up** process. E-top up platform with proven deployments globally offers a convenient experience for customers to top up their prepaid accounts in real-time, within seconds. It replaces the traditional scratch cards based top up and offers great flexibility to operators of Mobile Networks, Fixed Line Telephony, ISPs, and Calling Cards, prepaid TV, prepaid electricity, prepaid utilities etc. The technology offers tremendous benefits to the subscribers and distributors of service providers.

E-top up solution is the modern delivery channel for banking services. Banks have used electronic channels for years to communicate and transact business with both domestic and international corporate customers. With the development of the Internet and the World Wide Web (WWW) in

the latter half of the 1990s, banks are increasingly using electronic channels for receiving instructions and delivering their products and services to their customers (Wondwossen and Tsegai, 2005). e-Top-up system provides unmatched flexibility for cash-based prepaid mobile top-up - any value, anywhere, at any time - using standard SMS or host-based messaging. The system has been specifically designed to make small, variable value top-ups profitable and secure. Customers with limited disposable income can purchase credit whenever they need it and for a value they feel comfortable with at the time

The eTop-Up application is a stored value account system that provides a secure and reliable network of agents, distributors and retailers able to transact virtual value between digital wallets arranged into a distribution hierarchy. The distribution agent's wallet is used to transact virtual value between members of the distribution tree and eventually to consumers' prepaid mobile accounts. The solution enforces the Operators business rules within the distribution hierarchy providing the Operator with more control over their distribution strategy than is available using traditional physical vouchers. E-Top-up can process top-ups from multiple channels, applying the Operator's business rules for sales, and calculating distribution and commission payments in real-time. A direct interface to the IN Prepaid system enables direct on-line recharge of customer's accounts. Security is ensured through end-to-end encryption of transaction data with keys that are unique to each terminal device

With the vast majority of the African population operating in the feature mobile market, top-up and prepaid services are the norm. Top-up options allow the consumer the flexibility of purchasing data and/or airtime at a price suitable to their current financial situation. The Electronic Top-up voucher-less airtime. The solution implements a hierarchical distribution model for distributors, sub-distributors and retailers and moves virtual airtime value between these entities in real-time (Pre- Tups 6.2 manual).

According to recently conducted a global study on the consumer experience, focusing on the mobile market revealed that the range of top-up methods available is very wide and growing, although not all methods are available in all countries. The ability to top-up via ATM varies greatly between countries. In Europe it is nearly universal – any ATM can be used to top-up services from any telecommunications operator and the top-up is processed straight to the prepaid account from

a bank account. In the US, the availability of top-up via ATM is limited and in a number of other countries there's no link between the ATM network and the operators' networks. E-top up platform offers two key variants:

- **Voucher Less E-top up**: Most advanced and easy way for subscribers, channel partners and service providers to manage the top up process. No need for e-PINs or Vouchers with pre-fixed denominations. Customer's account is topped up instantly against payment of any value made at a retail outlet. The retailer triggers a direct recharge of customer's account using his mobile phone or other devices like POS or a computer enabling true Anytime, Anywhere, Any Value Top up.
- **E-Voucher**: A preferred way of recharge in some countries. An e-PIN is delivered via SMS to subscriber's mobile phone, or is printed from a POS terminal against payment made at retail outlet. The subscriber then sends the e-PIN via SMS, IVR or USSD to the service provider's top up application short code and their account is recharged.

### 2.2.2 Virtual Airtime

The currency of the mobile phone is the airtime, also called airtime credit or simply credit. Currency in this regard is used loosely in the sense of the commodity that enables one to communicate on the mobile phone network. Credit is also used loosely and does not denote credit in the financial sense. It denotes a concept that you purchase the commodity called airtime and then the commodity gets credited to your phone. With time, airtime has emerged not only as a means by which to communicate but also serves as a form of currency which can be transferrable. For example, a popular service on most mobile phone service providers is the (Me2U) (me to you). In this service one mobile phone user can transfer airtime to another. This can be for gratis but may also be in exchange for cash or other form of payment. This has led others to suggest that airtime is a form of e-money or at least an alternative currency (airtel,2015)

Across Africa and Asia where it has its footprint, the mobile network operator Airtel has provided a unique mobile telephony product called one network.<sup>118</sup> This allows one to use Airtel services when in another country within the footprint as if they are at home. One can therefore purchase airtime in country X and travel to country Y and use it. Better still, one can be in country D and purchase airtime in country E if one has means. It is this aspect that makes airtime unique and also

easily remittable across borders. Initially both Airtel and Telekom Networks Malaŵi (TNM) used to denominate airtime units in United States Dollars such that although payment could be made in the local currency, the value was usually a fixed rate of the local currency to the Dollar. Following complaints by consumer groups as well as concerns and directives by the Malaŵi Communications Regulatory Authority (MACRA), this has stopped and the airtime units are now sold in Kwachas. However, the dollarization of airtime had its value as it allowed for it to maintain unit of value across time and space. One Dollar of airtime had the same value in country X as it had in country Y in terms of airtime units although the local monetary value varied (airtel, 2015)

Airtime credit is the fuel that drives the phone, the power energizing the invisible wires that connect two connection points. It has no value other than to users of mobile phones (and of that network). It is coveted because without it one's mobile phone is just another useless device. However, it has no value in itself, as a string of digits. It is only the phone (connected to the right network) that will recognize the value and lead to the topping up of credit. Its value therefore, comes from its usage, its utility (Sunduzwayo, 2017).

By its very nature, the airtime credit goes with the phone. It is embedded in the SIM card as well as on the servers of the mobile network operator. This prevents the creation of counterfeit airtimes which would be rejected by the computer servers operated by or for the mobile network operator. Therefore, like mobile money, airtime is highly portable. It has no weight or personality of its own but can easily be transmitted across time and space. Similar to mobile money, it can be redeemed if the phone is lost even if it has been partially used. To prevent airtime from being used with a lost or stolen phone, one can provide for a passcode for the phone (Sunduzwayo, 2017).

Once airtime credit is created or generated, it is indestructible but to a limit. It retains its value because it is a digital representation. Therefore, if one buys a paper voucher containing an airtime credit code, and the voucher gets defaced, it will usually contain information which can be used to retrieve from the servers of the mobile network operator the code for the airtime credit. Although it is termed airtime, it does not dissipate or disappear into the air if stored in the phone. It only does this when it is being used. However, in Malaŵi, Airtel have a time limit for their airtime credit. The credit will expire at a designated time unless one procures an additional amount of credit. This has been criticized as a means of forcing customers to continue procuring airtime as well as robbing

them of money they have already paid for. In this regard, Airtel airtime cannot be said to be indestructible in the strictest sense (Sunduzwayo, 2017).

Airtime also maintains a uniformity of value. It is homogenous over space and time, mainly because it is expressed in terms of the label used for flat money (Birr), although it may itself vary. A bundle or packet of airtime can also be unbundled into smaller parts. It is therefore possible for one who has 100 Birr worth of airtime credit to transmit this to 10 people airtime credit worth 10 Birr each. There is no service charge for this service making it perfectly divisible. Although officially the mobile network operators have provided coupons with specific values, vendors, act as agents have devised means of breaking the values in the coupons further. For example, the minimum value of a virtual air time at ethio telecom is 5 Birr. Vendors can load this into their phone and then sell a fraction to a customer who may not have 10 Birr. The balance can then be sold to other customers or combined with other credit vouchers to create a higher value.

### **2.3 Benefit from the Operator's point of View**

Top Up is the unique payment product providing unlimited opportunities for your subscribers to recharge credit to their mobile account. is designed to deliver an electronic top up system which provides a real time re-charge capabilities for prepaid mobile airtime/data replacing any paper print or scratch cards, optimizing the management process of the service. The main advantages of E top up (FSD,2015) for operators are as follows:

- Operators maintain control over the distribution network, pricing and margin, ensuring effective sales coverage across their entire distributor and customer base, while being shielded from direct reseller management and associated costs. Pre TUPS has enabled operators to reduce the cost of top up by up to 20%, significantly improving margins.
- Prepaid Operators can achieve savings in the areas of voucher production, warehousing, distribution, and fraud, while offering an improved top-up service for their customers.
- The system opens up new distribution opportunities and enables Operators to target their products to new market segments through the creation of a low cost, high volume mobile retail network that can drive new ways to sell prepaid mobile airtime.
- Improved channel and commission management: Pre TUPS allows the operator to define any number of channels and any number of hierarchal to reach untapped market. The

operator can define transfer rules for each channel members and define their scope of activities. The operator also benefits from an enhanced ability to manage commissions.

- Reduced the huge cost on logistics of physical vouchers.
- Flexible Top Up denominations, which is not possible in case of physical vouchers: with the complete removal of denomination dependency, retailers need carry no deed stock or face stock out situations. And operators can also track performance across channel members in near real time, reducing the need for resource to manually track inventory.
- Modular combination with other Media Pay Modules.
- Minimize fraud and theft

#### **2.4 Benefit from the channel user and subscribers point of View**

- Improved convenience: end users determine the amount of top up they wish to make, rather than the operator determining the top up denominations available. This delivers greater convinces to the end customer and improves overall satisfaction levels among users of the prepaid electronic recharge system.
- Access to affordable top up: Subscriber with low income levels have access to mobile phone services as a result of the flexible and relatively low top up denomination offered.
- Air time availability of stock.
- Better control over the distribution network.

#### **2.5 Benefit from the channel**

- Faster and Simpler acquisition of talk time: Retailers are able to procure talk time credits from distributors immediately by simply by placing a call or sending an SMS.
- Affordable business opportunity: for the cost of a mobile phone and SIM card, an individual can become a member of distribution hierarchy and supplement their income.

#### **2.6 Challenges of E top up**

It significantly magnifies the importance of security controls, customer authentication techniques, data protection, audit trail procedures, and customer privacy standards (BCBS, 2001). Other E-top up related problems are user error, network access problems and security issues. Most of these problems happen less to outweigh its benefits. Here are the most challenges:

- Customer cannot top-up their prepaid phones from other operators' e top up system and hence retailers have to keep different cell phones for different operators and have to invest money in each operator's electronic wallet.
- Each operator need to have dedicated sales personnel to distribute top-up balances to their dedicated distributors and retailers to reach it to their respective customers.
- Retailers, who often sell top-up for all operators, find it very difficult to remember tariff schemes and top-up incentives while interacting with customers.
- Customers often run into difficulty in topping up as all retailers may not have all operators' wallet or balance in the wallet of a particular operator at a point in time.

## **2.7 E-top up Risks**

Strong security is imperative for mobile network and other members in the prepaid service chain. indeed, the true potential for generating revenue from the pre TUPS is realized if network operators can guarantee delivery of the level of security subscribers demand.

**Security risk:** Security issues are a major source of concern for everyone both inside and outside the industry. E-banking increases security risks, potentially exposing hitherto isolated systems to open and risky environments. Security breaches essentially fall into three categories; breaches with serious criminal intent (e.g. fraud, theft of commercially sensitive or financial information), breaches by 'casual hackers' (e.g. defacement of web sites or 'denial of service' - causing web sites to crash), and flaws in systems design and/or set up leading to security breaches (e.g. genuine users seeing / being able to transact on other users' accounts). All of these threats have potentially serious financial, legal and reputational implications

## **2.8 Typical Security Technologies Applicable to Control System Networks**

According to Juniper (2010), the following are among the major typical security technologies applicable to control System Networks:

**Firewalls:** A firewall is simply a program or hardware device that filters the information coming through the Internet connection into the private network or computer system. If an incoming packet of information is flagged by the filters, it is not allowed through. A firewall limits a control system's network access to specific ports and protocols from specified networks. It can also

provide the ability to create distinct security zones using Network Address Translation (NAT), which enables multiple areas of a private network to access the Internet using a single public IP address and Virtual Private Networks). The firewall's main task is to regulate traffic between network segments at different trust levels—for example, between the Internet, as a zone with no trust, and the internal control network, a zone of higher trust.

**Intrusion Detection and Protection:** its appliance provides a more advanced layer of defense. Such defense (known as intrusion prevention system) can be deployed to help prevent attacks, or simply to detect attacks using intrusion detection systems. Information is sent through the network in small blocks of data known as packets. It goes deeper than a firewall by assessing each packet based on the network protocols, the context of the communication, and its tracking of each session (the time the user spends communicating on the network). Akin to antivirus software on a desktop, it contains a large repository of signatures that help to identify potential attacks by matching attempts to exploit known vulnerabilities.

**Authentication/Authorization Systems:** Authentication and authorization systems protect applications by verifying user identity, providing access to devices based on that user's role and privilege level, and logging all access attempts in order to audit any infringement or misuse of critical plant functions. The use of passwords alone is not a secure enough mechanism, yet it is still the norm to find devices in the field that rely on the manufacturer's default password. Most security standards require two-factor authentication, which requires the combination of two methods of identification, such as a password and a certificate.

**Network Access Control:** This might include ensuring those users and their laptops or other devices meet a minimum baseline of security in order to gain access. Such policies can be based on various criteria, such as user identity, device identity, device health, and device and/or network location. A solution including it ensures that both user and device properly make the appropriate connection to the appropriate network. It also ensures that users and their devices meet all authentication and security policies. Since network access control applies to users as well as devices, this can become a reliable method for rogue device mitigation over wireless or wired networks.

**Encryption of Critical Data:** Encryption is the process of transforming information, such as a document or important message, by using an algorithm or cipher to make it unreadable to anyone who does not have the key to the cipher. It is a standard method for protecting highly confidential information. However, as heavily encrypted messages can slow network performance unless managed effectively, its use is often restricted to non-real-time messaging and data.

**Monitoring for Administration and the Audit Trail:** An increasingly important aspect of today's security solutions is the ability to monitor and administer the entire network to keep it at optimum performance, identify weaknesses, maintain consistent security policies, track a constant history of activity, and assure the complete safety of information.

**Secure Remote Access:** on top of these security capabilities, contractors, engineers and managers may remotely communicate via remote access virtual networks enabled by the secure socket layer (SSL) based security protocols. Found in all standard web browsers, SSL provides a more secure, efficient and effective way to access control networks from an outside location or even outside the organization. This set of protocols allows secure communications via the Internet for gathering sensor data, sending instructions to field devices, performing remote maintenance and administrative data transfer task

**Configuration Management:** A final aspect of security is helping to assure high network performance to avoid problems of availability, access and lack of service. A good security solution provides support for configuration management and control, a model that focuses on establishing and maintaining knowledge of the system and network configuration, including security. Based on this approach, operations personnel have the ability to manage security features and assurances through control of changes made to hardware, software, firmware, testing and documentation throughout the lifecycle of the systems Juniper (2010).

**Web application security:** the system provides safeguards from session hijacking and manipulation. The session ID is verified with every request.as a result, a fake user cannot login using another user session id. right clicks are not allowed on the web page to prevent viewing the source.

## **2.9 Airtime Transfers in Africa**

According to Alex comminos et.al. (2009) study conducted in 17 African countries in all the countries surveyed 7.4% to 53.9% of respondents indicated that they had transferred airtime to someone else's mobile phone. The majority of the transfers conducted are as a favor to family and friends; however, there is also significant usage of airtime to pay for goods and services in a few countries. In Ethiopia, Ghana, Nigeria, Tanzania and Zambia, 4.2% to 14% respondents indicated that the transfer was to pay for goods and services. On the other hand, 4.8% to 68% of respondents indicated that they had received airtime from someone else before across all countries surveyed. The most prevalent type of transfers was those received from family or friends or airtime received as part of a financial transaction with someone else. In all countries except Burkina Faso and Rwanda, 0.3% to 9.9% of respondents indicated that they had received airtime before as payment for goods or services.

The survey indicates widespread use of airtime transfer, but not such a widespread use of airtime to pay for goods or services. For example, 88.3% of people in Kenya that had received airtime received it as a favor from a friend or family member, compared to only 1.2% who received airtime as payment for the provision of goods or services. 24.8% had bought airtime from an independent source (i.e. from someone that was not a family member or a friend, most likely an electronic airtime re-fill or top-up).

## **2.10 Conceptual Framework**

Researchers have been used different frameworks in the study of adopting new technological innovation. Among frameworks that have been developed in different studies includes,). Technology-Organization-Environment (TOE) framework, Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT) and Theory of Reasoned Action (TRA).

### **A. Technology- Organization- Environment (TOE) Framework**

TOE framework was developed by Tornatzky and Fleischer; it is designed for studying the likelihood of adoption success of technology innovations. This framework is a comprehensive and well received framework in the context of innovation adoption by organizations and has been used in many studies (Salwani, et al., 2009, Ellis, 2009, Chang et al., 2007, Zhu & Kraemer, 2006).

According to Tornatzky and Fleischer (1990), technology adoption within an organization is influenced by factors pertaining to the technological context, the organizational context, and the external environment.

The technological factor refers to adopter's perception of E-service attributes. Typical characteristics of technology considered in technology adoption studies are based on the assumption of Roger's diffusion of innovation Which include relative advantages (perceived benefits), and relative disadvantages (perceived risks). Technological factors include complexity, compatibility, relative advantage, ease of use and usefulness. The technological factors are related to challenges to technology adoption and its perceived benefits. The perceived benefits for manager could be direct, such as cost savings or income generation, or indirect, such as potential opportunities in new market, marketing, or publicity (Rogers 2003).

- The organizational factor refers to the organizations characteristics that influence its ability to adopt and use of E- system. The organizational factors that have been mostly cited in literature include: Information Technology (IT) users' community; organizational structure; firm's process; firm size; technological capabilities of the organization's members; the technological and financial resources available; process of selecting and implementing the IT; management backing and support for the project (Harrison, 2012).
- The environmental factor refers to the external environment in which an organization operates and its condition for supporting the development of E- services. Environmental factors relating to IT adoption (and specifically the adoption of internet technologies) includes pressure from competitors, customers or suppliers; the role of government (incentives); partners, alliances; technological infrastructure; technology consultants; image of internet technology; and users expectations (Harrison, 2012).

## **B. Technology Acceptance Model (TAM)**

Technology Acceptance Model (TAM) was introduced by Davis (1986) quoted in Davis et al., (1989). Technology acceptance model is an adaptation of Theory of Reasoned Action (TRA), developed to specifically deal with modeling user acceptance of information systems. As compared to TRA, Technology Acceptance Model is significantly less general. The model was developed to particularly

explain the computer usage behavior. But since, TAM includes findings collected from over a decade of Information System (IS) research, so it is particularly well-suited for modeling computer acceptance.

The Technology Acceptance Model (TAM) defines the casual relationship between perceived usefulness, ease of use, system design features, attitude towards using and actual usage behavior. In general, an informative representation of the mechanisms by which design choices influence user acceptance is provided by TAM. Hence, Technology acceptance model is useful in applied contexts for forecasting and evaluating user acceptance of information technology (Davis, 1993).

According to Technology Acceptance Model (TAM), perceived usefulness (PU) and perceived ease of use (PEOU) are two key beliefs that are mainly relevant for computer acceptance behavior. Theory of Reasoned Action (TRA) is used by TAM as a theoretical basis to specify causal association between these two key beliefs i.e. PU and PEOU.

Perceived usefulness (PU) is defined as the degree to which a potential user thinks that using a particular system would increase his/her job performance. The term usefulness is derived from the word 'useful', which means the advantage of using particular IS. Whereas, perceived ease of use (PEOU) is defined as the degree to which a potential user thinks that using a particular system would be free of effort. The word 'ease' means, freedom from difficulty, hardship or effort. In short, ease of use means 'user-friendliness' of IS (Davis,1989).

### **C. Theory of Planned Behavior (TPB)**

TPB is developed originally based on the theory of reasoned action (TRA) which explains almost any human behavior. In predicting and explaining human behavior across various application contexts, it has been proven successful. According to TRA, a person's behavioral intention guides his actual behavior of performing some certain action and where subjective norm and attitude toward the behavior determine the behavioral intention (Liao et al., 2007). According to Ajzen (1991) quoted in Liao et al., (2007, p. 2809), "behavioral intention is a measure of the strength of one's willingness to try while performing certain behaviors". As in the original model of TRA, there are some limitations when dealing with behavior for which there is incomplete volitional control of people. Therefore, TPB is proposed to eliminate these limitations; and in fact, TPB differs from TRA because of the addition of perceived behavior control, which potentially effects behavioral intention. According to Ajzen (1991), the theory of planned behavior proposes three independent determinants of intention which are attitude towards the behavior, subjective norm and perceived behavioral control.

Attitude as defined by Fishbein and Ajzen (1975) quoted in Liao et al., (2007, p. 2809), is “the degree of one’s favorable or unfavorable evaluation of the behavior in question”. The attitudes are developed reasonably from one’s beliefs about object of the attitude. Subjective Norm refers to “the perceived social pressure to perform or not to perform the behavior” (Ajzen, 1991 quoted in Liao et al., 2007, p. 2809). It can be said that it is related to the normative beliefs about other people’s expectations on either to perform or not to perform the behavior.

Perceived behavioral control refers to “people’s perception of ease or difficulty in performing the behavior of interest” (Ajzen, 1991 quoted in Liao et al., 2007, p. 2809) and is assumed to reflect past experiences as well as the predicted difficulties and barriers. The construct of the perceived behavioral control in the TPB is added to cope with the situations in which people may lack the complete volitional control over the behavior of interest. Perceived behavioral Control is directly connected to the beliefs of the control factors that can facilitate or hinder the performance of the behavior (Ajzen, 2002 quoted in Liao et al., 2007). Control factors can be referred to as the internal or external constraints where internal constraints are related to self-efficacy and external constraints to the environment (Ajzen, 1991 quoted in Liao et al., 2007). Generally speaking, the more favorableness and un-favorableness of the attitude, subjective norm and the higher perceived behavior control are directly proportional to the strength of one’s intention to perform the behavior under consideration (Ajzen, 1991).

#### **D. Innovation Diffusion Theory (IDT)**

According to Rogers (1995 p. 11), innovation is defined “an idea, practice, or object that is perceived as new by an individual or other unit of adoption”, whereas diffusion is defined as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 1995, p. 5). Therefore, Innovation Diffusion Theory (IDT) states how new ideas, concepts or technologies spread or become common in a society and adopted by users.

Innovation Diffusion Theory (IDT) includes five characteristics. These characteristics as defined by Rogers (1995, pp. 250-251) are:

- Relative Advantage: “The degree to which an innovation is perceived to be better than the idea it supersedes”.
- Compatibility: “The degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters”.

- Complexity: “The degree to which an innovation is perceived as relatively difficult to understand and use”.
- Trialability: “The degree to which an innovation may be experimented with on a limited basis”.
- Observability: “The degree to which the results of an innovation are visible to others”.

The above mentioned characteristics, defined by Rogers (1995) greatly influence adoption. According to Chen et al., (2000), among five characteristics of IDT, relative advantage, compatibility and complexity are the only attributes, which are consistently related to innovation adoption

### **E. Theory of Reasoned Action (TRA)**

The theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975 quoted in Belleau et al., 2007) is based on the assumption “that individuals are rational and make systematic use of information available to them”.

According to theory of reasoned action, behavioral intention (BI) of an individual is a measure of the strength of one's intention to perform a specified behavior. BI is determined by two factors: 1) Attitude towards the behavior (AB), which is a function of beliefs (bi) that performing the behavior possesses certain attributes and the evaluation of those beliefs (EI) 2) Subjective Norm (SN), which is the perception of social groups i.e. what specific individuals or groups think that a person should or should not perform (Belleau et al., 2007). “An individual's Subjective Norm (SN) is determined by a multiplicative function of his or her normative beliefs (NBI), i.e., perceived expectations of specific referent individuals or groups, and his or her motivation to comply (MCI) with these expectations” (Fishbein and Ajzen, 1975, p. 302 quoted in Davis et al., 1989).

Apart from the above mentioned factors, Ajzen and Fishbein (1980) quoted in Belleau et al., (2007) mentioned that some external variables might also have influence on behavioral intention, for instance, demographics, traditional attributes towards targets and personality traits. Some researchers have proposed additional external variables, which could be included in the model for predicting the behavior. Those variables are: past behavior, past experience or involvement (Bagozzi, Wong, Abe, & Bergami, 2000; Bunce & Birdi, 1998; Shim et al., 1989 quoted in Belleau et al., 2007). According to Fishbein and Ajzen (1975) quoted in Sheppard et al., (1988) “a behavioral intention measure will predict the performance of any voluntary act, unless intent

changes prior to performance or unless the intention measure does not correspond to the behavioral criterion in terms of action, target, context, time-frame and/or specificity”.

TRA model predicts consumers’ intention and behavior very well. Armitage and Conner (2001) quoted in Belleau et al., (2007); state that behavior that is comparatively straightforward i.e. under volitional control can be predicted adequately by theory of

However, there is a constraint associated with the TRA model regarding the distinction between a goal intention and a behavioral intention, which has also been acknowledged by Fishbein and Ajzen. The limitation is that they established their model to cope with behaviors, for example, taking weight loss pill, applying for a loan or purchasing a new car; but not with outcomes that result from behaviors, for example, losing 10 pounds, getting a loan or owning a brand new car. Moreover, only those behaviors are dealt by model that is under an individual’s volitional control. The conditions of the model can’t be fulfilled, whenever the performance of some action needs resources, knowledge, skills or environmental hurdles need to be overcome (Sheppard et al., 1988).

In this study, Technology-organization-environment framework will be used to have a more precise forecast on the challenges of adopting and developing E-top up technology (Virtual prepaid air time) in Ethiopian telecom industry.

## **2.11 Empirical Literature review**

Literatures regarding to challenges and prospects of e-payment in Ethiopia is scanty most of the studies focus on challenges to adopt the e-payment system in Ethiopia. Wondwossen and Tsegai (2005) also studied on the challenges and opportunities of E-payments in Ethiopia; their objective was studying of E-payment practices in developing countries, Africa and Ethiopia. The authors employs interview and on site observation to investigate challenges to E-payment in Ethiopia and found that, the main obstacles to the development of E-payments are, lack of customers trust in the initiatives, Unavailability of payment laws and regulations particularly for E-payment, Lack of skilled manpower and Frequent power disruption. According to Wondwossen and Tsegai (2005), an adequate legal structure and security framework could foster the use of E-payments, which is contradicting with the finding of the previous study.

Gardachew (2010) conducted research on the opportunities and challenges of E-banking in Ethiopia. The aim of his study was focused on analyzing the status of electronic banking in Ethiopia and investigates the main challenges and opportunities of implementing E-banking system. The author conducted a survey on the existing operating style of banks and identifies some challenges of using E-banking system, such as, lack of suitable legal and regulatory frame works for E-commerce and E- payments, political instability in neighboring countries, high rates of illiteracy and absence of financial networks that links different banks. According to Gardachew (2010), Opportunities offered by ICT through e-learning programs and Commitment of the governments on development of ICT infrastructures is considered as drivers of using E-commerce and E-payment systems. Ghazi and Khalid (2012), found that, the most important barriers for E-business growth are technological issues, such as, security risk, quality of internet and cost of implementation to be the most prominent.

The study conducted by Daghfous and Toufaily (2007) on factors affecting adoption of E-banking technology in Lebanese banks. The study was conducted on the factors that can lead to success the adoption of E-banking and the other factors that can constitute as challises to its adoption, it focus on the organizational, structural and strategic factors. Data, used in their study were collected using semi structured interviews and survey questionnaire that was given to E-banking managers all the banks on the official list of institutions operating on the Lebanese market, with a total of 57 banks, 31 of them operate internationally and 26 are strictly local were used to gather data.

The results of the study revealed that the organizational variables (bank size, functional divisions, technical staff, technical infrastructure, perceived risks, decision makers` international experience and mastery of innovation) are variables which exert significant impact on the adoption of E-banking, among the structural characteristics, the result revealed that internal technological environment of the bank is a very important factor in determining the adoption of E-banking, also the result shows that banks which are developing in the international scale are more likely to adopt E-banking innovations. Finally, the result of the study indicated that extent of penetration of E-banking in the growth phase of an emerging market has an important correlation with the improvement of commercial performance.

Rasoulilian and Safari (2011) carried out research concerning reasons as to why there was a lack of E-banking achievement; the result of the first chapter of their study showed the importance of

Internet use, frameworks and encouraging policies to impress beneficiaries to use electronic banking. The second part introduced cultural elements as the most important challenge followed on by financial elements (the cost of the Internet and commissions) as the second influencing factor. The significance of technical elements is fading away according to their study due to improvements in the banking system. In addition, their study highlighted other parameters such as management obstacles as also playing an important role in electronic banking in Iran.

## **2.12 Challenges of E-services**

According to Harrison (2012), it is hypothesized that many of the factors affecting the successful adoption of new technologies such as e-commerce and E-banking are generic in nature and that the successful adoption of internet technologies in part depends on how these are used in conjunction with the other technologies and management practices that form a technology cluster. However, the most critical challenges can be ascribed to the very limited information and communication infrastructure available in most developing countries. Reasons vary widely among sectors and countries and are most commonly related to lack of applicability to the business, preferences for established business models, (OECD, 2004).

Common challenges include; enabling factors (availability of ICT skills, qualified personnel, network infrastructure); cost factors (ICT equipment and networks, software and re-organization); security and trust factors (security and reliability of ecommerce systems, uncertainty of payment methods, legal frameworks and intellectual property right); and challenges in areas of management skills, technological capability, productivity and competitiveness. Lack of reliable trust and redress systems and cross country legal and regulatory differences was also impeding e-commerce adoption (OECD, 2004). It is however important to note that challenge to e-commerce adoption work differently according to organizational type and culture. Areas of training and people development need to be addressed Harrison (2012).

Ziad et al., (2009) also analyzed E-commerce challenges in terms of three categories: economic, socio-political and cognitive. The economic obstacles include several factors that affect the diffusion of e-commerce such as slow internet diffusion, unavailability of credit cards, unavailability of a physical delivery system, and low bandwidth availability. The socio-political challenges take account of government regulations like privacy and security, lacks of business laws for e-commerce, lacks of legal. Finally, the cognitive hindrances contain a number of factors

which lead to a negative cognitive assessment of E-commerce of individuals and organizations like inadequate awareness, knowledge, skills, and confidence; a lack of awareness and understanding of potential opportunities; lack of confidence in service providers and the postal network and computer illiteracy. Japhet and Usman (2010) identified the following specific challenges hindering the adoption of e-commerce in developing countries.

Exploratory study conducted by Alhaji Ibrahim H. (2009) the following are among the critical challenges for the adoption of E-banking in Nigeria: -

- A** Lack of Technological Infrastructure – the implementation of e-payment is been impeded by unavailability of ICT infrastructure. Most rural areas where majority of small and medium scale industries are concentrated have no access to internet facilities
- B** ICT Equipment Costs – where available, the cost of ICT is a critical factor relative to per capital income. This makes the cost of entry higher compared to developed countries.
- C** Regulatory and Legal Issues – inexistence of proper legal and regulatory framework.
- D** Non-readiness of banks and other stake holders (acceptability) – even though some have shown impressive willingness, some banks are still not fully ready to for this new payment regime.
- E** Resistance to changes in technology among customers and staff due to:
  - Lack of awareness on the benefits of new technologies
- F** Fear of risk among banks
  - Lack of trained personnel in key organizations and
  - Tendency to be content with the existing structures
  - People are resistant to new payment mechanisms;
- G** Security – where disclosure of private information, counterfeiting and illegal alteration of payment data may be rampant.
- H** Frequent connectivity failure in telephone lines.
- I** Frequent power interruption.

### **2.13 Drivers of virtual Air time Adoption**

From the discussion of currencies, it can be said that both mobile money and airtime are forms of digital currencies. Mobile money is clearly a form of e-money since it is backed by a one-to-one ratio with fiat money. Airtime is not e-money as it lacks this characteristic. Both mobile money and airtime have in-built security features that prevent interference by third parties. They may not be cryptocurrencies in the traditional sense but it is clear that there is some low level of encryption. This allows a digital tracking of mobile money and airtime transactions. On the other hand, an airtime code which may be written in the form of a coupon may be obtained by an unauthorized third party who can use it. The system would not prevent this as it would assume the airtime code is being validly used. As indicated, there is always a digital trace left by airtime and mobile money transactions (Sunduzwayo,2017).

In answering the question whether mobile money and airtime are money, it may be said that in the classical sense they are not. However, as Bitcoin has proved, the future may lie in decentralization of sovereign monetary power. Being legal tender may no longer be the yardstick for money. It may well all depend on whether one provides an economic definition of money or the legal definition of money. It can therefore be said that mobile money and airtime are emerging forms of money. How successfully they will fulfil the function of money will depend on how they develop. As has been shown earlier, evolution of money has been a constant attribute of money from its origins. Evolution is a part of the character of money. It can therefore be asserted that with advances in technology, demands of society and changes in procurement habits, 'money will continue to evolve'(Kelley jr.,2016) Of the two, mobile money has shown characteristics that demonstrate that it is on a faster route to being accepted as money. However, it is argued that although airtime does not at first glance come out as money, it should also start being considered as such, especially in the context of rural areas of countries such as Malaŵi.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter will present the methodological framework applied to solve the research problem and to answer the research questions. The chapter starts with the chosen research design, research approach and study area. Afterwards, the sample selection and the data collection methods will be presented.

### **3.2 Research Approach**

The study has used quantitative where survey research is followed since it provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population that includes a cross-sectional study using survey questionnaires for data collection with the intent of generalizing from a sample to a population (Fowler, 2008) consequently, a cross-sectional research is applied since this enables the researcher to compare two or more groups once and represent a snapshot of one point in time .

### **3.3 Research design**

Descriptive research design is adopted under this study since it enables the researcher to gain an accurate profile of events, persons or situations under study by answering the questions that are descriptive are likely to begin with, or include, either ‘Who’, ‘What’, ‘Where’, ‘When’ or ‘How’. Descriptive research may be an extension of a piece of exploratory research or a forerunner to a piece of explanatory research. It is necessary to have a clear picture of the phenomenon on which you wish to collect data prior to the collection of the data. A survey research strategy will be followed since it provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population that includes a cross-sectional survey i.e. where the data will be collected at one point in time using questionnaires for data collection with the intent of generalizing from a sample to a population (Fowler, 2008). Hence, the research design of the study is descriptive as the study is concerned with narration of facts and characteristics regarding group of employees of ethio telecom.

### **3.4 Data Source**

The study was conducted by collecting data from primary and secondary data sources. Primary sources are directly related to the study purpose. Primary data consists of all the data collected throughout the study. Secondary data on the other hand, contains relevant data that has been collected for a different purpose but from which the conclusion is valuable for the purpose.

The study has conducted by collecting data from both primary and secondary sources. Primary data was collected from the staffs ethio telecom in Addis Ababa based on a structurally designed questionnaire. It included both closed ended and open-ended questions, which gives the respondents an opportunity for adequate expression of their view on the questions. In addition, semi-structured interview with division officer, department managers and E-top up manager. In order to get sufficient and reliable data that represents the whole zones both primary and secondary data was collected from each zone and at the head office level. Secondary data: different documents, records and reports of the industry, from web site, books, annual reports and magazines will also have analyzed.

### **3.5 Sampling Technique**

#### **3.5.1 Target population, Sampling frame and Sampling technique**

##### **Target Population**

Population is described as a group of elements or cases, whether individuals, objects, or events, that conform to specific criteria and to which we intend to generalize the result of the research (McMillan and Schumacher, 2001). For the present research, the target population comprises of six zonal offices direct channel employees of ET in Addis Ababa (Central Addis Ababa zone. East Addis Ababa zone, West Addis Ababa zone South Addis Ababa zone, South West Addis Ababa zone and North Addis Ababa zone) includes sales representatives, supervisors and direct channel managers. Furthermore, at head quarter of ET project team members (sales, technology and distribution), Division officer and department managers and the total number of population has around 150.

Direct channel employees has chosen because they already offer virtual air time services to customers and are already familiarized with the service for the past one year. At the headquarter

Division officer and department managers were selected since they have a direct relation with the project in different level of engagement

### **Sampling frame**

The ideal sampling frame as in many research methodology literatures is based on the notion of its accessibility to the researcher. And so, in the case of this research, since there is no readily available sampling list (frame) for the target population a non-probability sampling method in the form of convenience sampling will be used to select the departments, employees and managers since non-probability sampling method is less costly and saves time Moreover, it is also the only feasible alternative sampling method as a result that the total population may not be available for this study. Similarly, probability sampling method in the form of simple random sampling and stratified random sampling will be used to approach respondents from the population.

The sampling design for this population will simple random sampling. In random sampling each individual in the population has an equal probability of being selected which is important for the external validity of the study (Creswell, 2009). Since the aim of the study is to make theoretical inferences from the results of the study that are suitable for further empirical investigation in any other context, random sampling is the most appropriate method

### **Sampling Technique**

Sample size is selected by using purposive sampling technique, which means the selection of the respondent is made in a way to get sufficient data regarding E-top up. Accordingly, the total sample size was determined by using the following sample size determination formula developed by Taro Yamane (1967).

$$n=N/(1+Ne^2)$$

n= corrected sample size, N = population size, and e = Margin of error (MoE), e = 0.05 based on the research condition.

$$n=300/ (1+150*(0.05)^2) =110$$

Hence, the total sample size is 110. Since the number of staffs in each zone currently involved in E-top up sales and HQ staffs are not the same, the number of samples for each zone was calculated by the following formula.

<b>S. no</b>	<b>Zones/Ho</b>	<b>No of DC staff</b>	<b>Samples taken</b>
1	CAAZ	20	15
2	NAAZ	23	17
3	WAAZ	24	17
4	SAAZ	20	15
5	SWAAZ	23	17
6	EAAZ	25	18
7	Ho/Project off.	15	11
Total		150	110

### **3.6 Instruments of Data Collection**

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer the stated research questions, test hypotheses, and evaluate out comes. Both qualitative and quantitative data has been collected. The qualitative data has obtained from a review of relevant literature (secondary sources), whereas the study plans to use a self-administered paper-based structured survey questionnaire (Rating questions) which was designed according to the aims of the research is employed to obtain quantitative data. The questionnaire is used a five-point Likert scale and yes or no to measure the variables. Scales to measure each variable developed based on prior studies with some measurements being modified to adapt to this study.

The questionnaire has three parts; the first part of the questionnaire used to screen prospective of respondents to determine whether they are employees of specify zone ET office and this section also asks the respondents for their specific position/job held in ET at the moment.

The second part covered information related to challenges of E-top up project implementation. The responses from this section are measured using nominal and ordinal scales The constructs are measured on a five point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The third part of the questionnaire measured the relevant constructs of opportunities and driving forces for the adoption of E-top up project in ET. The questionnaire items will be directed to selected respondents, since these are the main focus of this study. The constructs have measured by suing a yes or no type response.

### **3.7 Data collection instruments**

To address Validity and reliability of the study instruments the questionnaire has pilot tested with sample of 10 participants encouraging participants to make useful suggestions concerning ambiguous question items for clarity and ease of understanding. After pilot testing, the suggestions and corrections from the participants will be incorporated into the final questionnaire and the participants for the pilot testing has excluded from the final sample. The pilot test helped to avoid any confusions, interpretation issues that respondents may face and mostly it will be used to check if respondents are understood the question items as intended to stated so that to avoid any misinterpretation. Data used to test the research model has gathered from a sample of respondents who are coming to specific zonal office of ET and headquarter under study.

### **3.8 Data analysis and presentation**

Data analysis has carried out by using the Statistical Package for Social Science (SPSS) version 23. Descriptive statistics such as frequency distribution is used to assess the demographic profile of the respondents to make the analysis more meaningful, clear and easily interpretable. Descriptive statistics allow the researchers to present the data acquired in a structured, accurate and summarized manner. The data collected from the field has sorted for completeness, checked for any errors and omissions, and was summarized in tables. Also the data obtained from the study will be entered into the computer and was statistically analyzed include descriptive statistics and cross tabulation.

### **3.9 Ethical Consideration**

In order to keep the confidentiality of the data given by respondents, the respondents did not require to write their name and assured that their responses were treated in strict confidentiality. The purposes of the study were disclosed in the introductory part of the questionnaire. Furthermore, the researcher has tried to avoid misleading or deceptive statements in the questionnaire. Lastly, the questionnaires were distributed only to voluntary participants.

## CHAPTER FOUR; RESULTS & DISCUSSION

### 4.1 Introduction

To find the major out puts of the study and to give important recommendations, the collected data should be analyzed and discussed, accordingly the analysis and important findings from the collected data are discussed below.

### 4.2 Description of Sample

Dillman, Smyth, and Christian (2009) recommended using multiple methods of contact (e.g., human interaction and mail) to improve response rates. The sample sizes as discussed in chapter 3 a total of 110 questionnaires were prepared to potential respondents to fill the structured questions. Out of the 110 potential respondents, a total of 90 questioners were collected and the remaining 20 were not returned. In the end, a total of 90 respondents filled and returned the questionnaire. The overall respondent rate for the survey was approximately 82%.

**Table 4.2 Questionnaire Distribution and Response Rates**

<b>Method</b>	<b>Distributed (%)</b>	<b>Returned (%)</b>	<b>Response Rate (%)</b>
<b>Hand Delivered</b>	110	90	82%

*Source: researcher's own compilation of Survey data 2018*

As presented in Table 4.1, response rates for hand-delivered questionnaires were higher 82%. The primary researcher's personal relationships and ongoing network efforts with ethio direct channel employees and management representatives may have contributed to the high response rate received when using the hand delivery method.

### 4.3 Background characteristics of the respondents

**Table 4.3 Demographic profile of the respondents**

Respondent characteristics	Number of respondents	Percentage %
	<i>n</i> = 90	
<b>Gender</b>		
Male	74	82.2%
Female	16	12.8%

*Source: researcher's own compilation of Survey data 2018*

The table above shows that the survey includes a higher percentage of male participants (82.2%) than female participants (12.8%).

<b>Age</b>		
22-25	12	13.3%
26-35	53	58.9%
36-45	20	22.2%
46-50	3	3.3%
Above 55	2	2.2%

*Source: researcher's own compilation of Survey data 2018*

Most of the respondents are in the age bracket from 26 to 35 years old (58.9%), followed by those of 36 to 45 years of age (22.2%). This means that more than two-thirds (97.8%) of the sample group are under 50 years old.

<b>Years of customer of ethio telecom</b>		
Less than 1 year	-	-
1-5 years	9	10.0%
6-10 years	68	75.6%
More than 10 years	13	14.4%

*Source: researcher's own compilation of Survey data 2018*

Employees years' experience aim to know about the number of years that the respondents has been working to ethio telecom. The results show that majority of the respondents were more than 6-10 years of customer experience (75.6%) and then more than 10 years of customer experience were (14.4%), 1-5 years of experience where (10.0%) of have 1-5 years of experience.

#### 4.4 Normality test

Many naturally occurring phenomena produce distributions of data that approximate a normal distribution. Statistical tests which formally test this assumption are for example the Kolmogorov-Smirnov test (with Lilliefors correction) and the Shapiro-Wilk W test for ordinal data. In the Kolmogorov-Smirnov test (with Lilliefors correction) as well as in the Shapiro- Wilk test, under 'Sig.', it must be determined if the null hypothesis for normality should be rejected or not. This appears to be the case with both tests, since both significance levels (respectively <.001 and .003) are less than .05. The 'Organizational Factors, Environmental Factors and Technological Factors variable are therefore not normally distributed.

**Table 4.4 Tests of Normality**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Organizational Factors	.188	90	.000	.886	90	.000
Environmental Factors	.213	90	.000	.934	90	.000
Technological Factors	.127	90	.001	.953	90	.003

a. Lilliefors Significance Correction

#### 4.5 Descriptive Statistics challenges that affect development of E-top up project

Descriptive is another frequently used procedure and are designed to give information about the distributions of the variables used in the study. Within this broad category are measures of central tendency (Mean, Median, Mode), measures of variability around the mean (Std deviation and Variance), measures of deviation from normality (Skewness and Kurtosis), information concerning the spread of the distribution (Maximum, Minimum, and Range), and information about the stability or sampling error of certain measures, including standard error (S.E.) of the

mean (S.E. mean), S.E. of the kurtosis, and S.E. of the skewness. As with kurtosis, a skewness value between  $\pm 1.0$  is considered excellent for most psychometric purposes, but a value between  $\pm 2.0$  is in many cases also acceptable, depending on the application. Accordingly, it was noticed that all three variables fall within the “excellent” range as acceptable variables for further analyses; the skewness.

**Table 4.5 Descriptive Statistics challenges that affect development of E-top up**

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Organizational Factors	90	2	5	3.68	.539	-1.250	.254	2.269	.503
Environmental Factors	90	2	4	3.61	.435	-.739	.254	.113	.503
Technological Factors	90	1	5	3.34	.881	-.527	.254	-.507	.503
Valid N (listwise)	90								

*Source: researcher’s own compilation of Survey data 2018*

#### 4.5.1 Interpretation of the result

The output is then being generated as it appears in table 4.4. It was observed that across the entire sample, the respondents apparently strive fairly strongly to achieve an optimal value-for Organizational Factors, Environmental Factors and Technological Factors variable (3.68,3.61, 3.34) act as a source of potential challenges that affect to adoption or development use of E-top up /Yimulu service project.

It was also noted that a relatively high dispersion is present for ‘Technological Factors’ (standard deviation = 0.881) and that there is a low dispersion for ‘Environmental Factors’ (standard deviation =0.435). This last result indicates that respondent’s opinions on ‘Environmental Factors’ are much more alike than they are when it comes to ‘Technological Factors’ and ‘Organizational Factors’.

#### 4.6 Descriptive statics -benefits that expected to realize from adoption of E-top up service

The Frequencies command produces frequency distributions for the specified variables. The output includes the number of occurrences, percentages, valid percentages, and cumulative percentages.

The valid percentages and the cumulative percentages comprise only the data that are not designated as missing.

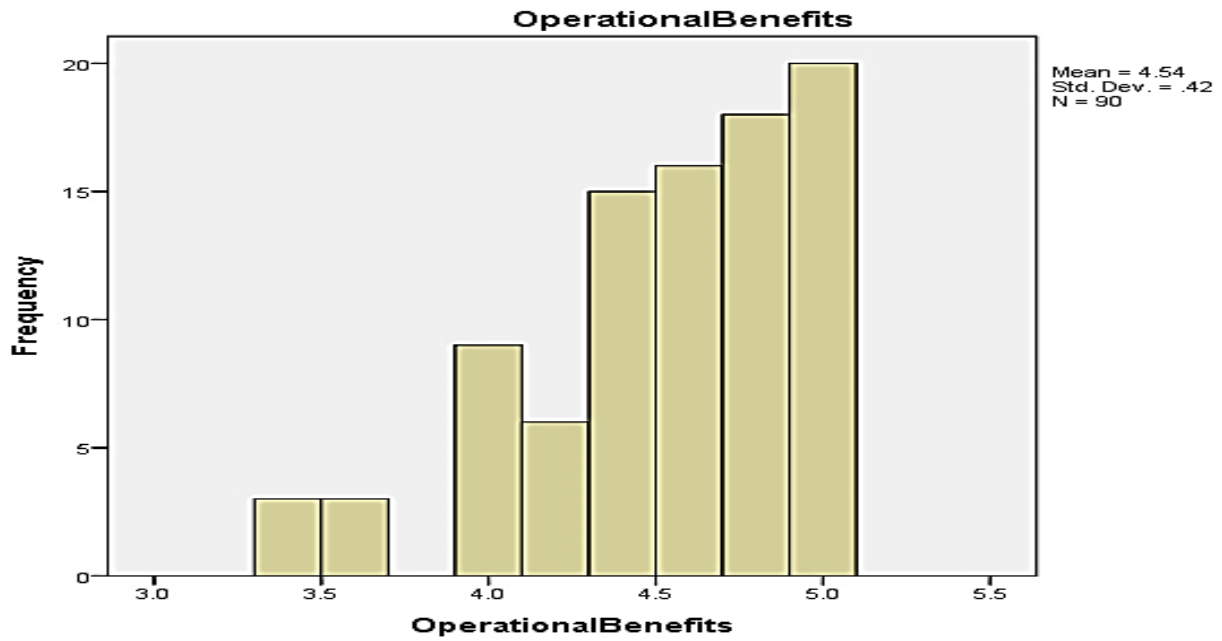
The Frequencies command is useful for describing samples where the mean is not useful (e.g., nominal or ordinal scales). It is also useful as a method of getting the feel for the study data. It provides more information than just a mean and standard deviation and can be useful in determining skew and identifying outliers. A special feature of the command is its ability to determine percentile ranks.

**Assumptions;** Cumulative percentages and percentiles are valid only for data that are measured on at least an ordinal scale. Because the output contains one line for each value of a variable, this command works best on variables with a relatively small number of values.

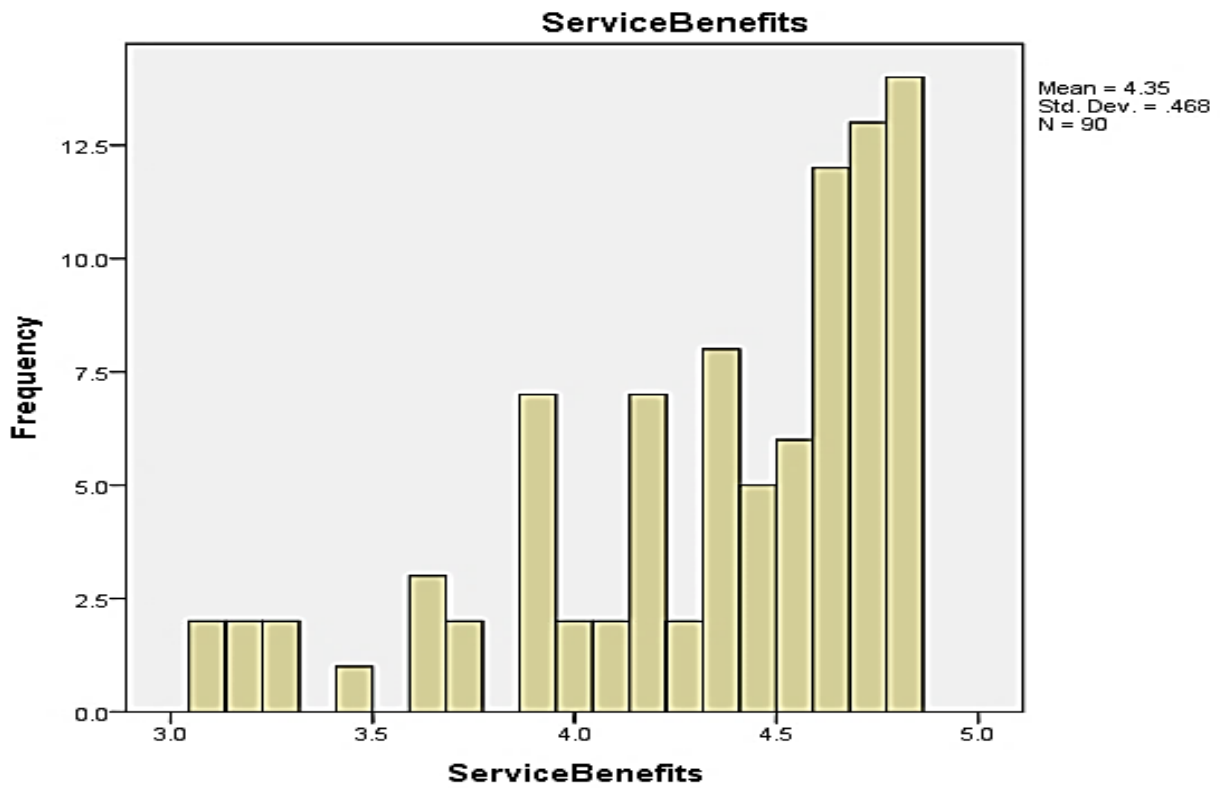
**Table 4.6 Frequency Statistics benefits that expected to realize from adoption of E-top up service**

		<b>Operational Benefits</b>	<b>Service Benefits</b>
N	Valid	90	90
	Missing	0	0
Mean		4.54	4.35
Median		4.60	4.50
Percentiles	100	5.00	4.82

*Source: researcher's own compilation of Survey data 2018*



**Figure 4.6-1 Histogram** *Source: researcher's own compilation of Survey data 2018*



**Figure 4.6-2 Histogram** *Source: researcher's own compilation of Survey data 2018*

#### 4.6.1 Interpretation of the result

The result as it appears in table 4.6.1-1. Indicated that across the entire sample, the respondents apparently strive very strongly to achieve an optimal value-for Operational Benefits and Services Benefits variable (Mean value = 4.54 and 4.35) in relation to the possible benefits that ethio telecom expected to realize from adoption of E-top up service.

It was also noted that a very high percentage of the respondent's (85%) agrees and strongly agreed in relation to the items indicated under 'Operational Benefits 'and that there is a low dispersion (standard deviation =0.42) and similarly a very high percentage of the respondent's (90%) agrees and strongly agreed in relation to the items indicated under 'Services Benefits 'and that there is a low dispersion (standard deviation =0.468). This result indicates that respondent's opinions on 'Operational Benefits' and 'Services Benefits' items are much more alike.

#### 4.7 Descriptive statistics - Driving forces for adopting of E-top up services project

Respondents were asked to identify the possible driving forces for the adoption of E-top up services in Ethiopia telecom Industry and the result indicated as follows;

**Table 4.7 Frequency Statistics- Driving forces for adopting of E-top up services**

		Desire to improve the relationship with customers;	Desire to cover wide geographical area;;	Desire to build organizational reputation	Desire to reduce transaction cost.	Desire to improve customer service;	Desire to improve customer service; (remittance companies ...)	Existence of high demand by other industries ( banks, digital financial providers, technology companies	Desire to satisfy rapid change of customer needs and	Legal frame works that enforce telecom industry to
N	Valid	90	90	90	90	90	90	90	90	90
	Missing	0	0	0	0	0	0	0	0	0
Mean		<b>4.22</b>	<b>4.59</b>	<b>4.53</b>	<b>4.22</b>	<b>4.09</b>	<b>3.68</b>	<b>3.49</b>	<b>3.92</b>	<b>3.92</b>
Mode		4	5	5	5	4	4	4	4	4
Percentiles	100	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00

Source: researcher's own compilation of Survey data 2018

#### **4.7.1 Interpretation of the result**

As depicted in the above Table 4.5.1-1 indicated that most respondents agreed that desire to cover wide geographical area, desire to build organizational reputation, desire to improve the relationship with customers, and desire to reduce transaction cost were the main influencing factors for adoption and development of E-top up services in Ethiopia telecom Industry (mean score = 4.59,4.53,4.22 and 4.22) respectively where a Significant proportion of respondents (65% strongly agree and 54% agreed) further also respondents said that desire to improve customer service has a strong influence for adoption and development E-top up services in Ethiopia telecom Industry (mean value = 4.09).

Likewise, the other driving factors that initiate the Ethio telecom for adoption and development of E-top up services in Ethiopia are Existence of high demand by other industries (banks, digital financial providers, technology companies, remittance companies...), desire to satisfy rapid change of customer needs and preferences, and legal frame works that enforce telecom industry to adopt technological innovation are factors according to the respondents (mean score = 3.68, 3.49 and 3.92).

#### **4.8 Descriptive Statistics - existing opportunities that initiates the adoption of E-top up service**

Respondents were asked whether they 'Strongly agreed, Agreed, Neutral, Disagreed or Strongly disagreed' based on the five questions shown in the table 4.11 below to confirm the existence of the opportunities for adoption and development of E-top up service in Ethiopia, Accordingly, the respondents relatively strongly indicate that Late adopter opportunities (Mean Value=4.02) is the primary driving factor for the adoption of E-top up service in Ethiopia. consequently, the existence of high demand, Commitment of the government to facilitate the expansion of ICT infrastructure, and Improvement in the banking habit of the society were pointed out as the drivers as well for the adoption of the project in Ethiopia (mean value= 3.82,3.46 and 3.28) respectively.

**Table 4.8 Frequency Statistics -existing opportunities that initiates the adoption of E-top up service**

		<b>Late adopter opportunities</b>	<b>The existence of high demand;</b>	<b>Improvement in the banking habit of the society</b>	<b>Commitment of the government to facilitate the expansion of ICT infrastructure</b>
N	Valid	90	90	90	90
	Missing	0	0	0	0
Mean		4.02	3.82	3.28	3.46
Mode		4	4	4	4
Percentiles 100		5.00	5.00	4.70	5.00

*Source: researcher's own compilation of Survey data 2018*

## **CHAPTER FIVE-SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter focuses on the conclusion of the study. It provides summary on major findings, conclusion and recommendation of the thesis, and limitations and implications for future research on related subject

### **5.2 Summary of Findings**

Despite the numerous benefits that E-top up technology brings to the nation, ethio telecom and customers, it also has its own challenges where Organizational, environmental and technological found to be the main challenges. High cost of implementation of E-top up such as cost of ICT equipment and network, software and re-organization, lack of customer awareness with E- top up service provided, and lack of skills and trained staff in implementation and running of E-top up system and resistance to changes in technology among by Board, top Management and staff are described in the study as organizational challenges for adoption and growth of E top up service at ethio telecom.

Limitation in network infrastructure and internet related support services, lack of ICT infrastructure, lack of sufficient government support and legal and regulatory differences with cross-country are considered the basic external challenges for adoption and development of E-top up technology in Ethiopia. Besides, lack of law mandating ethio telecom to adopt E-top up technology, lack of adequate coordination, interaction and cooperation between banks and other decision making centers in E-top up context, frequent power disruption, tight foreign currency regulation and lack of uniform platform by banks are another environmental challenges for adoption and growth of E-top up technology in Ethiopia.

In connection with technology factors, lack of customer trust with E-top up services provides by the ethio telecoms, customer fear of risk to use E-top up technology and security risks are consider

as technological factors negatively affect the adoption and growth of E-top up technology in ethio telecom.

The study revealed lists of benefits that may ethio telecom Realize from adoption and extension of E-top up service. The benefits were classified as operational and service benefits. Operational benefits identified in this study as agreed by the participant include increase ethio telecom productivity, reduces paper work, reduce transaction cost, generate foreign currency, increase reliability and reducing errors. The study has also described lists of services benefits in the adoption and extension of E-top up technology in telecom industry as agreed by the participants, such as facilitates development of new products, facilitates marketing and market access, improve customer service, reduce long queues in ethio telecom shops, increase accessibility of the telecom services, create good relation among ethio telecom and clients and encourages price transparency.

Furthermore, the study revealed lists of factors that initiate ethio telecom for adoption and development of E-top up technology as agreed by the participants such as desire to cover wide geographical area, desire to build organizational reputation, desire to improve the relationship with customers, and desire to reduce transaction cost, desire to improve customer service were a strong influence for adoption and development E-top up services in ethio telecom.

Finally, late adopter opportunities is the primary driving factor for the adoption of E-top up service in Ethiopia. Consequently, the existence of high demand, Commitment of the government to facilitate the expansion of ICT infrastructure, and Improvement in the banking habit of the society were pointed out as the drivers as well for the adoption of the project in Ethiopia.

### **5.3 Conclusion**

The findings of the study revealed that adoption and development of E-top up service in Ethiopia telecom industry stretches wide across the two extremes of the challenges and prospects where the concerted effort by stakeholders to overcome the challenges will bring about immense opportunities to the dominant players in the field with the ultimate result of transforming the country towards financial inclusion. Accordingly, a number of conclusions are e drawn from these results.

Despite the tremendous benefits of adopting and developing E-top up service in Ethiopian, it is associated with challenges. The study shows that high cost of ICT equipment's and network, software and re-organization, lack of customer awareness and resistance to changes in technology are the major challenges that ethio telecom facing for adoption and development E-top up service in Ethiopia. Similarly, the prevailing technical and managerial skills available in ethio telecom towards adopting and extending of E-top up service are found to be limited to influence the technological development rate.

Furthermore, the desire to cover wide geographical area, desire to build organizational reputation, desire to improve the relationship with customers, and desire to reduce transaction cost, and desire to improve customer service were a strong influence for adoption and development E-top up services in Ethiopia telecom.

Moreover, late adopter opportunities is the primary driving factor for the adoption of E-top up service in Ethiopia. Consequently, the existence of high demand, Commitment of the government to facilitate the expansion of ICT infrastructure, and Improvement in the banking habit of the society were pointed out as the drivers as well for the adoption of the project in Ethiopia.

#### **5.4 Recommendations**

Based on the findings the study provides the following possible recommendations to government policy makers and ethio telecom, in order to overcome the challenges, exploit the untapped opportunities in adoption of E-top up service and to a successful practice of the service plus digital banking service in Ethiopia bank industry.

- Ethio telecom should create deep awareness to community concerning E-top up service that it offers and the benefits associated with using E-top up service services through advertising the services through interacting the product with other organizations such as digital financial service providers and banks. Besides, ethio telecom should attract the community to use the service by diverse incentive campaigns to customer's and business partners of ethio telecom (distributers, wholesalers and retailers).
- Ethio telecom should work to improve customers' confidence by providing adequate security of transaction back up of critical data files and alternative means of processing information. Furthermore, in collaboration with banks, ethio telecom should educate and

inform the community on the workability and effectiveness of E-top up service to increase the customer confidence levels.

- The company should facilitate proper and continuous training for their employees to have adequate understanding of the E-banking technology so as to achieve the desired objectives;
- Government should support ethio telecom by facilitating development of sufficient ICT infrastructure for the successful implementation and development of E-top up service; and also ERCA and NBE should issue suitable legal frameworks for adoption of the international top up service and digital banking services so that to facilitate financial inclusion in Ethiopia.

## References

- Alex Comminos, Steve Esselaar, Ali Ndiwalana, Christoph Stork, (2009); *Airtime to Cash: Unlocking the Potential of Africa's Mobile Phones for Banking the Unbanked*, IST-Africa 2009.
- Ajzen, I., 1991. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes* [e-journal] 50, pp. 179–211
- Belleau, B.D., Summers, T.A., Xu, Y. and Pinel, R., 2007. Theory of Reasoned Action Purchase Intention of Young Consumers. *Clothing & Textiles Research Journal* [ejournal] 25 (3), pp. 244-257.
- Chang, et al., 2007, *Factors affecting the adoption of electronic signature: Executives Perspective of hospital information department*, *Decision Support Systems*, 44(4):350- 359.
- Creswell, W 2003, *Research Design: Qualitative, Quantitative and Mixed Approaches*,“ 2<sup>nd</sup> edition. Sage publication, California.
- Davis, F.D., Bagozzi, R.P. and Warshaw, P.R., 1989. User Acceptance of Computer.
- Daghfous, N and Toufaily, E (2007); *The adoption of E-banking by Lebanese banks: success and critical factors*, research paper, University Du Quebec a Montreal:
- Delali Kumaga (2010) *The challenges of implementing Electronic Payment Systems; The Case of Ghana’s E-zwich Payment System*.
- Donald R. Cooper, (2014), *Business Research Methods*, Twelfth Edition, Copyright © 2014 by The McGraw-Hill Companies, Inc.
- Gardachew Worku,(2010); *Electronic-Banking in Ethiopia- Practices, Opportunities and Challenges*, *Journal of Internet Banking and Commerce*, August 2010, vol. 15, no.2 (<http://www.arraydev.com/commerce/jibc/>).
- Ghazi, A & Khalid, A 2012, ‘E-business Enablers and Barriers: Empirical study of SME in Jordanian communication sector’, *Global journal of Business Research*, 6(3):1-15.
- Harrison Utum Ubi, 2012, *Adoption of e-commerce in the Nigerian banking Industry: problems and prospects, A study of UBA PLC and Zenith Bank PLC*, Nnamdi Azikiwe University, AWKA Anambra State.MA thesis.

Harrison Utum Ubi, 2012, Adoption of e-commerce in the Nigerian Banking Industry: problems and prospects, A study of UBA PLC and Zenith Bank PLC, Nnamdi Azikiwe University, AWKA Anambra State.MA thesis

International Journal of Scientific and Research Publications, Volume 6, Issue 8, August 2016  
ISSN 2250-3153.

Japhet E. Lawrence, Usman A. Tar (2010). Barriers to E-commerce in developing countries, Information, Society and Justice, Volume 3 No. 1, January 2010: pp 23-35 ISSN 1756-1078.

John W. Creswel, (2013), Qualitative Research Design 3<sup>rd</sup> edition, SAGE Publications. International Educational and Professional Publisher.

Kelley Jr EW, 'The future of electronic money: a regulator's perspective' 34 Spectrum, IEEE 21 Functional Specification document, signed between ethio telecom and commviva limited company in 2014.

Liao, C., Chen, J-L. and Yen, D.C., 2007. Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model. *Computers in Human Behavior* [e-journal] 23, pp. 2804–2822.

Me2u Service' (TNM, Malawi) <<http://www.tnm.co.mw/index.php/me2u.html>> accessed on 19 February 2015 'one airtel makes it easy' (Airtel).

Me2U'(Airtel,Malawi<<http://africa.airtel.com/wps/wcm/connect/africarevamp/malawi/home/personal/voice-and-text/phone-services/me2u>> accessed on 19 February 2015.

Organization for Economic Cooperation and Development (OECD, 2001). Electronic finance: Economics and Institutional Factors, occasional paper No 2, financial affairs division, OECD, Paris.

Rasoulia. M and Safari. M. (2011). The Reasons to Lack of Electronic Banking Achievement in Iran. *International Journal of Managing Information Technology (IJMIT)*. 3(3), August 2011.

Rogers, M 2003, *Diffusion of Innovations*, 5th edition, New York: Free Press

Salwani, *et al.*, 2009, E-commerce usage and business performance in the Malaysian tourism sector: empirical analysis', *Information Management & Computer Security*. 17(2):166-185.

Sheppard, B.H., Hartwick, J. and Warshaw, P.R., 1988. The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. *Journal of Consumer Research* [e-journal] 15 (3), pp. 325-343

Technical Proposal, PreTUPS 6.0.1 Ethio Telecom - Function Specification Document ID: P5X0413\_ET\_001 Version: 1.8 Date: 29-07-2013.

Technology: A Comparison of Two Theoretical Models. *Management Science* [ejournal] 35 (8), pp. 982-1003.

Tekabe Sintayheu and Gadise Gezu, 2016, Challenges and Opportunities of E-payment in Ethiopia Banking Industry: With the reference of private commercial banks, *International Journal of Scientific and Research Publications*, Volume 6, Issue 8, August 2016 502 ISSN 2250-3153.

Tekabe Sintayheu Sherferahu and Gadise Gezu, (2016) Challenges and Opportunities of E-payment in Ethiopia Banking Industry: With the reference of private commercial banks,

Tornatzky, G & Fleischer, M 1990, *The Process of Technology Innovation*, Lexington, MA, Lexington book.

Wondwossen Tadesse and Tsegai G. Kidan. 2005 'E-Payment: Challenges and Opportunities In Ethiopia'. United Nations Economic Commission for Africa.

Ziad Hunaiti, Masa'deh, Mohammed Mansour and Ahmad Al-Nawafleh (2009) *Electronic Commerce Adoption Barriers in Small and Medium-Sized Enterprises in Developing Countries: The Case of Libya* IBIMA business review Volume 2, 2009, pp 37-43.

Zhu, K, Kraemer, K & Xu, S 2003, Electronic business adoption by European firms: a Cross-country assessment of the facilitators and inhibitors", *European Journal of Information Systems*, 12(4):251-268.

## Annex I Questioner Distributed to Respondents



### **Addis Ababa University School of Commerce Master of Art in Project Management.**

Questionnaire on (An Assessments of the Challenges and opportunities on the implementation of E-Top Up (Yimulu) project in the case of ethio telecom)

#### **Dear respondent,**

This questionnaire is designed to assess the challenges and opportunities on the implementation of E-Top Up in the case of ethio telecom. The purpose of this questionnaire is to collect data from employees of ethio telecom in Addis Ababa for conducting thesis on the title.

Your response is vital to the outcome of the study and you are kindly requested to completely and objectively answer all questions. The research is going to be carried out based on your responses and other relevant data that could support it.

Your cooperation to respond genuinely is very important to this study. The information you provide will be used only for academic purpose and will be kept confidential.

***Thank you, for your cooperation and timely response in advance***

Thank you!!

Gezahegn Ketema

Tel-0911-25456

**General Instructions**

- Please answer all questions
- The questions are open and closed ended, so please put tick (✓) for close ended.

**Part-I Demographic Factors**

1) Gender

Male

Female

2) Age

Under 21

36-45

22-25

45-50

26-35

50 years and over

3) No of years' service (Experience) at ethio telecom

Less than 1 year

3-5 years

1-3 years

More than 5 year

### Part-III Questions regarding E-top up challenges and opportunities

Please indicate the level of your agreement on the statements below

1= strongly disagree 2= disagree 3= neutral 4= agree 5= strongly agree

		Rating points				
Potential challenges that affect to adoption or development use of E-top up / Yimulu service project		1	2	3	4	5
<b>Organizational Factors</b>						
1	Lack of technical and managerial members awareness with E-top up product;					
2	Lack of technical and managerial skills in implementation and development of E-top up project					
3	High cost of implementation of E-top up . (such as cost of ICT equipment and network, software and reorganization)					
4	Resistance to changes in technology among by Board, top Management and staffs ;					
<b>Environmental Factors</b>						
6	Lack of sufficient government support affect customers' willingness;					
7	Lack of legal framework for E-top up service;					
8	Cross-country legal and regulatory differences will have impact on the adoption of new technological innovation in telecom sector.					
9	Lack of law mandating ethio telecom to adopt E-top up sservice.					
10	Limitation in network infrastructure and internet related support services;					
11	Business partners ( distributors, wholesalers and retailers) low levels of technology adaptation					
13	Lack of adequate coordination, interaction and cooperation between ethio telecom departments and other decision making centers in E-top up context;					
14	Absence of financial networks that links different services with banks;					

15	lack of coordination ,guidance and support by other governmental bodies like national bank ,ERCA in implementing the service					
16	Relative high cost of handsets					
	<b>Technological Factor</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
10	Lack of confidence with the security aspects					
11	Loss of Audit Trail;					
12	Money laundering and other financial crimes that may be easily facilitated through e– top up ;					
13	Users do not trust the E-top up technology provided by ethio					
14	Customer fear of risk to use E-top up technology;					

Please kindly state any other Barriers or challenges that the Banks faces in the adoption E-top up into Ethiopia banking industry.

---



---



---



---



---



---



---

		Rating points				
Possible benefits that ethio telecom expected to realize from adoption of E-top up service		1	2	3	4	5
<b>Operational Benefits</b>						
1	Reduced paper work;					
2	Low transaction cost;					
3	Enhance productivity in telecom industry;					
4	Enhance foreign currency generation;					
6	Increase reliability and reducing errors;					
<b>Services Benefits</b>						
7	Facilitates development of new products and new business with the banking industry;					
8	E-top up is convenient, in terms of 7 days and 24 hours services i.e. accessibility; i.e. No time limit to access airtime and information					
9	Enhance accessibility of the telecom's services (in terms of place);					
10	Overcome geographical limitations;					
11	Improve customer service;					
12	Improving transaction speeds					
13	Limitation in ICT infrastructure ;					
14	Facilitates marketing & market access;					
15	Absence of financial networks that links with different banks and digital financial service providers ;					
16	Create better relationship among banks, digital financial service providers and clients;					
17	Encourages tariff, commission,& incentive transparency;					

	<b>Do you think that the following are among the driving forces for the adoption of E-top up services in Ethiopia telecom Industry?</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Desire to improve the relationship with customers;					
2	Desire to cover wide geographical area;;					
3	Desire to build organizational reputation;;					
4	Desire to reduce transaction cost;					
5	Desire to improve customer service;					
6	Existence of high demand by other industries ( banks, digital financial providers, technology companies ,remittance companies ...)					
7	Desire to satisfy rapid change of customer needs and preferences					
8	Legal frame works that enforce telecom industry to adopt technological innovation					

**Please kindly state any other Driving forces for adoption E-top up into Ethiopia banking industry.**

---



---



---



---

	<b>What are the existing opportunities in the country that initiates the adoption of E-top up service?</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
10	Late adopter opportunities					
11	The existence of high demand;					
12	Improvement in the banking habit of the society					
13	Commitment of the government to facilitate the expansion of ICT infrastructure					

## Annex -II Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Lack of technical and managerial members awareness with E-top up product	90	2	4	3.68	.516
Lack of technical and managerial skills in implementation and development of E-top up project	90	1	5	3.82	.842
High cost of implementation of E-top up . (such as cost of ICT equipment and network, software and reorganization)	90	1	5	3.82	.907
Resistance to changes in technology among by Board, top Management and staffs.	90	1	5	3.41	.993
Lack of sufficient government support affect customers' willingness;	90	1	5	3.33	.924
Lack of legal framework for E-top up service;	90	1	5	3.61	.831
Cross-country legal and regulatory differences will have impact on the adoption of new technological innovation in telecom sector.	90	1	5	3.47	.824
Lack of law mandating the bank to adopt E-top up service.	90	1	5	3.29	.915
Limitation in network infrastructure and internet related support services;	90	1	5	3.41	.923
Business partners (distributers, wholesalers and retailers) low levels of technology adaptation	90	1	5	3.71	1.041
Lack of adequate coordination, interaction and cooperation between ethio telecom departments and other decision making centers in E-top up context;	90	1	5	4.11	.892
Absence of financial networks that links different services with banks;	90	2	5	4.00	.670
lack of coordination ,guidance and support by other governmental bodies like national bank ,ERCA in implementing the service	90	1	5	3.73	.776
Relative high cost of handsets	90	1	5	3.46	.901
Lack of confidence with the security aspects	90	1	5	3.74	.906
Loss of Audit Trail;	90	1	5	3.38	.978
Money laundering and other financial crimes that may be easily facilitated through e- top up ;	90	1	5	3.24	1.368
Users do not trust the E-top up technology provided by ethio	90	1	5	3.08	1.154
Customer fear of risk to use E-top up technology;	90	1	5	3.26	1.186
Valid N (list wise)	90				

### Annex-III Frequencies

#### Operational Benefits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	3	3.3	3.3	3.3
	4	3	3.3	3.3	6.7
	4	9	10.0	10.0	16.7
	4	6	6.7	6.7	23.3
	4	15	16.7	16.7	40.0
	5	16	17.8	17.8	57.8
	5	18	20.0	20.0	77.8
	5	20	22.2	22.2	100.0
	Total	90	100.0	100.0	

#### Service Benefits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	2	2.2	2.2	2.2
	3	2	2.2	2.2	4.4
	3	2	2.2	2.2	6.7
	3	1	1.1	1.1	7.8
	4	3	3.3	3.3	11.1
	4	2	2.2	2.2	13.3
	4	7	7.8	7.8	21.1
	4	2	2.2	2.2	23.3
	4	2	2.2	2.2	25.6
	4	7	7.8	7.8	33.3
	4	2	2.2	2.2	35.6
	4	8	8.9	8.9	44.4
	4	5	5.6	5.6	50.0
	5	6	6.7	6.7	56.7
	5	12	13.3	13.3	70.0
	5	13	14.4	14.4	84.4
	5	14	15.6	15.6	100.0
	Total	90	100.0	100.0	

## Annex-IV Frequency Tables

### Desire to improve the relationship with customers;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	1.1	1.1	1.1
	3	5	5.6	5.6	6.7
	4	57	63.3	63.3	70.0
	5	27	30.0	30.0	100.0
	Total	90	100.0	100.0	

### Desire to cover wide geographical area;;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	1	1.1	1.1	1.1
	3	3	3.3	3.3	4.4
	4	27	30.0	30.0	34.4
	5	59	65.6	65.6	100.0
	Total	90	100.0	100.0	

### Desire to build organizational reputation;;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	6	6.7	6.7	6.7
	4	30	33.3	33.3	40.0
	5	54	60.0	60.0	100.0
	Total	90	100.0	100.0	

### Desire to reduce transaction cost;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	2.2	2.2	2.2
	3	14	15.6	15.6	17.8
	4	36	40.0	40.0	57.8
	5	38	42.2	42.2	100.0
	Total	90	100.0	100.0	

### Desire to improve customer service;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.2	2.2	2.2
	3	7	7.8	7.8	10.0
	4	60	66.7	66.7	76.7
	5	21	23.3	23.3	100.0
	Total	90	100.0	100.0	

**Existence of high demand by other industries ( banks, digital financial providers, technology companies ,remittance companies ...)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	5	5.6	5.6	5.6
	3	30	33.3	33.3	38.9
	4	44	48.9	48.9	87.8
	5	11	12.2	12.2	100.0
	Total	90	100.0	100.0	

**Desire to satisfy rapid change of customer needs and preferences**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.2	2.2	2.2
	2	12	13.3	13.3	15.6
	3	24	26.7	26.7	42.2
	4	44	48.9	48.9	91.1
	5	8	8.9	8.9	100.0
	Total	90	100.0	100.0	

**Legal frame works that enforce telecom industry to adopt technological innovation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	6	6.7	6.7	6.7
	3	14	15.6	15.6	22.2
	4	51	56.7	56.7	78.9
	5	19	21.1	21.1	100.0
	Total	90	100.0	100.0	

## Annex-V Frequency Tables

### Late adopter opportunities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	7	7.8	7.8	7.8
	3	10	11.1	11.1	18.9
	4	47	52.2	52.2	71.1
	5	26	28.9	28.9	100.0
	Total	90	100.0	100.0	

### The existence of high demand;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.2	2.2	2.2
	2	2	2.2	2.2	4.4
	3	25	27.8	27.8	32.2
	4	42	46.7	46.7	78.9
	5	19	21.1	21.1	100.0
	Total	90	100.0	100.0	

### Improvement in the banking habit of the society

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	2.2	2.2	2.2
	2	1	1.1	1.1	3.3
	2	1	1.1	1.1	4.4
	2	1	1.1	1.1	5.6
	2	1	1.1	1.1	6.7
	2	2	2.2	2.2	8.9
	2	1	1.1	1.1	10.0
	2	2	2.2	2.2	12.2
	2	1	1.1	1.1	13.3
	2	1	1.1	1.1	14.4
	2	1	1.1	1.1	15.6
	3	2	2.2	2.2	17.8
	3	2	2.2	2.2	20.0
	3	1	1.1	1.1	21.1
	3	1	1.1	1.1	22.2

3	2	2.2	2.2	24.4
3	2	2.2	2.2	26.7
3	1	1.1	1.1	27.8
3	1	1.1	1.1	28.9
3	1	1.1	1.1	30.0
3	1	1.1	1.1	31.1
3	1	1.1	1.1	32.2
3	1	1.1	1.1	33.3
3	1	1.1	1.1	34.4
3	1	1.1	1.1	35.6
3	2	2.2	2.2	37.8
3	1	1.1	1.1	38.9
3	1	1.1	1.1	40.0
3	1	1.1	1.1	41.1
3	1	1.1	1.1	42.2
3	2	2.2	2.2	44.4
3	1	1.1	1.1	45.6
3	1	1.1	1.1	46.7
3	2	2.2	2.2	48.9
3	2	2.2	2.2	51.1
3	1	1.1	1.1	52.2
3	2	2.2	2.2	54.4
3	1	1.1	1.1	55.6
3	1	1.1	1.1	56.7
3	1	1.1	1.1	57.8
4	1	1.1	1.1	58.9
4	1	1.1	1.1	60.0
4	1	1.1	1.1	61.1
4	1	1.1	1.1	62.2
4	1	1.1	1.1	63.3
4	2	2.2	2.2	65.6
4	1	1.1	1.1	66.7
4	2	2.2	2.2	68.9
4	2	2.2	2.2	71.1
4	1	1.1	1.1	72.2

4	3	3.3	3.3	75.6
4	2	2.2	2.2	77.8
4	1	1.1	1.1	78.9
4	1	1.1	1.1	80.0
4	2	2.2	2.2	82.2
4	1	1.1	1.1	83.3
4	1	1.1	1.1	84.4
4	1	1.1	1.1	85.6
4	1	1.1	1.1	86.7
4	2	2.2	2.2	88.9
4	2	2.2	2.2	91.1
4	2	2.2	2.2	93.3
4	1	1.1	1.1	94.4
4	1	1.1	1.1	95.6
4	1	1.1	1.1	96.7
4	1	1.1	1.1	97.8
5	1	1.1	1.1	98.9
5	1	1.1	1.1	100.0
Total	90	100.0	100.0	

**Commitment of the government to facilitate the expansion of ICT infrastructure**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	2.2	2.2	2.2
	2	3	3.3	3.3	5.6
	2	1	1.1	1.1	6.7
	2	5	5.6	5.6	12.2
	2	2	2.2	2.2	14.4
	2	1	1.1	1.1	15.6
	2	2	2.2	2.2	17.8
	2	1	1.1	1.1	18.9
	3	2	2.2	2.2	21.1
	3	5	5.6	5.6	26.7
	3	2	2.2	2.2	28.9
	3	1	1.1	1.1	30.0
	3	1	1.1	1.1	31.1

3	3	3.3	3.3	34.4
3	6	6.7	6.7	41.1
3	2	2.2	2.2	43.3
4	3	3.3	3.3	46.7
4	1	1.1	1.1	47.8
4	2	2.2	2.2	50.0
4	7	7.8	7.8	57.8
4	5	5.6	5.6	63.3
4	2	2.2	2.2	65.6
4	10	11.1	11.1	76.7
4	2	2.2	2.2	78.9
4	5	5.6	5.6	84.4
4	7	7.8	7.8	92.2
4	1	1.1	1.1	93.3
5	1	1.1	1.1	94.4
5	2	2.2	2.2	96.7
5	1	1.1	1.1	97.8
5	2	2.2	2.2	100.0
Total	90	100.0	100.0	