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FACTORS AFFECTING CUSTOMERS' ATTITUDE TOWARDS INFORMATION TECHNOLOGY ADOPTION IN COMMERCIAL BANKS OF ETHIOPIA: A CASE STUDY OF SELECTED BANKS IN MEKELLE CITY

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ABSTRACT

Information Technology infrastructures have various advantages for business organizations like financial institutions, and more particularly banks. They assist to improve their service quality, increase speed of service delivery, minimize cost, increase profitability, offer convenience in providing anytime and anywhere banking. Hence, adoption of such technologies is highly appreciated. However, the implementations of the technologies depend on the attitude of customers towards the technology to be adopted. Therefore, this research is concerned with investigating the factors affecting attitude of customers towards Information Technology adoption in the banking sector; because, customers are the ultimate users of the technology to be adopted. Such factors are discovered based on Roger's Diffusion of Innovation theory which identifies five variables affecting customers' attitude for technology adoption; these are simplicity, trialability, relative advantage, observability and compatibility. Multiple regression model is used to determine the significance of the variables. Accordingly, all variables except compatibility are found to be significant. The attitude of the banks' staff to technology adoption is also assessed using descriptive statistics; since they are stakeholders of the technology adoption, and it is assessed that they have positive attitude. Similarly, descriptive statistics is used to examine the existing status of the banks in Information Technology adoption. And most commercial banks are found lagging behind in adopting Information Technologies that can provide them with multi-directional benefits.

KEYWORDS

Customers' attitude towards Information Technology, Diffusion of Innovation theory, Information Technology in banks, Technology adoption.

1. INTRODUCTION

McFarlan, (1984) discussed that information technology is, nowadays, affecting the daily activity of individuals and organizations. He said that information is an input for every activity of organizations, without which organizations cannot function efficiently. He also added that to be competent nationally and internationally, organizations should apply information technologies in such a way that can help them to achieve their goals.

According to Avison, *et al.*, (2000) information technology helps organizations to be successful. It helps organizations to be competent in the industry for which they belong to. Danielsson and Persson (2006) also investigated that information technology has positive impact on economical successfulness of organizations. As Idowu *et al.*, (2002) found, information technology, that is dynamically changing, has impact in the banks' service quality as well as efficiency and effectiveness. Kraemer *et al.*, (1994) in their study explored that proper application of information technology can create business value by reducing or avoiding costs, increasing or sustaining revenues, creating capabilities for future revenues and improving the decision making process. In his study, Ferguson (2000), described that most of the industries including the banking industry, for that matter, rely on gathering, processing and providing information in order to meet the needs of their clients. Because Information Technology leads to irreversible change that creates new opportunities for banks in the way they organize product development, delivery and marketing (Holland *et al.*, 1997).

People perceive that banks are strictly about money. However, they are about information. Banks are information processing and control centers that adjust control, update and maintain financial information based on the need of their customers (Vohra, 2007). Banking as any other type of business organization relies on information technology to be successful. Over the past few years, studies have shown that there is a positive relationship between banks productivity and information technology. As a result, the industry is facing extensive and unprecedented change. As customers demand new levels of personal service at an unexpected fast rate, the level of competition in the banking industry becomes fast growing. Therefore many banks now depend on improved technology in order to stay competitive in the market (Osho, 2008).

Hence, the utilization of information technology has been magnificently increased in the banking industry. By using information technology products such as internet banking, electronic payments, security investments, information exchanges, financial organizations can deliver high quality and efficient services with less effort for their customers (Berger, 2003).

2. REVIEW LITRATURE

2.1. DEFINITIONS OF INFORMATION TECHNOLOGY

Information Technology is data resource management, hardware, and software and telecommunications technologies, used in computer based information systems (Obrien, 1996).

Information technology is a technology that deals with the physical devices and software that link various computer hardware components and transfer data from one physical location to another (Laudon and Laudon, 1991).

Anderson (2006) has defined information technology as hardware and software technologies used to create information system.

2.2. THE BUSINESS VALUE OF INFORMATION TECHNOLOGY

According to (Kraemer *et al.*, 1994) business value of information technology refers to the contribution of information technology to organizational performance. Information technology adds value for business organizations to perform well. Different organizations operating in different environments, apply different information technology products, and thus attain values from the applied information technology. In effect, individual firms or firms in different industries do not gain equal value from information technology. Moreover, Kraemer and his colleagues have identified ten dimensions in which information technology can contribute to the business performance. These are organizational effectiveness, organizational efficiency, and economies of production, new business innovation, customer relations, supplier relations, product and service enhancement, inter-organizational coordination, marketing support and competitive dynamics.

As studies indicate, information technology has positive influence on the productivity and profitability of organizations (Brynjolfsson and Hitt 1996). Information technology is changing the way organizations do their activities. It uses computer technologies, telecommunication technologies and other software and hardware technologies to facilitate the activities of business organizations (Obrien, 1996).

In his study entitled "The Output Contributions of Computer Equipment and Personnel", Lichtenberg (1995) also has found that information technology application result in invaluable benefit.

Moreover, information technology helps organizations to take competitive advantage. As result organizations are trying to use the modern information technology in such a way that fits with their working style and organizational environment (Mallick, 2006). It has significant role in increasing the organizations'

market share; and missing to apply information technology lags the business organization behind its competitors who are using information technology. Hence, inability to apply information technology will make the organization to lose market share (Clemons, 1991).

Information technology is an instrument for socio-economic development. The utilization of present day technology is the distinguishing factor between human species in today's contemporary society (Inkster, 1990). Every individuals and organizational life is being highly influenced by technology (Oscamp and Spacapan, 1990). In one or other way the life of this modern world is becoming dependant on technology. Application of the up-to-date information technology is, therefore, the better way of life for human being as well as organizations for the fact that it is one among the technologies which highly affect the life of human beings and/or organizations (Kirkup and Keller, 1992).

2.3. BENEFITS OF INFORMATION TECHNOLOGY IN BANKS

Like any other organization information technology has business value for banks. According to Ghaziri (1998) the benefits of information technology is three directional; i.e. to the customer, to the bank and to the employees.

2.3.1. BENEFIT OF IT FOR THE CUSTOMER

Banks are aware of customers' need for new services and plan to make them available. IT has increased the level of competition and forced them to integrate the new technologies in order to satisfy their customers. They have already developed and implemented a certain number of solutions among them:

- *Self-inquiry facility*: customers enjoy from self-service provided by the technologies.
- *Remote banking*: Remote terminals at the customer site connected to the respective branch through a modem, enabling the customer to make inquiries regarding his accounts, on-line, without having to move from his office.
- *Anytime banking- anywhere banking*: Installation of ATMs which offer non-stop cash withdrawal, remittances and inquiry facilities. Networking of computerized branches inter-city and intra-city will permit customers of these branches, when interconnected, to transact from any of these branches.
- *Tele-banking*: A 24-hour service through which inquiries regarding balances and transactions in the account can be made over the phone.
- *Electronic Banking*: This enables the bank to provide corporate or high value customers with Graphical User Interface (GUI) software on a PC, to inquire about their financial transactions and accounts, cash transfers, cheque book issue and inquiry on rates without visiting the bank.
- As information is centralized and updates are available simultaneously at all places, single-window service becomes possible, leading to effective reduction in waiting time.

2.3.2. BENEFIT OF IT FOR THE BANK

During the last decade, banks applied bank-related information technologies to a wide range of back and front office tasks in addition to a great number of new products. The major advantages for the bank to implement IT are:

- Availability of a wide range of inquiry facilities, assisting the bank in business development and follow-up.
- Immediate replies to customer queries without reference to ledger-keeper as terminals are provided to managers and chief managers.
- Automatic and prompt carrying out of standing instructions on due date and generation of reports.
- Generation of various reports and periodical returns on due dates.
- Fast and up-to-date information transfer enabling speedier decisions, by interconnecting computerized branches and controlling offices.
- Reduce cost by improving the efficiency of employees by automate business processes.

2.3.3. BENEFIT OF IT FOR THE STAFF

IT has increased their productivity through the followings:

- Accurate computing of cumbersome and time-consuming jobs such as balancing and interest calculations on due dates.
- Automatic printing of covering schedules, deposit receipts, pass book / pass sheet (transaction documents), freeing the staff from performing these time-consuming jobs, and enabling them to give more attention to the needs of the customer.
- Signature retrieval facility, assisting in verification of transactions, sitting at their own terminal.
- Avoidance of duplication of entries due to existence of single-point data entry.

A search of the banking literature reveals that banks are moving rapidly to take advantage of recent and new customer service and cost reduction opportunities that new technologies offer. A sampling is in the table below:

2.4. MAJOR INFORMATION TECHNOLOGY PRODUCTS USED IN BANKS (BANKING INFORMATION TECHNOLOGIES)

According to Rahman (2007) there are so many Information Technology products that can be applied in the banking industry. Among others the following are most important.

✚ AUTOMATED TELLER MACHINE (ATM) TECHNOLOGY

ATM technology is an information technology product that replaces human tellers. It runs automatically through ID like card and password, PIN (personal Identification Number), which is uniquely provided by the bank. If people insert their visa card in to the machine, it verifies the password and makes it open for the user to access the service delivered by the machine. It allows all visa card holders to withdraw cash and ask their balance. It allows 24-hours cash withdrawal facilities using debit/ credit cards, fast cash, fund transfer, Personal Identification Number (PIN) change, mini-statement request etc.

✚ INTERNET BANKING TECHNOLOGY

It is the use of internet technology as a channel for providing service directly for customers. Using internet banking technology, customers who have access to internet, can conduct transaction from wherever they are. Account balance enquiry, fund transfer among the accounts of same customer, opening or modify of term deposit account, pay order request, exchange rate or interest rate enquiry, bills payment, account summary, account details, account activity, standing instructions, loan repayment, loan information, statement request, cheque status enquiry, stop payment cheque, refill prepaid card, password change, bank guarantee application, lost card (debit/credit) reporting, pay credit card dues, view credit card statement or check balance are some of the services that can be provided by banks through internet banking technology.

✚ POINT OF SALE (POS) TERMINAL

It is an electronic machine that can sense a special plastic card that is encoded with information on a magnetic slip. Actually, the device functions as a receiving desk of cash counter of a bank branch. Allows debit cards, credit cards, visa cards etc for making transactions. POS provides a number of services such as, payment for products purchased or services rendered at different merchant locations using debit/ credit cards etc

✚ TELE BANKING TECHNOLOGY

Tele Banking Technology is a banking technology that enables customers to get banking service by dialing to particular telephone number of the banks from the place they are. It provides detail account information, balance inquiry, information about products or services, ATM card activation, bills payment, credit card service etc.

✚ CREDIT CARD TECHNOLOGY

A special plastic card that is encoded with information on a magnetic strip linked with credit accounts with access to ATM or POS terminal located at merchant outlet, restaurant, 5 star hotels, hospitals etc. It provides 24-hours cash access within the sanctioned limit to customer's credit account through ATM, POS, merchant shop window, and payment counter, making payment to merchant against purchase of goods and services, availing cash advances, withdrawal of cash from ATM, SMS banking, internet banking, E statements, auto bills, pay insurance coverage, rewards program, card cheque, etc

✚ DEBIT CARD TECHNOLOGY

A special plastic card that is encoded with information on a magnetic strip linked with deposit accounts with access to ATM or POS terminal. It provides 24-hours cash access to customer's savings or current account through ATM and POS terminals, balance enquiry, mini statement printing in ATM, cash withdrawal from ATM, fund transfer to linked accounts of respective customer, PIN change, utility bills payment, cash deposit, cheque deposit, purchase of goods and

services through POS terminal, transaction details, etc While using the debit card, cash will be subtracted from the account from which the debit card is linked. Unlike the credit card, debit cards purchase doesn't incur interest. However, it has usage charges.

✚ SOCIETY FOR WORLDWIDE INTER-BANK FINANCIAL TELECOMMUNICATION (SWIFT)

It is a Belgium based international network of the bank community that provides banking service worldwide through member banks of the network. It provides instant message transmission services to its member banks, sending and receiving fund transfer message both outward and inward, receiving NOSTRO account statement and correspondence between banks, transmits remittance related messages, transmitting payment instructions, transmit letter of credit (L/C) related messages such as, L/C issuance, advising, subsequent amendments, negotiations, add confirmations and reimbursements.

✚ MOBILE BANKING TECHNOLOGY

According to Andrew (2009) Mobile banking is defined as 'the provision of banking and financial services with the help of mobile telecommunication devices'. About two billion people worldwide are using a mobile phone. As the number of mobile phone increases there has been a pervasive impact on people's lives. Mobile banking helps to cover wide geographical area. They can reach remote area at low cost.

Mobile banking has the potential to be a powerful tool for poverty alleviation. In developing countries where financial services are scarce, mobile banking provides an inexpensive and secure way to transfer funds. It also offers improved access to savings accounts (Britni Must and Kathleen Ludewig, 2010).

2.5. ATTRIBUTES DETERMINING DIFFUSION/ADOPTION OF INNOVATIONS

Different technologies are innovated in different countries at different time. Thanks to globalization, if one technology innovated in a nation is found to be important to the other part of the world; it will made diffused using various mechanisms. The attitude of the ultimate users to the technologies is a critical component. As a result dealing with the attitude of such ultimate users towards the technology to be applied or already adopted technology is quit important. The successfulness of diffusion of innovation is determined by different factors that influence the attitude of such ultimate users. Rogers (2003) theorizes that about 49-87% of the successful diffusion of new technologies is determined by five attributes namely relative advantage, ease of use (simplicity), compatibility, trialability and observability. This theory is called "Diffusion of Innovation (DOI) Theory". According to him innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. The perceived newness of the idea for the individual determines his/her reaction to it. And diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system.

He defined the five variables as follows.

- ✚ **Relative advantage** – that is the degree of which an innovation is perceived to have better advantage than the idea it supersedes. The greater the perceived relative advantage of an innovation the more rapid its rate of adoption is going to be.
- ✚ **Compatibility** – that is the degree to which an innovation is perceived to be consistent with the existing values, past experience and needs of potential adopters. The greater the compatibility, the faster is the rate of technology adoption.
- ✚ **Simplicity** – that is the degree to which the innovation is perceived to be simple to understand or to use. In other words the simpler the innovation for understanding it will be more rapidly adopted than innovation that requires more complex understanding. More complex understanding require the adopter to develop new skills thus the rate of understanding, slows down the process of the diffusion,
- ✚ **Trialability** – that is the degree to which an innovation may be experimented on a trial basis before it really convince large majority of the adopters. If the innovation is not tested it is likely that the innovation will not succeed as expected. If an innovation can be broken down into parts and tried small portions at a time, the innovation has a greater chance for adoption.
- ✚ **Observability** – that is the degree to which the results of an innovation are visible to others. The easier for individuals to see the results of an innovation the more convincing the innovation to be adopted.

In general, the greater the relative advantage, compatibility, trialability, observability, and simplicity of the innovation, the more rapidly it will be adopted by individuals.

2.6. FACTORS AFFECTING STAFF'S ATTITUDE TOWARDS BANKING TECHNOLOGIES

Banks' staff' attitude and expectations towards banking information technologies are a crucial element in the development of successful banking technologies implementation (Constantine and Chaniotakis, 2005). Because so long as they are stakeholders of the technology, the adoption of technology is in part dependent up on their attitude. If banks' staff' have positive attitude, it will be easy to adopt the technology (Nath *et. al.*, 2001); and on the other hand if they have negative attitude towards the technology, they will resist the adoption of the technology (Mols, 2001). (Moore and Benbasat, 1991) argue that staff' attitude is the determinant factor of technology adoption.

Liao *et. al.*, (1999) also argue that targeted users may reject the new technologies for several reasons. Absence of user involvement, lack of an understanding, technical difficulties, lack of training, and insufficient support from top management and perceived complexity, are considered as the main affecting staff' attitude.

In their research conducted in Libya, Abukhzam and Lee (2010) have described factors affecting the attitude of banks' staff towards application of banking information technology. Some of them are fear of new responsibilities, fear of job losses, fear of losing autonomy, fear of losing customer relationship, lack of effective leadership, lack of training, lack of strategic IT plan, lack of appropriate technical knowledge amongst bank staff, IT terminology, availability of IT funds, poor IT infrastructure, lack of national IT expertise, fear of transaction error and fraudulent activities, poor security measures, confidentiality and privacy, system integration problem, system technical difficulties etc.

- ✚ **Fear of new responsibilities:** when new technologies are applied, it is obvious that they will come up with new way of doing things, which employees assume it as new responsibilities. Employees fear such responsibility and as a result develop negative attitude towards new technology adoption.
- ✚ **Fear of job losses:** bank's staff might have negative attitude towards the application of new banking technology anticipating it as a threat to their jobs. Because they perceive that application of modern banking technology reduces the labor force of the banks.
- ✚ **Fear of losing autonomy:** Bank's staff worry about possible vigilance of daily banking operations with the use of banking technologies. As a result they develop negative attitude towards banking technology.
- ✚ **Fear of losing customer relationship:** employees argue that the benefits of face of face interaction with their customers will be lost as result of banking technology implementation.
- ✚ **Lack of effective leadership:** employees act the way their leader act. If there isn't effective leadership style that could motivate employees towards implementation of modern banking technologies, the bank's staff will be reluctant about such technologies.
- ✚ **Lack of strategic Information Technology plan:** lack of strategic IT plan in the bank implies lack its attention to banking technologies. If the bank doesn't give due attention for banking technology, employees similarly might not worry about the implementation of banking technology.
- ✚ **Lack of training:** absence of Information Technology related training for employees make them passive about the use and application of banking technologies. As a result bank's staff will not give value for banking technologies and as a result might develop negative attitude towards such technologies.
- ✚ **Telecommunication infrastructure:** All interviewees identified that a lack of appropriate IT infrastructure is the main technical constraint preventing e-banking implementation in Libya. According to the literature, this acts as a barrier to IT adoption.
- ✚ **Compatibility (System integration problem):** bank's staff perceives that banking technology might not compatible with their existing banking systems.
- ✚ **Complexity (System technical difficulties):** Banks' staffs fear that new banking technology might be complex to adopt in many ways.
- ✚ **Fear of transaction error and fraudulent activities:** All interviewees expressed great anxieties about security issues such as potential fraudulent activities and errors in conducting customer transactions.
- ✚ **Poor security measures:** Absence of laws and legislations allowing e-contract and other related e-services.
- ✚ **Confidentiality and privacy:** Less standard security measures expressed by those responsible for IT are not up to the standard required in the banking industry.

- ✚ **Lack of appropriate technical knowledge amongst bank staff:** bank's staff with poor IT backgrounds will show a negative attitude towards banking technology application.
- ✚ **Availability of Information Technology funds:** this is related with lack of strategic plan. If there is no strategic plan for Information technology, there will not be budget for Information technology.

3. STATEMENT OF THE PROBLEM

Technology in general and information technology in particular has significant impact on quality and productivity of banking and finance sector (Batiz-Lazo and Wood, 2001). Marketing of banking service is changed as a result of the new electronic age, at which financial transactions are being conducted without the necessity of carrying money. And as a result of it, customers demand new and different financial product and service. Therefore, banks are indebted to apply the modern information technology to respond to such customers' needs. Information technology comes up with different products that ease the complexity of traditional banking system. Some of the information technology products that can be applied in the banking industry include Automated Teller Machine (ATM), mobile banking, and internet banking and so on. A study conducted in Kenya shows that ATM banking, Debit Card, Credit Card, Internet Banking, Tele Banking and Mobile Banking are the most widely used information technology products in the banking industry. (Nyangosi and Arora, 2010)

New competitive pressures have emerged due to the emergence of the modern information technology. This information technology innovation make consumers more perceptive and less dependable to a particular bank, and demanding of products and services that fit their specific financial needs and time schedules. To respond to consumer and market demands, banks must provide greater convenience, increase accessibility of financial services and products, and deliver new and better targeted products and services at a faster speed. (Boutt'e, 2001).

Some nations' banks are getting advantage of information technology and some others (especially developing nations) are lagging to exploit such opportunity. Banks in most developed countries have been investing on information technology and using it as means to increase bank productivity by reducing costs and improving operational efficiency (Ehikhamenor, 2003).

As discussed above information technology has greater role in organizations and brings forth profitability. Hence application of such technologies is unquestionable issue for banks. However, banks need to know what the response of end users, customers for which the technology is going to be installed, would be before coming in to action. Accordingly, such attitude of customers towards bank-related information technologies and their intention to use them are determined by different factors. Therefore, these factors need to be identified beforehand so that the technologies will be installed to be used by them. In Ethiopian context I found no research conducted to identify factors affecting customers' attitude towards bank-related information technology application in the banks. Therefore, conducting research in this area will be used an input for Ethiopian banks to make decision regarding information technology adoption.

4. RESEARCH OBJECTIVES

4.1. GENERAL OBJECTIVE:

The general objective of the study is to investigate factors affecting customers' attitude towards Information Technologies' adoption in banks.

4.2. SPECIFIC OBJECTIVES

- ✚ To identify the current status of banks' in IT application.
- ✚ To assess the attitude the staff towards application of banking technologies.
- ✚ To assess factors affecting attitude of customers to adopt banking information technologies.
- ✚ To assess the attitude of customers towards banking technologies.
- ✚ To assess the customers' intention of using banking technologies.

5. RESEARCH HYPOTHESIS

To investigate the significance of the variables affecting customers attitude towards acceptance of bank-related information technologies, the following hypotheses formulated.

Hypothesis 1: The *relative advantage* of using banking technologies does not affect the attitude of customers towards using banking technology.

Hypothesis 2: *Simplicity* of the banking technologies does not affect customer's attitude of banking technology.

Hypothesis 3: The *compatibility* of banking technologies does not affect the attitude of customers towards using banking technology.

Hypothesis 4: The *trialability* of banking technologies does not affect the attitude of customers toward using banking technology.

Hypothesis 5: The *observability* of banking technologies does not affect the attitude of customers towards using banking technology.

Hypothesis 6: The *attitude* towards banking technologies does not affect the intention of customers towards using banking technology.

6. METHODOLOGY OF THE STUDY

6.1. POPULATION, SAMPLING TECHNIQUE AND SAMPLE SIZE

Among the commercial banks operating in Mekelle city, Awash International Bank S.C, Dashen Bank S.C (Mekelle Branch), Bank of Abyssinia, Wegagen Bank S.C (Mekelle Branch) and United Bank S.C are selected as sample banks based on their year of establishment.

For the sake of similarity governmental banks are not part of this study. Unlike private banks whose primary objective is profit making, the main objective of governmental banks is providing service for the public. Their prime motive is the welfare of the general public. Of course both governmental banks and private banks may similarly require banking technology. However, the way that banks plan to apply such technologies is quite different. Governmental banks view banking information technology from the point of view of its fitness to public service.

On the other hand, private banks view application of banking information technology from the point of view of profitability. This means governmental banks and private banks might follow different IT policies. Therefore, the researcher thought that handling private and governmental banks together for research purpose is not reasonable. As a result, only selected private banks are considered in this study.

The target populations are the banks' customers, banks' staff, the banks' IT managers as well as the banks' branch managers of the selected banks.

Customers are targeted so as to know their attitude towards the banking information technologies; because they are the main stakeholders for which the technology is to be adopted; but the number of banks customers is not well known. In measuring attitude of customers, there are five variables that influence customer attitude towards banking information technologies. The impact of such attributes is therefore measured by regressing attitude over the five attributes. As cited by pallant (2007), Tabachink and Fidell (2007) said that the sample size can be determined by the number of independent variables in to account when multiple regression is to be used for analysis. And he formulated that $n > 50 + 8m$, where m is the number of independent variables. He added that in stepwise regression, 40 observations per independent variable determine the sample size. Based on Tabachink and Fidell formula the sample size of customers will be $n > 50 + 8 \times 5$, i.e. $n > 90$.

However, the researcher used 208 sample sizes, which is much greater than Tabachink and Fidell's assumption. The 208 observations are addressed using convenience sampling technique. All the enumerators involved in the study are assigned in all banks at a time and collected data from customers that are conveniently available for a period of one hour. This is thought to minimize the possibility of repetition, since there is a possibility for a person to be customer of more than one bank. The following table shows summary of selected respondents.

TABLE 1: PROPORTION OF SAMPLE SIZE OF CUSTOMERS

No	Name of bank	No of sample taken per period of an hr
1	Awash International banks S.C	35
2	Dashen Bank S.C	40
3	Bank of Abyssinia	43
4	Wegagen Bank S.C	48
5	United Bank S.C	42
Total		208

The number of banks' staff of all selected bank branches is 140. From this population samples of 103 banks' staff are selected based on the following formula using 95% confidence interval.

$$n_0 = \frac{N}{1+N(e)^2} \quad \text{Where } n_0 = \text{sample size}$$

N = population size

e = sampling error/level of precision

Proportional stratified sampling technique is used to select each individual bank's staff. $103/140=0.736$, which means 73.6% of each banks' staff are selected. In this context each banks are taken as a strata. The following table displays such information.

TABLE 2: PROPORTION OF STAFF'S SAMPLE SIZE

No	Name of bank	No of staff (population)	proportion
1	Awash international Banks S.C.	19	$0.736*19=14$
2	Dashen Bank S.C	33	$0.736*33=24$
3	Bank of Abyssinia	21	$0.736*21=16$
4	Wegagen Bank S.C.	40	$0.736*40=29$
5	United Bank S.C	27	$0.736*27=20$
Total		140	$0.736*140=103$

Furthermore, I used complete enumeration technique to select IT managers and branch managers, since there are only one IT manager and branch manager per bank. The summary information of target population, sampling technique and sample size determination is shown below.

TABLE 3: TARGET POPULATION, SAMPLING TECHNIQUE AND SAMPLE SIZE DETERMINATION

Target population	Sample size	Sampling Technique
Branch Managers	Five	Complete Enumeration
IT managers	Five	Complete Enumeration
Staff	103/140 (Yamane, 1967) $n_0 = \frac{N}{1+N(e)^2}$	Proportional stratified sampling followed by Convenience sampling technique
Customers	208; $n>50 + 8m$, where m is the number of independent variables; i.e. 5 (Tabachnick and Fidell, 2007)	Convenience sampling technique

6.2. DATA TYPE AND SOURCE

Only primary data is used in this study. The data is collected from the employees, customers and IT managers through questionnaire and from branch managers through semi-structured interview.

6.3. DATA COLLECTION

Questionnaires are distributed to collect primary data from the staff of the banks and customers and IT managers. The questionnaire of customers include all closed ended questions and the questionnaires of IT managers and bank staff include both open and closed ended questions. Moreover, data is collected from the branch managers through semi-structured interview. The reliability of the data collected from customers and employees through questionnaires is tested using Cronbach's alpha. Cronbach's alpha above 0.6 is acceptable to say that the data has internal consistency/reliability (Nunnally, 1978). The overall reliability of data collected from customers is found to have Cronbach's alpha value of 0.816. Similarly the data collected from staff's has Cronbach's alpha value of 0.711. The reliability of data collected from IT managers is tested by test-retest method and found to be reliable.

6.4. DATA PROCESSING AND ANALYSIS

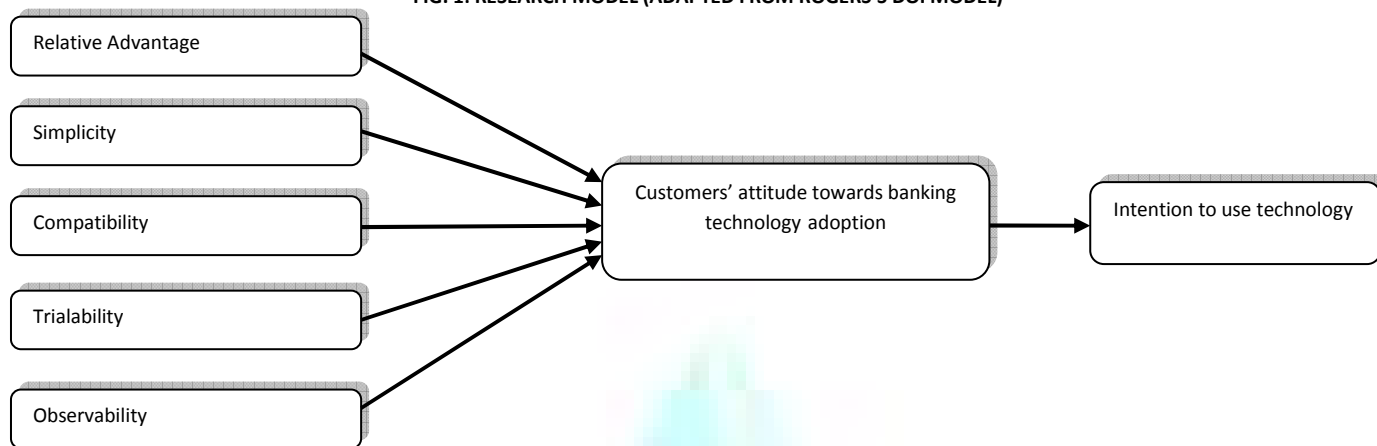
First, the primary data collected through questionnaire is edited and coded and then it is analyzed using STATA software. Descriptive analysis is used to achieve the first two objectives and multiple regression model is used to achieve the rest objectives. As Menard (1995) noted, when dependent variables are measured on an ordinal scale, treating the variable as though it were continuous does not seriously distort the findings. In this case, just you can use Ordinary Least Square regression or the other techniques we have discussed for continuous variables. Certainly, this is widely done, particularly when the dependent variable has 5 or more categories.

6.5. MODEL SPECIFICATION

Roger's Diffusion of Innovation Theory (DOI), used in this study, attempted to examine the factors that influence customers' attitude to adopt an innovation (Rogers, 2003). The theory set five variables or constructs that influence the attitude of individuals towards adoption of an innovation. These are relative advantage, simplicity, compatibility, trialability, and observability.

Based on the model, all the attributes positively affect the attitude of customers towards banking information technology products. Customer attitude internally positively affects the intention of customers to use the technology.

FIG. 1: RESEARCH MODEL (ADAPTED FROM ROGERS'S DOI MODEL)



Regressing the dependent variable attitude over the five independent variables help to know the impact of each independent variables on the dependent variable. Moreover, the significance of each of the independent variables will be determined based on their p-values. According to the coefficients of each of the independent variables, attitude of customers will be determined as follows. Based on the above information, the regression equation will be:

Attitude = $f(\text{relative_adv, simplicity, compatibility, trialability, observability})$

Attitude = $\beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5$

Attitude = $1.077 + 0.214x_1 + 0.032x_2 + 0.139x_3 + 0.142x_4 + 0.319x_5$

Where:

x_1 = relative advantage

x_2 = compatibility

x_3 = simplicity

x_4 = trialability

x_5 = observability

Similarly multiple regression model is used to know the intention of customers to use technologies based on attitude they have; i.e. attitude is independent variable and intention is dependent variable. Hence the impact of attitude on decisions of customers to use or not to use technology will be measured. Consequently the following regression equation is developed.

Intention = $f(\text{attitude})$

Intention = $1.88 + 0.57y$

Where: y = attitude

7. DISCUSSION AND FINDINGS

7.1. CURRENT STATUS OF SELECTED BANKS IT APPLICATION

According to the data collected from IT managers, the current status of IT application of the selected banks is analyzed below. The branch managers of the banks also confirmed the response of the IT managers. The following table shows current status of bank regarding the banking technologies.

TABLE 4: CURRENT STATUS OF IT APPLICATION OF BANKS

No	Name of Technology	Awash international Bank S.C	Dashen Bank S.C	Wegagen Bank S.C	Abyssinia Bank S.C	United Bank S.C
1	ATM banking Technology	x	✓	✓	x	x
2	Mobile banking Technology	x	✓	x	x	✓
3	Internet Banking technology	x	x	x	x	✓
4	Tele banking technology	x	x	x	x	✓
5	Debit card technology	x	x	x	x	x
6	Credit card technology	x	✓	✓	x	x

KEY x Do not apply the technology

✓ Applied the technology

As we can see from the above table, most of the banks do not apply the modern banking technologies. Relatively Dashen Bank S.C and United Bank S.C have better installed banking technologies than others. Dashen bank has installed ATM banking technology, Mobile banking technology (Dashen Modbirr) and credit card technology. United Bank S.C. has also installed mobile banking, internet banking and tele-banking. Wegagen bank S.C has installed ATM banking technology and credit card technology. Abyssinia Bank S.C and Awash International Bank S.C are still looking for the modern banking technology.

Based on the interview with the branch managers, the banks have planned to apply uninstalled technologies in the near future. All banks have short term plan to apply most of the available banking technologies by studying their feasibility, as the branch managers explained. Dashen bank S.C (Mekelle branch) manager said that the bank is preparing itself to apply Tele-banking and Internet banking. The manager of United bank S.C (Mekelle branch) said that the bank will apply ATM banking technology and Credit card technology.

According to the interview with the branch manager of Awash International Bank S.C, the bank will install ATM banking technology and core banking system in the near future. Similarly the branch manager of Wegagen Bank S.C (Mekelle branch) asserted that Core banking system and mobile banking system are planned to be applied in the near future. United Bank's manager on his behalf said that it will apply ATM banking in the near future.

7.2. STAFF'S ATTITUDE TOWARDS INFORMATION TECHNOLOGY APPLICATION IN BANKS

To measure banks' staff attitude towards application of information technology in banks, the researcher finds out the mean score of responses of all staff to each individual question. This helps to reveal average response of the staff to each question. Then the mean of the staffs' response is calculated to determine whether employees have positive or negative attitude. The questionnaire is designed using 5 rating likert scale questions which begin with 1, which represents strongly disagree, and ends with 5 which represents strongly agree. Similarly, 2 represents disagree, 3 represents neutral and 4 represents agree.

TABLE 5: ATTITUDE OF STAFF TOWARDS APPLICATION OF IT IN BANKS

No	Factors affecting staffs attitude to the technology adoption	Minimum	Maximum	Mean of Scores
1*	It will add new responsibilities on employees.	1	4	2.194
2*	It technologies lead employees to lose their position or jobs.	2	5	4.068
3*	It causes lose of autonomy of bank's staff	1	5	3.738
4*	It lead to lose customer relationship	1	5	4.01
5*	bank leaders might push technological failures and responsibilities back to the bank staff	1	4	3.272
6*	Since there is no training concerning the banking technologies, application will be difficult.	1	3	2.612
7	Application of banking Information technology saves service operating time.	1	5	4.165
8	Banking information technologies speed up transactions.	1	5	4.214
9*	Lack of appropriate technical knowledge amongst bank staff might make Banking information technologies application complicated.	1	4	2.563
10	Banking information technology increases accuracy of service	1	5	4.146
11*	It is better to use existing banking system than applying new banking information technology, because it is costly.	1	5	3.67
12*	In current infrastructure (electric power availability, NW, and others), it is difficult to apply banking information technology.	1	4	2.709
13*	Previous IT professionals are based on previous innovation. So it might difficult to apply new technology with no professional to manipulate such new technology.	1	4	2.942
14*	Application of new technology lead bank's staff to make more transaction error since it is new for the staff.	1	5	3.087
15	Banking information technology increases service quality.	1	5	4.029
16*	It is difficult to be confident on the security of manmade technologies for monetary activities.	1	5	3.204
17	There is threat of compatibility of the technology with the existing banking system.	1	4	3.01
18*	Banking information technology might be complex to operate.	1	5	3.563
19	Banking information technology reduces operation cost	1	5	3.66
20	Banking information technology helps the organization to be profitable.	1	5	4.078
21	Banking information technology Support collaboration and sharing of information	1	5	4.107
22	Banking information technology increase organization efficiency	1	5	4.301
23	Banking information technology increase organization effectiveness	1	5	4.32
24	Banking information technology increase organization competitiveness	1	5	4.262
25	Banking information technology eliminates time and space constraint.	1	5	4.087
AVERAGE RESPONSE SCORE OF ALL RESPONDENTS TO REGARDING THE FACTORS				3.64

* Items whose weights are set reversed because they have negative content.

The calculated mean of responses' of the banks' staff response is found to be 3.64. This shows that employees have positive attitude towards the application of information technology in banks. Most of the banks' staff gives high degree of intensity for the parts of the questions which explain benefit of the banking technology for the banks and for the staff indicating that banking technologies are helpful for the staff and for the banks. According to the staff, banking technologies increase profitability of banks by increasing efficiency and effectiveness of bank activities. They agreed that banking technologies save time by speeding up transaction. They also reduce service cost, increase accuracy and service quality.

On the other part of the questions, which include issues about the influence of the technology on the banks' staff, they gave low level of intensity showing that technologies have negative impact on banks' staff. Most of the banks' staff responded that application of information technology in banks will add new responsibilities on staff, let the staff to lose existing accustomed position, lose of autonomy and consequently might lead to lose of job. They, in general, perceived that application of information technology will negatively affect their work environment, though its benefit in improving the efficiency and effectiveness of the service delivery system is undeniable.

The mean of means value, which is 3.64, is not more far from the median (bench mark) value. From the response, it is possible to infer that this is because of staff's wrong perception on IT application regarding the influence of the technology in the job environment of the staff.

7.3. TESTING THE HYPOTHESES

In this section, the hypotheses formulated based on the five variables of Rogers's Diffusion of Innovation (DOI) theory are tested to check how much they predict attitude of customers towards bank-related information technology products.

TABLE 6: STATA REGRESSION OUTPUT FOR THE ATTITUDE AND THE FIVE VARIABLES

Number of obs = 208, Prob > F = 0.0000, R-squared = 0.5373

DEPENDENT VARIABLE - ATTITUDE		
Explanatory Variables	B-value	P-value
Observ	0.3193707	0.000*
Trialability	0.1416296	0.006*
Simplicity	0.1394393	0.005*
compatibility	0.0324876	0.592
relative_adv	0.2136537	0.004*
Constant	1.076773	-

* Statistically significant at 1%

The above table presents the results from the multiple regressions carried out using the five variables: relative advantage, simplicity; compatibility; observability and trialability as the independent variables and attitude as the dependent variable.

Based on the table above, we can know the goodness-of-fit of the model in general. The p-value of the model is 0.000. This means the probability of variation in the dependant variable to occur by chance (not to be affected by the explained independent variables) is 0.000. This will result in the following null hypotheses.

$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

$H_0: \beta_1=0; \beta_2=0; \beta_3=0; \beta_4=0; \beta_5=0$

Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. This shows that the beta coefficients of the independent variables are different from zero. Hence, the model can be used to predict attitude based on the explanatory variables.

The table shows R-squared values of 0.537, that indicates how much of the variation of the dependent variable is explanatory variables. Hence, 53.7% of variation of the dependent variable, attitude, is explained by the independent variables observability, simplicity, relative advantage, trialability and compatibility; and the rest 46.3% is determined by unexplained factors.

7.3.1. TESTING HYPOTHESIS ONE

Hypothesis 1: *The relative advantage of using banking technologies does not affect the attitude of customers towards using banking technology.*

Respondents perceived that getting service via banking technologies provide safety and convenience. Most of the customers respond that using banking technology to get bank service provides different advantages over the traditional banking system. Using banking technology reduces/avoids waiting time. According to them, banking technologies are better in accuracy. Moreover, respondents appreciate the modern banking services for their anytime banking service delivery, which breaks many of the customers' restrictions to get the banking service.

Their response shows that the advantages of using banking technologies have enabled customers to develop positive attitude towards banking technologies. Some of these advantages include speed (time saving), convenience, anytime banking service, safety and so on.

Based on the p-value (0.004), relative Advantage was found to have a significant effect on customers' attitude towards using banking technologies at 1% significance level. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. Hence, the relative advantage of using banking technologies positively significantly affects the attitude of customers towards using banking technology.

7.3.2. TESTING HYPOTHESIS TWO

Hypothesis 2: *Simplicity of the banking technologies does not affect customer's attitude of banking technology.*

The simplicity of a technology affects how well customers view the technology and develops a certain attitude. Based on their response, customers agreed that banking technologies are not complex to adapt. They are simple to operate which enable customers to get self-service. Getting self-service provides customers an ability of control over their transactions. Most of customers respond that they are confident in banking technologies. According to its p-value (0.005), simplicity is found to be significant at 1%. Hence the null hypothesis is rejected and the alternative hypothesis is accepted. As a result the simplicity of the technology is found to significantly affect attitude of customers towards banking technologies.

7.3.3. TESTING HYPOTHESIS THREE

Hypothesis 3: *compatibility of the banking technologies does not affect the attitude of customers towards using banking technology.*

The response of customers indicates that banking technologies do not contradict with the culture, as well as cultural feasts and festivals of the society; but they are not compatible with the local language of the customers and all customers cannot use banking technologies equally. From the responses of customer it is possible to infer that inability of the banking technologies to accommodate the local language is critical factor that will be an input to develop negative attitude for the customer. Of the five constructs, compatibility has the least impact on attitude. It is found to positively contribute to the research model, $\beta = 0.032$. Although compatibility positively influences the attitude of customers towards banking technologies, it is statistically insignificant even at 10% significance level as shown in the above table. Hence, the null hypothesis which says "compatibility of the banking technologies does not positively significantly affect the attitude of customers towards using banking technology" is accepted; and the alternative hypothesis is rejected.

7.3.4. TESTING HYPOTHESIS FOUR

Hypothesis 4: *Trialability of the banking technologies does not affect the attitude of customers towards using banking technology.*

According to their response, customers can easily try banking technologies, without incurring significant cost, and then join to be actual customer. Moreover, they responded that it is not costly to switch off, if the technology is found to be uncomfortable due to some reasons. Like other constructs, trialability also positively affect attitude of customers to accept and use the technologies. And it is statistically significant at 1%. Hence, the null hypothesis is rejected; i.e. trialability of the banking technologies significantly affects the attitude of customers towards using banking technology.

7.3.5. TESTING HYPOTHESIS FIVE

Hypothesis 5: *Observability of the banking technologies does not affect the attitude of customers towards using banking technology.*

Observability has the highest beta-value; and it is significant at 1% significance level. This shows that customers attitude towards banking technology is highly affected by the observability of the results of technologies. When customer observe that banking technology is avoiding queue, waiting time, distance and related problems of the traditional banking system, that is completely dependent on the opening of the branch office, they easily tend to use the banking technologies. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. Among the five constructs, observability has the highest impact on attitude of customers towards banking technology.

7.3.6. TESTING HYPOTHESIS SIX

Hypothesis 6: *The attitude towards banking technologies does not affect the intention of customers towards using banking technology.*

Hypothesis-6 is concerned with the impact of attitude on intention. But before testing its significance, it is better to regress it first.

TABLE 7: STATA REGRESSION OUTPUT OF INTENTION AND ATTITUDE

Number of obs = 208, Prob > F = 0.0000, R-squared = 0.3521

DEPENDENT VARIABLE - INTENTION

Independent Variable	B-value	P-value
Attitude	0.5702486	0.000*
Constant	1.88137	-

* Statistically significant at 1%

Table 8 shows R-squared value of 0.3521. This means that 35.2% of variation in intention of customers to use technology is explained by their attitude. The output of the regression depicts that the model is appropriate to be used for the given data. As explained in the above regression model, (prob>F) value that represents probability that variation on intention to be occurred by chance is 0.000 (i.e. intention is influenced by attitude).

This hypothesis is also tested using p-value of the dependent variable. As we can see from the table, attitude significantly affects intention to use technology at 1% level of significance.

7.3.7. SUMMARY OF HYPOTHESES RESULTS:

TABLE 8: HYPOTHESES RESULTS

Hypothesis	Result
H ₁ : The <i>relative advantage</i> of using banking technologies does not affect the <i>attitude</i> of customers towards using banking technology	Rejected
H ₂ : The <i>simplicity</i> of the use of banking technologies does not affect the <i>attitude</i> of customers towards using banking technology	Rejected
H ₃ : The <i>compatibility</i> of banking technologies with the adopter's values does not affect the <i>attitude</i> of customers towards using banking technology	Accepted
H ₄ : The <i>trialability</i> of banking technologies does not affect the <i>attitude</i> of customers toward using banking technology	Rejected
H ₅ : The <i>observability</i> of banking technologies does not affect the <i>attitude</i> of customers towards using banking technology	Rejected
H ₆ : The <i>attitude</i> towards banking technologies does not affect the <i>intention</i> of customers towards using banking technology.	Rejected

7.3.8. ATTITUDE OF CUSTOMERS TOWARDS BANKING TECHNOLOGIES

The questionnaire delivered for the respondents contains five rating scales that ranges from one, which is strongly disagree to five which is strongly agree. The variables are fed to STATA software in order to predict the overall attitude of customers towards banking technologies. And STATA output provides the following coefficients of independent variables.

TABLE 9: COEFFICIENTS OF INDEPENDENT VARIABLES AND THE CONSTANT

Independent Variables	β - value
Relative Advantage	0.2136537
Simplicity	0.1394393
Compatibility	0.0324876
Trialability	0.1416296
Observability	0.3193707
_Const	1.077

The beta values of variables shown above indicate that all the independent variables have positive impact on the dependent variable.

Hence, the regression equation will be:

$$\text{Attitude} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5$$

$$\text{Attitude} = 1.077 + 0.214x_1 + 0.032x_2 + 0.139x_3 + 0.142x_4 + 0.319x_5$$

Where:

x_1 = relative advantage x_4 = trialability x_2 = compatibility x_5 = observability x_3 = simplicity

The beta values of the five variables and their influence on attitude is shown in the above table. The attitude of customers towards banking technologies is, therefore, calculated based on the derived regression equation.

For example, the attitude of respondent 1 can be calculated in the following manner. Here are the responses of respondent1 for the five attributes.

Relative advantage=3.166667

Compatibility=3.666667

Simplicity=4.166667

Trialability=3.5

Observability=3.0

Then:

$$\text{Attitude} = 1.077 + 0.214x_1 + 0.032x_2 + 0.139x_3 + 0.142x_4 + 0.319x_5$$

$$\text{Attitude} = 1.077 + (0.214 \times 3.166667) + (0.032 \times 3.666667) + (0.139 \times 4.166667) + (0.141 \times 3.5) + (0.319 \times 3)$$

$$\text{Attitude} = 3.905167 = 3.9$$

This shows that respondent 1 has positive attitude towards banking technologies. The attitude for the other customers is calculated in the same manner; and lastly the overall attitude of customers is calculated by taking the mean value of each respondent's attitude values. This result is found to be 4.35, which indicates that customers have positive attitude towards banking technologies.

This shows customers' have positive attitude towards banking technologies in that banking technologies have good relative advantage compared to the traditional banking system, they are somehow compatible with the customers' needs, simple to operate, trialable and its result is observable by other.

7.3.9. INTENTION OF CUSTOMERS TO USE TECHNOLOGY**TABLE 10: COEFFICIENTS OF THE INDEPENDENT VARIABLE AND THE CONSTANT**

Variable	β - value
Attitude	0.57
_const	1.88

As assured in the regression, 35.2% of the variation in intention of customers is affected by the variation in their attitude. And customers are found to have positive attitude towards banking technologies. This gives a clue that customers might have intention to use technologies. Based on the outputs of the regression equation the intention of customers to use the technology is calculated as follows.

$$\text{intention} = \beta_0 + \beta_1 y, \text{ where } y = \text{attitude}$$

$$\text{intention} = 1.88 + 0.57y$$

According to this regression equation the intention of the first respondent will be:

$$\text{intention} = 1.88 + 0.57 \times \text{attitude}$$

$$\text{intention} = 1.88 + 0.57 \times 4$$

$$\text{intention} = 4.16$$

Since 4.16 is 1.16 far from the median, we can say that respondent 1 has high intention to use the banking technology.

Similarly the intention of the rest 207 customers is calculated and the average intention value is found to be 4.3. This shows that customers have intention to use banking technologies.

8. CONCLUSION AND RECOMMENDATION**8.1.1. CONCLUSIONS**

The purpose of this research was to investigate factors affecting customers' attitude towards bank-related information technologies in banks operating in Mekelle city. According to the response of customers, they have positive attitude to bank-related information technology application in banks. It is also discovered that customers have intention to use such technologies. More over the significance of some of the factors that affect customers' attitude are tested. The regression output indicates that all the variables affecting customers' attitude have positive impact on their attitude towards bank-related information technology application in banks. All variables are found to be significant at 1% significant level except compatibility, which is insignificant even at 10%. Similarly attitude of customers, that in turn determines their intention, is found to be significant at 1%; that contributes customers to have intention to use bank-related information technology results.

8.1.2. RECOMMENDATIONS

- Nowadays, customers are more perceptive and less dependable to a particular bank, and demanding of products and services that fit their specific needs. As expressed in the findings, customers' demand of using banking technologies has increased. Therefore, those banks who have applied some technologies should install other extra banking technologies; and those banks that are lagging to adopt the modern banking technologies should follow the footprint of the banks who have applied to take advantage of latter adopter opportunities.
- The current Ethiopian education system is promising that there will be literate customers than ever before. Besides, banks should use media in order to introduce the technology to the customers. They could prepare pamphlets to provide tutor about operation of the applied technologies for their customers.

- In Ethiopia, there was no legal and regulatory framework for electronic services. This was because of absence of electronic services for which regulation is to be set. But now since there is emergence of electronic services in banks and other institutions, banks should collaborate with other e-service providing institutions and request government to set legal framework to handle electronic services.
- Banks should formally discuss with the Ethiopian telecommunication corporation so that the frequent network interruption problem will be alleviated.
- Banks should build the capacity of the banks' staff by providing corresponding/relative trainings to get them fit with the adopted technology.
- Banks should be committed enough to cope-up with challenges result from technology application by developing good IT policy rather than frustrating and ignoring to apply information technology, so long as IT is found to increase efficiency and effectiveness of the transaction activities and profitability of the bank altogether.
- Banks should try to have optional user interface developed with the local language of the customers so that customers can easily communicate with the technologies to execute their transactions.
- Banks should use highly secured authentication/authorization systems which protect applications by verifying user identity and password, providing access to devices based on authentication given for the user. They should also assure customers that they will take risks which might result from system failures.
- Banks should create awareness for their staff that application of banking technology will not negatively influence their working environment and assure them that application of information technology in the bank will not let them lose their job and or autonomy. And the banks should show a sense of accountability for their staff with respect to job related risks that might be caused by application of information technology in the bank. This will make the staff to have sense of belongingness and strive for the successfulness of the organization's goal instead of feeling as any ordinary employee.
- Banks who have installed technologies should try to customize them in such a way they agree with their customers.
- Banks should install information technology products that are simple to operate; compatible with the living style, working hours, local language and societal cultures; whose results are observable so that they will easily get adopted by customers.

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