CAPITAL INVESTMENT DECISIONS ON INFORMATION TECHNOLOGY AND ITS IMPACT ON THE PERFORMANCE OF PRIVATE COMMERCIAL BANKS IN ETHIOPIA

By

RAHEL AFEWORK

Addis Ababa University

Collage of Business and Economics

Department of Accounting and Finance

March, 2016

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Advisor: ASMARE EMERIE KASSAHUN (PhD)

A Thesis Submitted to the Department of Accounting and Finance of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Arts in Accounting and Finance.

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Approved by Board of Examiners

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Name of Advisor	Signature
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Name of Internal Examiner	Signature
_____	_____
Name of External Examiner	Signature

STATEMENT OF DECLARATION

I, Rahel Afework, hereby declare that the thesis work entitled "Capital Investment Decisions on Information Technology and Its Impact on the Performance of Private Commercial Banks in Ethiopia" submitted for the partial fulfillment for degree of Masters on Accounting and Finance from Addis Ababa University, Faculty of Business and Economics, Department of Accounting and Finance is my original work and it hasn't been summited for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution.

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Name: Rahel Afework Araya

Signature _____

Date _____

Confirmed by Advisor

Name: Asmare Emerie Kassahun (PhD)

Signature _____

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STATEMENT OF CERTIFICATION

I certify that the thesis work entitled “Capital Investment Decisions on Information Technology and Its Impact on the Performance of Private Commercial Banks in Ethiopia” is the work of Ms. Rahel Afework, who carried out the research under my guidance. I certified further to the best of my knowledge, the work reported herein doesn’t taken from part of any other project report or dissertation on the bases of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Advisor: Asmare Emerie Kassahun (PhD)

Signature: _____

Date: _____

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ACKNOWLEDGMENTS

First and foremost I would like to give my thanks for the almighty **GOD** and **St. VERGIN MARRY** for all things that have been done for me and for being guardians though good and rough times of my life.

Next my biggest gratitude goes to my advisor **Dr. Asmare Emerie Kassahun (PhD)** for his assistance and valuable guidance in the preparation of this study.

It is my pleasure to give my appreciations for all commercial banks managers and staff members who helped me without any hesitation while I was collecting data for the study.

I am sincere to give my thanks to my beloved families my mom **W/ro Zebenay Kassa** and My Father **Ato Afework Araya** for their unconditional love and support. Next, I am grateful for all my friends, classmates and work colleagues for their understanding and moral support that is what kept me moving forward.

Finally, my deepest gratitude goes to my beloved brother **Abel Afework**, for his unlimited support and carrying both on my academic and personal life all the way until now.

Thank you very much!!!

LIST OF ACROYMS

ARR- Accounting Rate of Return

AIB- Awash International Bank

ATM- Automatic Teller Machine

BLUE- Best Liner Unbiased Estimator

BOA- Bank of Abyssinia

CA- Capitalization

CAPM- Capital Asset Pricing Model

CLRM- Classical Regression Model

DB- Dashen Bank

DEA- Data Envelopment Analysis

EFS- Efficient Structure Hypothesis

G&EXP/S- General and Administrative Expense

GDP- Gross Domestic Product

IN– Inflation

IRR- Internal Rate of Return

IS- Information System

IT-Information Technology

LA- Labor

MOC-Market Concentration

NBE- National Bank of Ethiopia

NGO- Non Governmental Organizations

NIB- Nib International Bank

NIM- Net Interest Margin

NPV- Net Present Value

OECD- Organization for Economic Co-operation and Development

OEXP/S- Operating Expense to Sales

OI/A- Operating Income to Asset

OI/S- Operating income to Sale

POS- Point of Sales

ROA- Return on Asset

ROE- Return on Equity

ROI- Return on Investment

ROS- Return on Sales

SCP- Structure Conduct –Performance

SFA- Stochastic Frontier Approach

UB- United Bank

USA- United States of America

WB- Wogagen Bank

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ABSTRACT

Over the years various studies have been made on the relation between technological investments and the performance of commercial banks and contradicting results were observed among researches. The purpose this study is to evaluate capital investment decisions on information technology and its impact on the performance of private commercial banks in Ethiopia. In order to achieve this objective mixed research approach with qualitative and quantitative methods is used on panel data of 6 private commercial banks for period of ten years starting from 2005 to 2014. The relation between dependent and independent variables is analyzed using multiple regression model by taking banks profitability measure ROA as dependent variable and IT capital, labor, capitalization, market concentration, and inflation as independent variables using OLS random effect model on Eviews 8. From the study result, except for IT capital the rest of explanatory variables show statistically significant impact on the ROA. The main variable shows there is positive relation between banks IT investment and profitability but the degree of impact measured as statistically insignificant. It is also observed that private commercial banks in Ethiopia has low experience of evaluating information technology investments before and after investment is made. In general the research concluded that banks will have better future with more technological advancements, if they are able to make sound information technology related investments with good management and IT governance system.

***Key words*: IT capital, commercial banks performance, IT impact on performance**

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

In today's complex business environment, there are six key assets in an organization namely, human, financial, physical, intellectual, IT, and relationships (Weill and Ross 2004). Among these assets IT investment is an important element in firms' value creation process and has grown to be the largest category of capital expenditures in businesses. It is also playing important role on creating competitive advantage for businesses within the industry they are operating in. Organizations view investments in IT as a way to combat competition by improving productivity, profitability, and quality of operations (Devaraj and Kohli, 2003). Since they can obtain such benefit from investment made on IT, organizations are willing to invest enormous amount of capital on this asset.

Firms all over the world have been making considerable investment on information and communication technologies aiming to increase the efficiency of both their internal processes and their transactions with customers, suppliers and business partners (OECD, 2008). In response to or anticipation of changes in their environment, most organizations are deploying information technology at an increasing rate for reasons of survival and to have competitive advantage.

Due to a pervasive and steadily growth of information and communication technology, world's banking industry is entering into new phenomena of unprecedented form of competition supported by modern information and communication infrastructure. Now a day's commercial banks and information technology products are two sides of a coin which cannot be separated. In order to deliver quality customer service and to stay competitive in the market, banks have to adopt information technology products and upgrade their service quality. Information technology investments in banks are any IT related investments made to enhance better customer service; such as core banking software, Electron banking like POSs, ATMS, mobile banking, internet banking and also any software and hardware used on daily activists of the bank.

Even though the banking system in Ethiopia is still highly dependent on cash transactions, in order to customize the benefits of IT, Ethiopian financial institutions especially commercial banks are determined to upgrade themselves with major technological advancements. As a result most commercial banks are using E-banking products to deliver service and are encouraging their customers to be part of this advancements.

Unlike that of other investments, IT investments are difficult to relate and measure with organization performance. Measuring the benefits out of costl2 is difficult because due to the fact that benefits from information technology are dynamic and most of the time intangible. As a result most organizations choose to ignore to measure the returns of information technology investment.

IT investment decision makers are confused and frustrated because they are unable and find it very difficult to justify their IT investments by using existing tools of performance and success measuring methods. Researchers have developed many IT success models to help managers to measure the performance of their IT (DeLone and McLean, 1992, 2002; Seddon, 1997; Robey and Boudreau, 2000). The major problems with these models are: First, they cannot be applied to all contexts and to all types of information systems. Second, these models show how to evaluate IT success independently from other organizational variables such as structure, strategy, and processes. Lastly, the values of these measurements may sometimes lead to confusion because they are not compared to a set of predefined expected values that define success to the organization (Hafid Agourram and Amine Nehari Talet, 2006).

Even though it is difficult to evaluate investment made on information technology, its evaluation and investment decision has to be done in relation to the objective of the organization (Eyob Dagne 2010). In this regard one of the widely accepted goals of a corporation is corporate value maximization, i.e. the investment on IT should be seen by its impact on this value creation on goal of the firm.

The worthy of information technology within an organization has been reason for many scholars to study the area, as a result for longer period many studies have been made to define the cost benefit relation of information technology investments in order to get convincing evidence that organizations are highly benefited from their IT investment regardless of the large amount of capital that is incorporated.

1.2. Statement of the Problem

Currently, it is becoming difficult for firms to become competitive without information technology. The most obvious example is perhaps the banking industry, where through the introduction of IT related products as internet banking, electronic payments, security investments and information exchanges, banks now can provide more diverse services to customers with less man power and shorter period of time. Seeing this pattern of IT investment growth, it seems obvious that IT is believed to bring about its share of contribution to organizations profit.

Organization investment decision on information technology is one of the most critical and enormous amount of fund requiring investment. Most organization currently depending on information technology to be competitive on ever increasing sophisticated world.

The return on Investment and the use of Information Technology (IT) starting from the beginning has been targeted for evaluation. Statement from R. Solow (1987) asserts that IT investments were not giving a return to its investors. Other studies also prove that there exists "productivity paradox" meaning poor relationship between IT and its contribution to organization performance improvement (Dos Santos et al. 1993, Strassman 1990). However, latter studies indicated that there is a positive relationship between IT investment and organizations performance (Brynjolfsson 1993, Brynjolfsson & Hitt 1996, 1998 & 2003).

Ethiopian financial institutions especially commercial banks, just like other financial institution worldwide, are highly information technology (IT) dependent. Banks daily operations, which have direct relation with their customers or internal activity, are facilitated by products and services of IT. And they are intended to invest large amount of capital on information technology to stay competitive in the industry.

Even though Ethiopian commercial banks investment on Information Technology is growing through time, there are not enough studies made on the relationship between these investments and profitability or performance of the investing institutions. The few empirical studies made on this area indicated that Ethiopian commercial banks are experiencing return from investments made on information technology (Eyob, 2010 & Tadesse, 2014). Whether the IT investment has a positive

outcome to the company or not is difficult to measure. In other words, the benefits are many, but they are in some cases difficult to capture.

Despite the great importance of IT within the organization, difficulty of measuring return of the large amount of capital invested and evaluating its impact on firm's value inspired the researcher to investigate the area and find some gaps faced by most commercial banks in Ethiopia.

1.3. Objective of the Study

1.3.1. General Objective of the Study

The general objective of the study is to evaluate the impact of Information Technology investments on the performance of Ethiopian Financial Institutions specifically private commercial banks.

1.3.2. Specific Objectives of the Study

With a view to achieve the above general objective, the study has the following specific objectives:

- To evaluate whether the decision to invest on IT was made by evaluating the pros and cons of the investment through the formal investment appraisal tools.
- To determine to what extent has IT dominating the Ethiopian banking industry and what factors the investment decisions.
- To understand how and to what extent the application of IT within firms leads to improved banks performance.
- To assess the possible challenges faced by Banks while investing on information technology.

1.4. Research Question

The study attempts to answer the following research questions:

- How do private commercial banks in Ethiopia make capital investment decision on information technology?

- To what extent IT has been dominating the Ethiopian banking industry and what factors determine for investment decisions?
- How and to what extent does the application of IT within firms lead to improve organizational performance?
- What are the possible challenges faced by organizations while investing on information technology?

1.5. Research Hypothesis Tested

Subsequent to the stated objective the following hypothesis is tested in order to evaluate the impact of IT capital investment on performances of Ethiopian private commercial banks.

H1: Capital Investment on IT makes positive contribution to profit of Ethiopian private commercial banks.

1.6. Significance of the Study

When compared to the growing trend of Ethiopian commercial banks to invest on Information Technology, more number of studies should have been conducted up to now to study the impact of IT investment on companies' performance. One of the factor that motivated the researcher to study this area is the lack of sufficient study made on the topic. This study contributes to the knowledge on the area and can also give chance for other researchers to have insight on the study area and to make further detailed study on the subject matter.

The study attempted to assess the capital investment trend of commercial banks in Ethiopia on IT and its pay off in relation to huge amount of capital invested. The study also address capital investment evaluation criteria in relation to information technology investment and explore the extent of information technology utilization within commercial banks in Ethiopia. The study's findings help commercial banks to capture the impact and pay off of the investment they made on Information Technology.

1.7. Scope and Delimitation of the Study

To study the capital investment decision on information technology and its impact on the performance of commercial banks in Ethiopia, the study is primary limited to private commercial banks that have been in operation at least for the last ten years and with relative same average IT capital. The size gap between private and public banks limited the researcher to focus on private banks only on this study.

Because IT capital is part of assets of commercial banks, only one dependent variable is selected which is ROA. The study is limited with four major determinants of performance of commercial banks as control variables because it is not significant to use more bank performance determinants on the current study objective.

1.8. Organization of the Study

The study is organized in five chapters. Chapter one provides the introduction which consists of background information, problem statement, research objective, research question, significance and limitation of the study.

Chapter two provides detail review of the study area. The third chapter discusses the methodology of the research. The research design, research method and hypothesis are explained in this chapter starting from how the data collection instrument was prepared to how the collected data was analyzed.

Chapter four presents the empirical findings and analysis of the study with interpretations. And the last chapter, chapter five, presents conclusion based on the analysis result and recommendations provided by the researcher.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1. Theoretical review

Under this section of the chapter of the theoretical review of information technology and its relation with the performance of banks is addressed.

2.1.1. Organization Performance

Organizations have an important role in our daily lives. Successful organizations is a key ingredient for development of nations as a result they are considered as an engine for every social, political and economic phenomena (Corina. G, Liviu. I. and Roxana. S, 2011). Due to this fact keeping continuous performance growth within an organization is the main goal of every management.

Organization performance have been defined in many ways by various literatures, Georgopoulos &Tannenbaum (1957: p. 535) define organizational performance as the extent to which organizations, viewed as a social system, and fulfilled their objectives. Organization performance is set of financial and non- financial indicators which offer information on the degree of achievement of objectives and results (Kaplan& Norton, 1992 as cited in Lebans & Euske 2006). Vorhies and Morgan (2005) said firm performance is a three dimensional construct that comprises the dimensions of customer satisfaction, market efficiency and corporate profitability. In general organization performance is the state on which organizations find themselves while achieving their goals and objectives.

Organizations performance can be determined by various factors which can be either internal or external factors. Internal factors are situations or conditions happened within the organization on which the organization itself have control over them while external factors are conditions outside the organization and beyond the control of management.

Company size, number of employees, management philosophy, organization structure and others can be mentioned as internal factors that can determine the performance of organizations whereas macro-economic factors such as GDP growth, inflation, tax, competition, government rules and regulations can be taken as external factors which can determine the performance of organizations.

2.1.2. Organization Performance Measurement

The performance measurements and its indicators were variously described by different scholars. Tze and Boon (2008) said performance measurement is a periodic measurement of improvement towards a long and short period goals and revealing of the outcomes to the decision makers so as to enhance program performance. Heshmati and Loof (2008) stated that a measure of firm performances consists of financial and operational aspects. Likewise Idirs(2008) measure firm performance with the return on investment and cost reduction in a study of the relationship between technology investment and firm performance.

Cemal Zehir et al (2010, p -146) also describe organization Performance evaluation have two criteria's qualitative criteria such as job satisfaction, organizational commitment, and perception of justice and quantitative criteria such as profitability, investment return ratio, and sales growth. Robert B. Carton (2004) further elaborated organizations performance measurement criteria's in to five sections accounting measures, operational measures, market based measures, survival measures, and economic value measures. The most common measurements accounting and operational measurements are discussed below.

i. Accounting Measures

Accounting measures refer to variables that can be derived from the three basic financial statements of all businesses, namely balance sheets, income statements, and statements of cash flows. Most accounting measures are generally expressed as values, ratios, or percentages (Robert B. Carton2004).

Financial performance measure the organization's basic economic targets. Increase in profitability and reduction on the operational cost and overall expenditures of the organization can be used as major financial performance indicators. Profitability and cost ratios such as return on assets (ROA), return on investment (ROI) and return on sales (ROS) and also total operating expenses to

sales (OEXP/S), and General and Administrative expenses to sales (G&A/S) are the most widely used measures to evaluate the financial performance of an organization (Eyob Dagne 2010).

ii. Operational Measures

Operational measures include variables that represent how the organization is performing on non-financial issues. Measuring performance on non-financial dimensions has received renewed attention over the past many years as corporations have adopted a "balanced scorecard" approach for the integration of strategy and performance measurement (Kaplan 1984; Kaplan & Norton 1992). These variables include market share, changes in intangible assets such as patents or human resources skills and abilities, customer satisfaction, product innovation, productivity, quality, and stakeholder performance.

By using both accounting and operational measures it is easy to evaluate both the qualitative and quantitative sides of organizations operation. The primary advantage to using operational measures in conjunction with financial performance measures is when they provide information about opportunities that have been created, but not yet financially realized.

2.1.3. Performance Measurement of Commercial Banks

Adequate performance of financial institutions is of crucial importance to their customers. Prices and quality of their products are determined by efficiency and competition. Since efficiency and competition cannot be observed directly, various indirect measures in the form of simple indicators or complex models have been devised and used both in theory and in practice (Jacob A. Bikker, 2010, p -1).

By bank performance, generally, it implies whether a bank has performed well within a trading period to realize its objectives. According to Rose (2001), a fair evaluation of any bank's performance should start by evaluating whether it has been able to achieve the objectives set by management and stockholders. Certainly, many banks have their own unique objectives. Some wish to grow faster and achieve some long-range growth objective, others seem to prefer quiet life, minimizing risk and conveying the image of a sound bank, but with modest rewards to their

shareholders (Rose, 2001). Ordinarily, stock prices and its behavior are deemed to reflect the performance of a firm. This is a market indicator and may not be reliable always. However, the size of the bank, the volume of deposit and its profitability could be deemed as more reliable performance indicators (Okafor C. and Akadakpo A. (2014).

In addition, there are variations of bank performance measurement. Revell (1980) uses interest margin as a performance measure for U.S. commercial banks. He defines interest margin as the difference between interest income and expense divided by total assets. Arshadi and Lawrence (1987) measure bank performance using normal correlation analysis. Their multidimensional indexes include indexes of profitability, pricing of bank services and loan market share.

Profitability indicators, precisely the Return on sales (ROS), Return on Equity and the returns on Assets (ROA) and cost indicators, specifically total operating expense to sales (OEXP/S), General and Administrative expenses to sales G&AEXP/S and productivity measures total loans and deposits used to assess banks performance and productivity. These ratios are indicators of management efficiency, and rate of returns. These profitability measures vary substantially over time and from one banking market to another (Rose, 2001; Eyob Dagne, 2010 and Girma Amare, 2012).

The ROE and ROA are popularly in use today. The main drivers of banks' profitability remain earnings, efficiency, risk-taking and leverage. Various stakeholders (e.g. depositors, debt or equity holders and managers) emphasize different aspects of profitability. These views need to be taken into account by market participants (i.e. analysts, rating agencies, consultants and supervisors) when looking at ways of measuring bank performance that meet their needs. For this, each different group of market participants has its own preferred set of indicators. ROA is the major ratio that indicates the profitability of a bank. It is a ratio of income to its total asset (Khrawish, 2011). It measures the ability of the bank management to generate income by utilizing company assets at their disposal. In other words, it shows how efficiently the resources of the company are used to generate the income. It further indicates the efficiency of the management of a company in generating net income from all the resources of the institution (Khrawish, 2011). Wen (2010), states that a higher ROA shows that the company is more efficient in using its resources on the

other hand the ROE measure, which is the ratio of net income to equity, serves as another indicator of a firm's net profit margin.

Concerning cost measures, two cost related measures (ratios) are frequently used to measure relative performance: total operating expenses to sales (OEXP/S), and General and Administrative expenses to sales (G&A/S). Total operating expenses (defined as the sum of all operating expenses) serve as a proxy for the firm's total cost of operations. (Girma Amare 2012).

2.1.4. Determinants of Commercial Banks Performance

Like that of any organization the performance of commercial banks is highly dependent on various factors internal, industry and macro-economic factors.

- **Macro – Economic Factors**

Macro- economic factors are countrywide factors that can have influence on the performance of all the banks working in a given economy. This factors are beyond the controlling capacity of management and it's always hard to predict their outcomes. Among these factors

Annual GDP growth rate: It is a measure of the total economic activity and it is adjusted for inflation.it is expected to have an impact on the supply and demand of banks deposits and loans (D. Alper and A. Anbar, 2010). GDP is one of the macro-economic factor that has influence on the performance of banks, which is expected to have a positive influence on banks profitability. As GDP growth slows down, and, in particular, during recessions, credit quality deteriorates, and defaults increase, thus reduce banks return.

Christos K and Geoffrey E (1998) describe the relation between GDP and banks performance as bank asset quality will depend on the position in the cycle. Loan loss provisions will be related to default risks. These will be greater in downturns than in upturns, so that bank profitability will be positively correlated with GDP growth. On the other hand GDP as measuring the size of the market in which banks operate. In upturns, there will be higher demand for bank credit than in downturns. If the number of banks operating across the cycle is constant, one would, under conditions of imperfect competition, expect bank profitability to be positively related to market size as measured by GDP.

Inflation: Inflation rate expected to have impact on the performance of commercial banks. Revell (1979) noted that variations in bank profitability can be strongly explained by the level of inflation.at the time of high inflation depositors are forced to withdraw cash which influence the capacity of banks to give loan to potential borrowers. Inflation effect is not only on depositors but for borrowers it creates difficulty to repay their loans leads to loan loss.

On the other hand if banks are able to anticipate inflation and mange interest rates accordingly they can benefit from increase in inflation rate during a period. Other studies, for example, Bourke (1989), Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1998), have found a positive relation between inflation and long term interest rates with bank performance.

- **Industry Specific Factors**

Industry specific factors are that are limited to certain industry and they only determine organizations operating within that industry.

Market Concentration: While explaining the relation between market concentration and performance of banks there are two approaches revealed, structure conduct – performance (SCP) hypothesis and efficient (EFS) structure hypothesis. (SCP) investigates the relation between highly concentrated market and profitability, states that an increase in market share and market concentration leads to monopoly powers and (EFS) investigate if efficiency of larger banks affects its profitability. Bikker and Bos (2005) argues that the ability of banks to charge higher rates for loans and lower rates on deposits increases in concentrated market, thus it will result on positive impact on the performance of banks. On the other hand Flamini (2009) argue market concentration does not have positive impact on the performance of commercial banks.

- **Bank Specific Factors**

Bank specific factors are determinants of commercial banks performance that are specifically in related to bank itself.

Credit Risk: Credit risk can be defined as the potential loss of all or part of interest owed, or the original loan, or both together. Negative relation is expected between banks profitability and credit risk. The more credit risk of the bank the less its ability to generate profit. There are lots of factors for credit risk to influence the performance of banks, poor loan management, poor legal

environment failed to exercise banks right, macro-economic factors ,lack of adequate information about borrowers and others can be mentioned.

Theoretically, the greater the exposure to credit risk, the lower is the banks' profits; a negative effect of the credit risk on the banks profitability is expected. On the other hand, and based on the CAPM arguments, the credit risk may positively affect the profitability.

While Athanasoglou, et al., (2008) and Miller and Noulas (1997) find that the effect of the credit risk on the Profitability is negative in the USA, Al-Haschimi (2007) finds a positive effect of credit risk on Sub-Saharan African profitability.

Capitalization: Capital should be the most important variable in determining the performance of commercial banks. Banks with good capital structure tend to borrow less in order to support their level of asset also it will increase their ability to absorb and handle risk exposer with capital available.

In his study for 12 European countries, Bourke (1989) concluded a positive and significant effect of the capital adequacy on bank profitability. Berger (1995a), finds that the capital and bank profitability tend to be positively related for a sample of US banks. Also, Anghazo (1997) finds that well-capitalized banks in USA are more profitable than other less-capitalized banks. A positive relation between capital adequacy and profitability was suggested by Kosmidou (2007).

Size: In most literature the size of the banks represent by total asset. Banks with bigger size are expected to have better influence on the market and generate higher profit. Results from Smirlock (1985), Akhavein, et al. (1997), Genay (1999), Bikker and Hu (2002) and Goddard, et al., (2004) support the above theory on which they concluded that effect of banks size on the performance is positive. If lager banks operates in noncompetitive market and achieve efficiency they are likely to enjoy profitability. Also if lager banks are able to achieve high lending rate and lower deposit rate they can manage better profit in non-competitive market.

On the contrary other literatures argue larger banks are hard to manage and may not have positive relation with performance. Berger, et al. (1987) and Boyd and Runkle (1993) find negative significant relation between size and profitability.

Asset Composition: Deposits and loans are the most important indicators banks performance because they reflect the bank's primary activity. Assumed other variables constant, the higher the rate of transforming deposits into loans, the higher the profitability will be(Imad Z, Qais A, Thair A. 2011). For that, a positive relation between the loans and banks profitability are expected. On the other hand, if increasing loans leads to higher funding requirements, a negative impact of the loan ratio on the banks profitability may accrue.

In their study Abreu and Mendes (2000) found a significant positive relation between asset composition and profitability, in contrast Staikouras and Wood (2004) and Bashir and Hassan (2003) documented a negatively significant relation with the profitability.

Asset Quality: Asset quality of commercial banks shows the level of loans in relation to the total asset of banks. The higher the ratio the poorer the quality and therefore the higher the risk of the loan portfolio will be. This means since high asset quality ratio implies the bank's asset highly dominated by loans and at the time of loan default performance of banks will be affected.

Liquidity: The ratio of liquid assets to total assets is measure of liquidity. The higher this percentage the more liquid the bank is. Insufficient liquidity is one of the major reasons of bank failures. However, holding liquid assets has an opportunity cost of loss higher returns. Bourke (1989) finds a positive significant link between bank liquidity and profitability. However, in times of instability banks may choose to increase their cash holding to mitigate risk. Unlike Bourke (1989), Molyneux and Thorton (1992) come to a conclusion that there is a negative correlation between liquidity and profitability levels.

Ownership Structure: Ownership structure affects the principal-agent relationships that influence profitability of banks (Barth, Caprio, & Levine, 1999; Boubakri, Cosset, & Saffar, 2013; Agusman, Cullen, Gasbarro, Monroe, & Zumwalt, 2013; Iannotta, Nocera, & Sironi, 2013). Based on the previous literature it is found that, the effect of differences in bank ownership on profitability is indeterminate, and there is even disagreement among the empirical studies.

2.1.5. Capital Investment on IT

Michael Gutmann (2001) define information technology (abbreviation IT) as science and activity of storing and sending out information by using computers. It is related to all aspects of managing and processing information, especially within a large organization or company. On the other hand Information technology, defined by Rodney L. Stump, (1996) includes computer hardware, software, and communications systems, as well as the personnel and resources dedicated to supporting these capabilities. Such investments are made to facilitate information management, that is, the compilation, analysis, and dissemination of task-related information.

Capital investment made on information technology resources can be classified as: tangible resources that comprising the physical IT infrastructure components, human IT resources that comprising the technical and managerial IT skills, and intangible IT resources, such as knowledge assets, customer orientation and synergy (C.Zehir, B.Muceldili, B.Akyuz and Ali Celep 2010).

IT investments may be deployed company-wide or more narrowly to support specific functions or projects (Rodney L. Stump 1996). IT is heterogeneous phenomenon comprises different kinds systems used to achieve varying managerial objectives. There has been a rising trend in IT expenditure over the last two decades (Benchmark Research, 1997), which corresponds to the mass of IT products now available in the market. Such new products pose in ever increasing problem to managers, as they constantly have to invest and justify their decisions to update software and hardware to keep abreast of their competitors.

Capital investment decision is the most important decision management faced on every organization to shape the future of the business and its ability to manage its future operations. They are generally difficult and expensive to reverse. So they need to be right first time. In making capital investment decisions, managers aim to maximize shareholder wealth by maximizing long-term returns, taking account of risk and liquidity.

Organization investment decision on information technology is one of the most critical and enormous amount of fund requiring investment. Most organization currently depending on information technology to be competitive on ever increasing sophisticated world. Eyob Dagne (2010) defined IT capital investment as any acquisition of computer hardware, network facilities,

or pre-developed software, or any "in-house" systems development project, that is expected to add to or enhance an organization's information systems capabilities and produce benefits beyond the short term.

Various studies demonstrates that many firms are in fact becoming dependent on IT, however investing in IT can be an extremely expensive and time-consuming process and its justification is difficult to quantify because of ineffective Information Management Systems (IS). Investment on information technology is known as the most challenging investment decision for mangers; due to the difficulty of measuring its return. For some organizations IT investment requires basic structural change within the organization; which is most of the time becoming reason for failure of IT investment. Brynjolfsson (2003) and Karl Westerlind (2004) show that when investments of this sort are supplemented with restructuring in the organization, the return occur faster.

Decisions making on capital investment on information technology is process of three major interdepending phases staring from selecting the appropriate investment to its implementation, management and control.

Select phase which is the first phase organizations identifies and analyzes each project's risks and returns before committing significant funds to any project and selects those IT projects that will best support its mission needs. This process should be repeated each time funds are allocated to projects, reselecting even ongoing investments has to pass on this phase. The second phase is control phase on which the organizations ensures that, as projects develop and investment expenditures continue, the project continues to meet mission needs at the expected levels of cost and risk. If the project is not meeting expectations or if problems have arisen, steps are quickly taken to address the deficiencies. If mission needs have changed, the organization is able to adjust its objectives for the project and appropriately modify expected project outcomes.

The third phase is known as evaluate phase, actual versus expected results are compared after a project has been fully implemented. This is done to (1)assess the project's impact on mission performance, (2)identify any changes or modifications to the project that may be needed, and (3)revise the investment management process based on lessons learned.

The investment process does not end with the evaluation phase. A project can be active concurrently in more than one phase of the select/control/evaluate model. After a project has been designated for initial funding in the select phase, it becomes the subject of evaluation throughout the control phase for the purposes of reselection. Reselection is an ongoing process that continues for as long as a project is receiving funding. If a project is not meeting the goals and objectives that were originally established when it was selected, or if the goals have been modified to reflect changes in mission objectives—and corrective actions are not succeeding—a decision must be made on whether to continue to fund the project. Ultimately, "deselection" can be one of the most difficult steps to implement, but it is necessary if funds can be better utilized elsewhere. Once projects are operating and being maintained, they remain under constant review for reelection. The figure below describes the above three phases briefly.

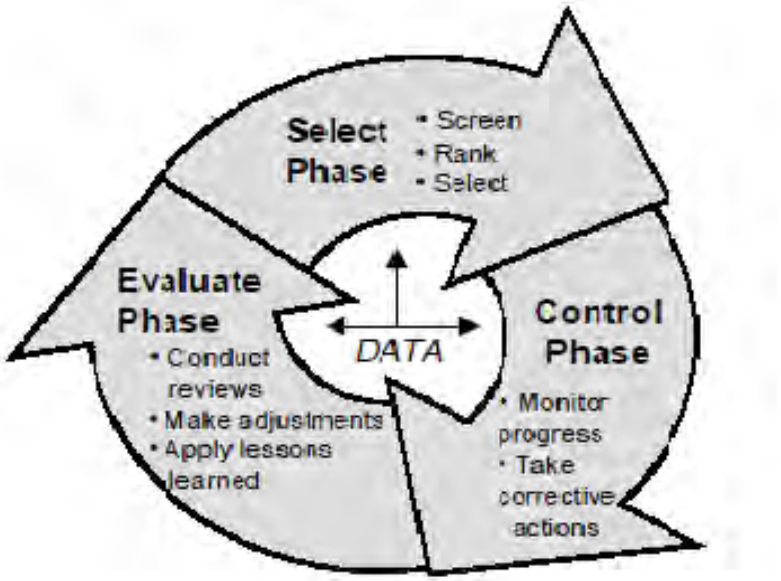


Fig 2.1. Fundamental phases of the IT investment

2.1.6. Evaluating Capital Investment Decisions on IT

Capital investment decisions in an organization are long term huge capital requiring investments decisions; which is assumed to benefit the organization in the long run. There is general agreement that investment decisions are the most important decisions made by corporations. Harris and Raviv (1996) extend the choice of projects and the level of investment are critical not only for stakeholders of the firm but also for the economic well-being of society as a whole.

Investments like information technology requires large amount of capital and so that critical evaluation both before and after investment should be made. Evaluating the value of information technology investments only from the financial perspectives likely to understate the value of investment made and there would also lay a risk in underestimating the cost versus the benefit of an IT investment (Karl Westerlind, 2004).

Organizational change fueled by the expansion of information technology, may have contributed to the erosion of the previously established relationship between company size and the quantitative investment appraisal criteria selected (Alan Sangster, 1993). Eyob Dagne (2010) argue traditional investment appraisal techniques have been useful in the past, when the business environment was easily predictable and stable but with the today's business environment where things are more and more unpredictable and unstable the utility of the traditional investment appraisal techniques have been questioned greatly.

The payback period is the time it takes for the cash flows generated by a project to pay back the initial cash outflows (for capital investment, working capital and initial costs) at the start of the project (capital investment appraisal). Khakasa (2009) survey made on east Africa showed payback period method of investment appraisal is the most widely used technique. A given project with smaller amount of payback period is preferred from that has larger number of payback period. Karl Westerlind (2004) relate payback period to IT investment as a key measurement of risk calculations, the shorter the period, the better, this is because the technology has tendency of rapid change. One of the problems related to pay back period method is it fails to consider other factors rather than cash flows such as profits and non-cash measures like deprecation and other immeasurable factors.

Net present value method is the sum of the present values of all the cash flows associated with an investment project (capital investment appraisal).The project should be accepted if NPV calculated is positive; the reasoning behind this is that when there is a positive NPV the project offers a return in excess of the cost of capital and acceptance of such a project will increase the wealth of the company. For a negative NPV project the cost of capital is not covered and acceptance of such a project will reduce the value of the firm. Using NPV method on information technology investment like that of payback period failed to consider technological benefits that are difficult to quantify.

Internal Rate of Return (IRR) is often used in order to decide in which alternative to invest in. Using IRR involves calculating an investments expected return and can be used to compare different investment alternatives (Karl Westerlind, 2004). By using discounting factor evaluation can be made between alternative investment ideas while calculating their IRR. The outcome of the calculation should equal zero and therefore the better of the alternatives is then likely to be invested in.

Accounting rate of return (ARR) is another traditional method of evaluating capital investment projects which expresses the profit from an investment as a percentage of the investment. The profit is the accounting profit, calculated as in the profit and loss account, and may be calculated before or after tax. It is usually the average profit over the life of the project. The investment includes fixed assets and working capital specific to the project, valued in the same way as in the balance sheet, and is usually also averaged over the life of the project. The ARR for the project is usually compared with a company, group or divisional target.

The above discussed traditional investment appraisal techniques used to evaluate benefits and costs of a given investment before enormous amount of capital is toss. But for information technology investments the chance of using these techniques and be successful on deciding the best investment decision is difficult. Measuring the intangible benefits and costs of information technology investment is one of the major problem that traditional investment appraisal techniques such as payback period, NPV and IRR faced. Also Peter E.D, Zahir and David J, (2004) said these techniques ignore the impact that the system may have in human and organisational terms. Companies may, therefore, be left questioning how to compare a strategic investment in IT, which delivers a wide range of intangibles, with other corporate investments whose benefits are more tangible. In addition to these, the risk associated with future technological advancements that can affect the likely benefits of information technology adopted is also one of the problems that cannot be dealt using this techniques. (Eyob Dagne 2010 and Karl Westerlind 2004).

Organizations frequently faces the IT project evaluation and selection problem. Numerous studies have shown that modern organizations are not able to function effectively and efficiently without appropriate development and implementation of IT projects for satisfying the increasing expectation of the stakeholders for organizational performance. As a result, making the right

decision on IT projects to develop and implement is of critical importance in every modern organization for their profitability and even survivability in today's dynamic environment.

Choosing an evaluation approach that reaches beyond the traditional boundaries of financial evaluation (for example, direct cost analysis and cash flow projections) is increasingly important, and many factors associated with developing a robust IS requires a business, user and technology context (Peter E.D et al 2004 p - 457).

Related researches further stressed the fact that financial transparency is paramount so as to ensure a suitable return on investment, other strategically softer, political and social factors need to be considered during the evaluation process.

To select the most appropriate IS project for development, the decision maker usually needs to (a) evaluate the performance of all the available IS projects, (b) assess the relative importance of the selection criteria, (c) aggregate the assessments for producing an overall performance index value for each available IS project alternative across all criteria on which a final decision can be made.

2.1.7. Investment on IT and Organization Performance

"Productivity paradox" refers to an investment on information technology in the 1980s, on which most studies point out the relation between information technology and organizational performance was negative that information technology has no significant effect on organizations, industries and economy as whole (Robert Solow, 1987).

There are some reasons why the productivity paradox exists. The main reason is likely to be due to Measurement errors of IT capital (Brynjolfsson, 1993). This can be due to rapid price and quality changes, and failure of economic statistics to measure qualitative improvements in the output of service industries. Since most studies were made in the United States and lots of technological advancements have been witnessed since then, the 1980s productivity paradox face time and space gap in order to use them on current information technology investments.

Information technology (IT) can be accepted as a unique resource in a firm in the ends of the 20th century and 21th century (Cemal et al, 2010). Investment on information technology is most of the

time assumed to add value to the organization even though measuring the ultimate benefit and return is difficult. But in general anticipated benefits from technology investments include reduced costs, improved quality, increased flexibility, improved customer satisfaction, higher productivity and ultimately, higher financial performance and coordination (Cemal et al 2010; Karl Westerlind 2004 ; Eyob Dagne 2010; Lu Zhang & Jinghua Huang 2009 and Shirley J. Ho & Sushanta K. Mallick 2006).

According to much theoretical and empirical evidence, IT offers benefits for a wide range of business processes and improves information and knowledge management within the firm, leading to better performance. Firms can manage their processes more efficiently and, as a consequence, they increase their operational efficiency. Moreover, IT reduces the coordination costs of the firm because of lower procurement and inventory costs and closer coordination with suppliers (Tachiki, 2004 and OECD, 2004). In addition, communication based on IT and the Internet can also improve external communication, reducing the inefficiencies resulting from lack of co-ordination between firms, and increasing the speed and reliability of information processing and transfer. In general, IT reduces transaction and coordination costs, maximizing the value of the transactions (OECD, 2004).

The relation between information technology and organizational performance is dependent on many factors simply investing large amount of capital on information technology do not create value. IT investments alone cannot be taken as a sole factor for the profits of a firm. There appears to be no doubt as to the business value of IT (Eyob Dagne, 2010), but the dimension and extent of the business value of IT depends on a varied array of factors.

Business value of information technology is dependent on many external and internal factors. IT is an input in the production process and there is an interaction between IT and other inputs. Recently, the empirical literature has begun to re-assess the association between IT and a wide variety of complementary factors (Arvanitis and Loukis, 2009; Giuri, 2008 and Aral & Weill 2007), with a consensus emerging that, in order for IT to be properly utilized, it must be used in conjunction with complementary resources such as organizational structure, human resources or organizational resources (Ana Gargallo-Castel and Carmen Galve-GórrizWalton, 1989; Bélanger

and Collins, 1998;Bresnahan et al., 2002; Mata et al., 1995; Ramírez et al., 2001; Peppard and Ward ,2004; Aral et al., 2010).

2.1.8. IT Investment in Commercial Banks

Recently, the world has witnessed a great development and a rapid change in the global banking environment as the circumstances obligated the banking industry to reconsider its structure, laying down strategies and the means used to achieve them in a world where the concepts became different and diversified and the competition turned out to be the foundation on both the domestic and international area. (K.A. Saeed and R Bampton, 2013).

Information technology has become the heart of banking sector while banking industry is the heart of every economy (Alhaji A.A and Rosmaini HJ, 2012). The recent economic crisis in the world raised from banking industry can be seen as proof for the influence of the industry on the world. Technology is now a day's becoming key element to overcome challenges in modern banking business such as performance improvement, customer's satisfaction and quality of service delivered. Through the introduction of IT related products in internet banking, electronic payments, security investments, information exchanges (Berger, 2003) banks now can provide more diverse services to customers with less manpower. Seeing this pattern of growth, it seems obvious that IT can bring about equivalent contribution to profits.

In response to the demands for quick, efficient and reliable services, industry players are increasingly deploying technology as a means of generating insights into customers' behavioral patterns and preferences. Well-developed outsourcing support functions (technology and operations) are increasingly being used to provide services and manage costs (e.g. Automated Teller Machine networks, Cards processing, Bill presentment and Payments, Software Development, Call center operations and Network management). (Oluwagbemi O et al, June 2011).

Technology investments in banks have two dimensions first one is technological investments which are directly related to customers. Using the techniques of electronic banking such as home banking services via the internet, which exceeds the dimensions of space and time, automated teller machines (ATMs) where customers can easily access their account from any geographic

location, point of sale (POS) machines which avoids unnecessary cash on hand while shopping in trade centers, Mobile Banking and etc. Such IT investments provide banking services that achieve advantages for both banks and customers in the provision of banking products and services (K.A. Saeed & R.Bampton 2013) and the second information technology investments in banks is investment made on various software's and applications that banks use for internal work such software used in payroll processing, financial and other report preparation, stock management, purchasing and others. Both kinds of investments enables banks to improve their performances. It is believed that IT can improve bank's performance in two ways: according to K.A. Saeed and R Bampton, (2013) IT can reduce operational cost (cost effect), and facilitate transactions among customers within the same network (network effect).

In the prior decades IT capital investment is more intensive in financial sectors, specifically in banks. According to Heike Mai (2012), In America, Europe and Asia financial services firms spend more on IT than other industries do. This author specified the ratio of IT expense and costs to the revenue and operating income of banks and the banks' expenses for IT equal 7.3% of their revenues and IT costs at 4.7% to 9.4% of operating income. In the future growth on IT investment will continue. Shaukat and Zafarullah (2009) indicated IT spending by the banking sector will grow at a healthy rate of 3.8% during 2009 to reach $63.6 billion in 2013. Even though there are different reasons for the higher use of IT in banks this author identified the following main reasons (Girma Amare, 2012)

1. As a financial service firms have to fulfill regulatory requirements which translate into IT costs that do not contribute to the firms' earnings.
2. Banks rely heavily on IT in their back offices as well as their distribution channels

2.1.9. Measuring the Impact of IT on Banks Performance

Even though measuring the impact of information technology on firm's performance is difficult and yet have many dimensions, the benefits that can be obtained are undeniable.

The objective of the study is to evaluate the impact of information technology investment on performance of financial institutions in Ethiopia specifically private commercial banks. Thus, the

relation of information technology with both financial and non-financial measures of organization performance is reviewed under this section.

- **Profit Measures**

A. Return On Asset (ROA)

A basic measure of bank profitability that corrects for the size of the bank is the return on assets (ROA), which divides the net income of the bank by the amount of its assets. ROA is a useful measure of how well a bank manager is doing on the job because it indicates how well a bank's assets are being used to generate profits.

Measuring the performance of IT capital in relation to ROA enables to determine the actual return of technological asset in relation to net income.

B. Return On Sales (ROS)

The ROS which is the ratio of net income to sales, serves as another indicator of a firm's net profit margin. The operating income to assets (OI/A) and operating income to sales (OI/S) ratios focus on operating returns only and exclude incomes earned by the firm from other sources such as gain on disposal of assets and from other extraordinary sources. Operating income is, therefore, regarded as a more appropriate measure of the direct value of IT (McKeen and Smith 1993, 1996) (Eyob Dagne, 2010).

C. Return On Equity (ROE)

It measures how efficiently a bank can use the money from shareholders to generate profits and grow. It is a profitability ratio from the investor's point of view. This ratio calculates how much Investment is made based on the investors' investment in the bank, not the company's investment in assets or something else (Molyneux, 1995), Belayneh (2011).

The above discussed profit ratios are believed to indicate the impact of IT on the financial performance of firms more than any other financial ratio and are the closest area where the impact of IT can clearly be seen. (Eyob Dagne, 2010)

- **Cost Measures**

A. Total Operating Expenses to Sales (OEXP/S)

The operating expense ratio is just one measurement of a company's performance. While it fails to provide complete insight into a company's financial health without the aid of other metrics such as free cash flow, price-to-earnings ratio and overall revenue growth over time, it does provide a quick reference for the company's overall profit margin.

The operating expense ratio is one measure of how efficient a company is. Said another way, it indicates how much each dollar in sales revenue cost the company to achieve. An operating expense ratio of 0.63 means that for every dollar of sales, the company spent 63 cents to create the sale. One of the most important considerations with this ratio is the direction it takes over time. An expense ratio that is increasing over time means the company is operating less efficiently from period to period.

B. General and Administrative Expenses to Sales (G&A/S).

General and Administrative Expense includes those costs that support the daily operations of a company, including legal, human resources, accounting, office supplies, advertising and marketing, payroll, rents, utilities, as well as executive salaries.

The sales to administrative expense ratio is an asset utilization measure that allows analysts to understand the level of overhead costs required to support a given level of revenues. Investor-analysts oftentimes track this ratio over time, since the ratio should decrease as a company achieves economies of scale.

- **Productivity Measures**

The word product is an ambiguous term in banking industry .since it is service providing sector measuring and knowing of the actual output product is difficult. Berger and Humphrey (1992) has developed three major approaches to evaluate the outputs of banks, the assets approach, the user-cost approach and the value-added approach. Asset approach considers financial institutions are intermediators that mobilize deposits from surplus area to those areas with deficit of fund, as a result according to this approach banks output is composed of loans and other assets while inputs are deposits and other liabilities of banks.

On the other hand the user cost approach studies the net contribution of each of the financial products to the bank's revenue. Depending on whether the product adds or detracts from the revenues of the firm, it becomes an output or an input (Prasad and Harker 1997).

The value-added approach (or the activity approach as it is sometimes called) studies all Assets and liabilities as having some output characteristics without grouping them into exclusive input or output categories. Benston, Hanweck and Humphrey (1982) posit that "output should be measured in terms of what banks do that because operating expenses to be incurred." Following this line of thought, Berger and Humphrey (1992) argue that the value-added for each financial measure of the bank should be determined on the basis of operating costs and those that have "significant" value-added should be considered the outputs of the bank. (Prasad and Harker 1997 p10-11).

Like that of financial measures the non-financial measures of information technology benefits are essential for evaluating the impact of information technology on organizations performance. The non- financial measures such as product quality, market share, customer's satisfaction, and employees work quality and others can be measured based on subjective judgments.

It is worth focusing on the non-financial performance metrics to assess the impact of IT on firm performance because much of the investment on IT is aimed at improving the work process, customer satisfaction, product/service quality etc. by definition these variables are of intangible and non-financial, but very crucial in that the success or failure of a firm depends to a large extent by how well the firm excels on these areas. (Eyob Dagne,2010) said there is no single best way of measuring non-financial performances like quality of work process, product/service quality… etc., as a result any measure of these variables would be vulnerable for subjectivity and bias.

2.1.10. Managing IT Investment

Further, other studies have demonstrated that IT management capabilities, or the managerial skills associated with acquisition, management and use of information technologies, have significant impact on business performance (Bharadwaj 2000; Santhanam et al. 2003; Sunil, Narayan, M. S. Krishnan and V. Sambamurthy (2003).

IT Management is managerial skills for the acquisition, management, and use of IT in key business processes and strategies and include IT infrastructure capability, IS-business partnering, solutions

delivery, vendor partnering, and strategic planning as key IT capabilities (Sunil, Narayan, M. S. Krishnan and V. Sambamurthy, 2003 p3-4).

Because of large amount of capital investment, over all IT practice in an organization has to have strong management and IT governance structure so that the appropriate benefit from IT can be fully utilized. To strengthen this doubt, Senft and Gallegos (2009) argue that as high-speed information processing has become indispensable to organizations' activities, from a worldwide perspective, IT processes need to be controlled and from a historical standpoint, much has been published about the need to develop skills in the field of IT audit and control. This is because when information systems or technology fail, they often cause significant impacts on shareholder value (Parent and Reich, 2009).

Mullineux (2006) also claimed that banks are special because their managers have duty to (more risk averse) depositors as well as (more risk prone) shareholders and thus a solution to the "principal-agent problem" aimed at maximizing shareholder value is inappropriate. Gruttner (2010) claimed that more than a way to create competitive advantage, IT plays a fundamental role in the banking market and IT Governance provides tools to manage IT structures and processes in order to appropriately support the business strategy. Implementing new IT Governance in financial institutions may be very challenging, especially when technical literature has not many examples in developing markets. Hence, the overall governance of banks and their IT governance in particular would be of critical interest for academia as well as practitioners.

2.1.11. IT Investment in Ethiopian Commercial Banks

Banking in Ethiopia began in 1905 with the Bank of Abyssinia, a private company controlled by the Bank of Egypt. In 1931 it was liquidated and replaced by the Bank of Ethiopia which was the bank of issue until the Italian invasion of 1936. During the Italian occupation, Bank of Italy banknotes formed the legal tender. Under the subsequent British occupation, Ethiopia was briefly a part of the East Africa Currency Board. In 1943, the State Bank of Ethiopia was established, with two departments performing the separate functions of an issuing bank and a commercial bank. In 1963, these functions were formally separated and the National Bank of Ethiopia (the central and issuing bank) and the Commercial Bank of Ethiopia were formed. During the next period until 1974, several other financial institutions emerged including the state-owned:

1. The Agricultural and Industrial Development Bank (established largely to finance state owned Enterprises)
2. The Savings and Mortgage Corporation of Ethiopia
3. The Imperial Savings and Home Ownership Public Association (which provided savings and Loan services)

Major Private commercial institutions, many of which were foreign owned, included

1. The Addis Ababa Bank
2. The Banco di Napoli
3. The Banco di Roma

The Banking sector left behind by the socialist oriented government comprised only three banks: The National Bank of Ethiopia, the Commercial Bank of Ethiopia (CBE) and the Agricultural and Industrial Development Bank. It is only since 1994, when the central bank was established that the Government has permitted activities and services of private banks and insurance companies. These services are strictly limited to domestic entities as foreign firms are prohibited from investing in the banking and insurance sectors.

At the end of the fiscal year ended in June 2014, there are nineteen commercial banks operating in Ethiopia (NBE annual report), of these sixteen are private commercial banks while the rest three are state owned banks. Despite a rapid increase in the number of financial institutions since financial liberalization, the Ethiopian banking system is underdeveloped compared to the rest of the world. Cash is the most dominant medium of exchange. The use of checks is mostly limited to government institutions, NGOs and some private business. For longer period Commercial banks in Ethiopia provide the same services with the same operational style that they used to offer before decades. The common banking functions provided by public and private banks in Ethiopia were deposit mobilization, credit allocation, money transfer and safe custody. Banks in Ethiopia were unable to improve customer service, design flexible and customized products, and differentiate themselves in a market where product features are easily cloned. Ethiopian banking is unable to come from long way of being sleepy to a high proactive and dynamic entity.

Even though as the financial Institutions specifically banking industry in Ethiopia is still on its growing stage, now day's banks are investing on IT, hoping to maximize the IT business benefit. Currently all operating banks in Ethiopia are recognizing the needs and some of them are introducing new IT applications like electronic banking, mobile banking, and core banking services. In Ethiopian banking Industry, all the banks under considerations for this study were going in the same direction towards IT capability. But the pace at which they are moving towards IT utilization was very different, some banks have heavily invested on IT but others were still relied on manual banking system on most operations. While using information technology products banks are faced with various challenges like network connections problems and most importantly problems related to evaluating their huge information technology investments both before and after the investment is made.

2.2. Empirical Review

Several studies over the years have been conducted both at industry and firm-level to examine the link between IT and productivity and the results were frequent from time to time.

Earlier studies point out that the impact of information technology investments made on performance of organization was insignificant, which later referred as "productivity paradox". Some studies have drawn on statistical correlation between IT spending and performance measures such as profitability or stock value for their analyses. Dos Santos (1993), Strassman (1990), Loverman (1994), Morrisson and Brendt (1990), Licht and Moch (1999) concluded that there is insignificant correlation between IT spending and profitability measures, implying thereby that IT spending is unproductive.

Measurement error, time lags, management error and redistribution were raised as major factors for insignificant relation observed between IT and organization performances (Karl Westerlind 2004). In addition even if Barua, Kriebel and Mukhopadhyay (1995) discussed on their findings that IT was positively related to some intermediate measures of profitability, but the effect was generally too small to measurably affect final output, on contrary Hitt and Brynjolfsson (1995) argued IT leads to increased productivity and consumer surplus, but not higher profitability.

Study made on relation between Nigerian banks and information technology stated that the deployment of IT facilities in the Nigerian Banking industry has brought about fundamental changes in the content and quality of banking business in the country (Oluwagbemi Oluwatolani, Abah Joshua and Achimugu Philip 2011). On the other hand Eyob Dagne (2010) reviled that there was no significant difference between banks with high IT capital and banks with relatively low IT capital in Ethiopian commercial banks. Despite the fact that, in three of the four financial performance measures the banks with high IT capital have shown a slightly better financial performance, the difference when it is statistically measured was not significant. As a result the study concluded that high IT capital did not produce a superlative rate of return and did not help the banks with high IT capital to have a significant cost advantage over their counter parts with a relatively lower IT capital.

On the other hand some studies concluded that IT has significant impact on performance of organization. Dr. T. Sreelatha, CH. Sekhar (2012) conclude Information Technology course do promise to change the pace of banking to the next few years. Mobile banking and internet banking are going to make indoor in the banking sector in the near future. Even though IT systems are complex and sophisticated but they are "energy guzzlers". Hence, the future for banking sector is going to make rapid straights in near future.

In addition Cemal, Busra, Bulent and Ali (2010) studied the relationship between information technology (IT) investment level, IT usage and IT perception, IT at decision making process, future orientation, and technology orientation with firm performance in the comprehensive competitive environment and concluded that IT investments are vital component of firm performance. If firms manages IT investments successfully, it will enhance firm performance.

Harrah (2009) find IT-enabled organizational learning for revenue generation is more tacit, complex and novel than that for cost reduction processes, IT will have a greater effect on profitability through revenues than through costs.in contrary Harrah (2009) conclusion Study made on US banks to analyze the impact of information technology on the banking industry either through cost reduction or profit maximization concluded that information technology has promising impact on performances of banks through cost reduction rather than its impact on profit maximization (Shirley J. Ho and Sushanta K. Mallick 2006).

Bacealli (2007) broaden the study of IT and performance link by studying the impact of IT on the efficiency of European banks. The author uses stochastic frontier approach (SFA) to estimate the efficiencies of costs and benefits for European banks, and concluded that IT had positive long term contribution to long term costs (technical changes), thus reducing the actual costs of production by approximately 3.1% .in addition, the impact of technological changes on cost reductions consistently increased the studied period. Studies from (Daniel, Longbrake and Muerhy (1973), Kolari and Zardkoohi (1987), and Lawerence and Shay (1986)) on US banks further support the results of Baccealli thus the studies explore the impact of technological changes on the U.S banking sector concluded that there was a reduction in the processing costs of banking transactions along with decrease in banking employment.

The study from Omri and Hachana (2008) attempted to identify the nature of relationship between IT and productivity of Tunisian banks by using Stochastic frontier approach, and concluded that IT played important role on the performance of banks and they further point out that x- efficiency is better way for explaining the relation between IT investment and performance than traditional ratios. Few years' letter study made by Syrine Ben Romdhane (2013) Again justified the results of former researches made and demonstrated that IT is playing important role by positively and significantly affecting the cost efficiency of Tunisian banks.

From the results of various studies made so far on the relation between IT investment and performance of organization specifically commercial banks around the world has different outcomes. At some point the results shows positive relationship on the other hand some studies reviled negative relationships.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

The aim of this chapter is to present the research methods that are used in the study. Discussed here are the elements of methodology:

3.1 Research Methodology

Methodology is the style or method researchers follow in conducting their research. Often researchers select the research methodology according to the nature of the research itself.

The researcher used mixed research methodology on which both quantitative correlational/regression analysis and qualitative analysis methods of research are applied to examine the impact of IT capital on the performance of private commercial banks in Ethiopia.

3.2 Source of Data and Collection Tools

To support the study the researcher used both primary and secondary data. Primary data collected through interview made with selected banks finance and IT department managers and concerned staffs and secondary data were collected from published and audited financial statements of banks that covers a period of ten years starting from 2004/05 until 2013/14 fiscal year.

Interview made used to grasp information in relation to banks experience in connection to IT investment, management and its contribution to work quality and workers performance so as to measure the qualitative benefits of IT. On the other hand secondary data collected used to measure the quantitative befits that can be obtained from IT by making analysis on trend of banks IT investment and its relation to performance measures such as profits and cost measures of an organization.

3.3 Research Population, Sample Size and Design

3.3.1 Population

In this study the target population is defined as financial service firms in Ethiopia; specifically the banking industry that have invested on software, hardware and networking equipment's and that has been in operation at least for ten years. The study population is sixteen private commercial banks.

The total study population is summarized on the following table that lists banks based on their state of ownership and year of establishment year in G.C.

Table 3.1 Establishment year of commercial banks of Ethiopia

Name of the Bank	Ownership	Establishment year (G.C)
Dashen Bank	Private	1995
Awash International Bank	Private	1994
Bank of Abyssinia	Private	1996
Wogagen Bank	Private	1997
United Bank	Private	1998
Corporate Bank Of Oromia	Private	2004
Nib International Bank	Private	1999
Zemen Bank	Private	2008
Oromia International Bank	Private	2008
Anbesa International Bank	Private	2006
Buna International Bank	Private	2009
Birhan International Bank	Private	2009
Debub Global Bank	Private	2012
Abay Bank	Private	2010
Addis International Bank	Private	2011
Enat Bank	Private	2012

Source: www.nbe.org.et

3.3.2 Sample size and design

A sample is a "part of a whole to show what the rest is like". It helps to determine the corresponding value of the population and plays a vital role in business research.

Six commercial banks are selected as a sample size for the study and non-probabilistic sampling method specifically judgmental sampling method is used to select the sample. Selecting the sample is based on the level of IT investment within the bank, banks working experience and total capital.as a result the total sample size is 38% of the total population.

3.4 Model Specification and Variable Identification

Cobb- Douglas production function model states that production is a function of capital and labor investment made. Where in its most standard form for production of a single good with two factors, the function is

$$Y = AL^{\beta}K^{\alpha}$$

Where:

- Y = total production (the real value of all goods produced in a year)
- L = labor input (the total number of person-hours worked in a year)
- K = capital input (the real value of all machinery, equipment, and buildings)
- A = total factor productivity
- α and β are the output elasticity of capital and labor, respectively. These values are constants determined by available technology.

For many years the Cobb- Douglas function model has been one of the simplest model used on IT based production measure studies (see for example Loveman 1994, Lichtenberg 1995, Brynjolfsson and Hitt 1996, Prasad and Harker 1997, Clemons 1991). Furthermore researchers also use the same equation to test the relation between IT investment and profitability and market share.

Production function model is the most famous framework used to evaluate return from information technology. Reason for selecting this model is due to difficulty to make cost benefit analysis associated with IT; the actual benefits are not easy to calculate. The production function can help to address this gap by relating IT spending to overall productivity or output measures.

Previous studies further separated the IT-components of capital and labor expenses from the non-IT components, and used all four parameters as inputs in the Cobb-Douglas function to make relative comparisons about contributions to output, and the resulting marginal products (Brynjolfsson and Hitt 1996 and Prasad and Harker 1997).

By taking logarithm and adding error term we can linearize the above equation as the following

Log (Q) = β + β1Log (L) +β2Log (K) + μ……1

Where

Q; Performance of Commercial Banks

ITC; Log (K) capital investment, Log (L); labor, (β, β_1, β_2); coefficient of variables

Independent Variables

IT capital-is the first independent variable measured by logarithm of banks annual investment on information technology products both hardware's and software's and annual IT related consultancy expenses. The reason for both hardware and software components used together is the fact that IT investment as described by various literatures and commercial banks in Ethiopia themselves as a combination of all IT related products which includes hardware, software, IT security and infrastructures and finally consultancy and maintenance related expenses. The expected relation with the profitability of banks is positive and significant. Since the objective of the research is to measure the impact of IT capital on performance of commercial banks, for the capital section of the model the researcher only uses the IT capital investment as independent variable.

Based on that the model became

$$Q= \beta + \beta_1 Log\ (IT) + \beta_2 Log\ (L) + \mu \ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where

Q; Performance of Commercial Banks

ITC; Log (IT) capital investment, Log (L); labor, (β, β_1, β_2); coefficient of variables

Performance of commercial banks is determined by many other factors other than IT.as a result the researcher used the following determinants of commercial banks performance as control variables.

Labor- considered as one factor that can determine the performance of commercial bank. Employee's efficiency measured as the ratio of annual labor cost to net income is expected to have negative relation with profitability of banks. Increase in annual labor cost to net income ratio implies that increase in inefficiency of labor capital as result inefficient labor decreases profitability of banks as the same time.

Capitalization: is included as a measure of the overall capital strength. The ratio is a measure of capital adequacy, and should capture the general average safety and soundness of the financial institutions. A deterioration of the equity-to-assets ratio indicates either an increase in debt financing of banks total assets (while holding total assets constant), or a decline in banks total assets (while holding total equity constant), or both over time and space. As a result in this study capitalization is measured as ratio of total equity to total asset. The higher the ratio the more capital concentration of banks is so that they are less risker in order to cover their liabilities as a result positive relation expected.

After using the above bank specific determinate of performance of commercial banks as control variables our model became,

$Q=\beta+\beta_1 Log\ (IT) + \beta_2 Log\ (L) + \beta_3\ (CA) + \mu \ldots\ldots$*Where*

Q; Performance of commercial banks, Log (IT); IT capital, Log (L); Labor, CA; capitalization, andβ, β_1, β_2, β_3,; coefficient of variables

Bank specific factors are not the only determinates of performance of commercial banks there are also industry and macro- economic determinates that can influence banks performance as a result to strength our model the following industry specific and macro- economic factors are added as control variables.

Market Concentration–market concentration is one of industry level determinants of performance of commercial banks. It is measured as individual banks loan share of total loan of the banking industry. Banks with highest loan share on which larger banks are expected to have better chance of profitability emerged from interest income as a result positive relation is expected.

Inflation–inflation is one of macro-economic determinants of performance of commercial banks.in bad economic situation such as high level of inflation banks performance is likely to be affected negatively as a result negative relation is expected to be observed.

Taking the above determinants of commercial banks profitability the model now becomes

$Q=\beta+\beta_1$Log (IT) $+\beta_2$Log (L) $+\beta_3$ (CA) $+\beta_4$ (MC) $+\beta_5$ (IN) $+\mu$…….....4

Where

Q; Performance of commercial banks

Log (IT); IT capital, Log (L); Labor, CA; capitalization, MC; Market concentration (Banks Share of Loans), IN; Inflation.

β, β_1, β_2, β_3, β_4, β_5;coefficient of variable **Dependent Variable**

Return on asset- is one of the major performance measurement of commercial banks.it is measure of how much profit is generated per asset invested it reflection of how efficiently banks are using their asset level, as a result ROA is dependent variable and measured as

$$ROA = \frac{\text{Net Income}}{\text{Total Asset}}$$

To end the research model becomes

ROA=β+β_1Log (IT) +β_2Log (LA) + β_3 (CA) + β_4 (MC) + β_5Log (IN) +μ……..5

Where

ROA; Return on Asset

Log (IT); IT capital, Log (L); Labor, CA; capitalization, MC; Market concentration (banks share of loan), IN; Inflation.

β, β_1, β_2, β_3, β_4, β_5;coefficient of variables

From the above model the following relation is expected between dependent and explanatory variables. The following table summarize the expected result of regression analysis.

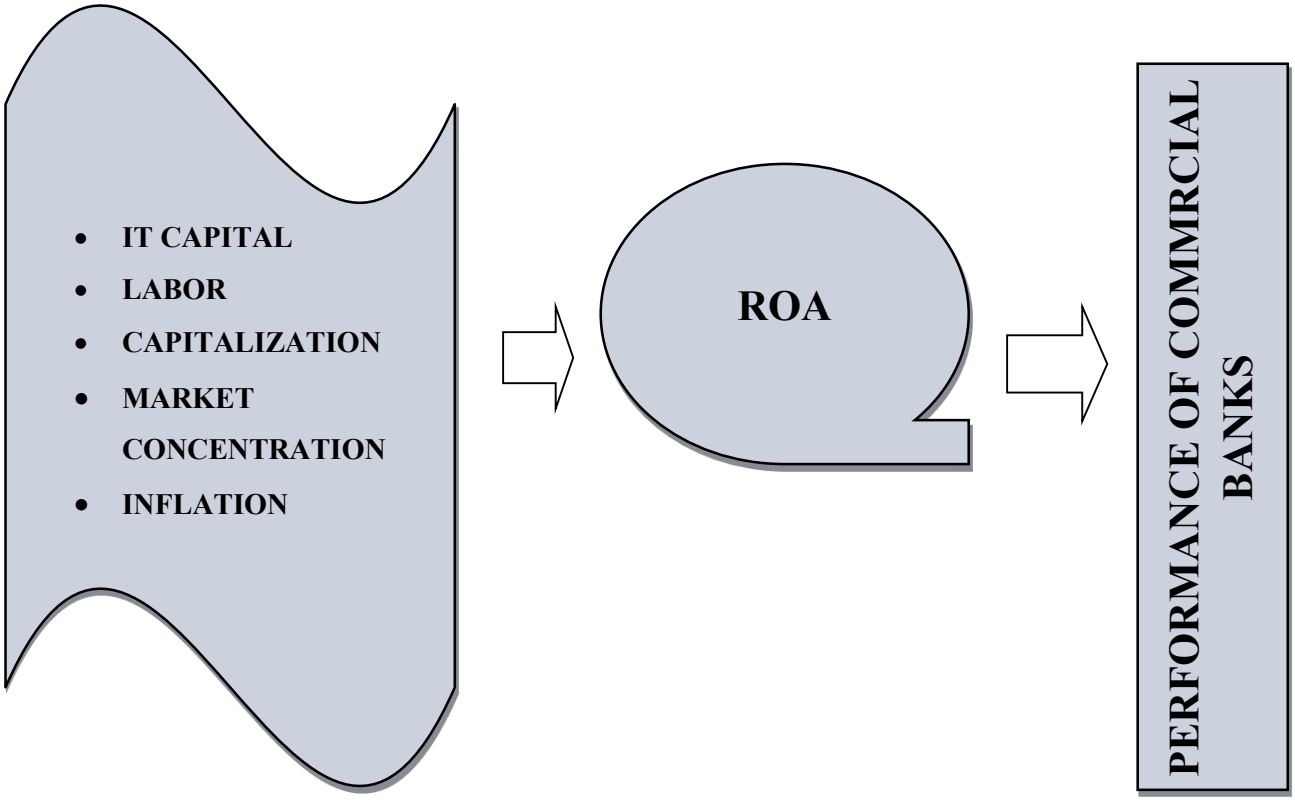
Table 3.2Summary of Variables to be tested measurement, expected sign and significance

Variables	**Measurement**	**Notion**	**Expected Result**
IT Capital	Annual IT Capital	IT	+/Sig
Labor	Annual Sal & Ben Exp/Net Income	LA	-/in Sig
Capitalization	Total Equity /Total Asset	CA	+/Sig
Market Concentration	Banks Share of Total Loans	MC	+/Sig
Inflation	Consumer price index	IN	-/Sig
Return On Asset	Net Income/Total Asset	ROA	

3.5 Conceptual Frame Work

Empirical evidences point out that performance of commercial banks is measured mainly by ROA, ROE and NIM. The study selected ROA as performance measure for private commercial banks in Ethiopia. On the other hand there are bank, industry and macro-economic specific factors specified as determinants of performance of commercial banks among them the researcher used four major determinates of commercial banks performance as control variables, CA, LA,MC,IN and IT capital as study variable. Based on this the following relation is expected on the study.

Fig 3.1 Conceptual frame work-Relation between variables



CHAPTER FOUR

DATA ANALYSIS PRESENTATION AND INTERPRETATION

The fourth chapter of the research is presented with the results of the study. It is organized in two parts, the first part presents results from interview analysis and the second part discusses quantitative analysis and results.

4.1 Interview Results

Under this section of the chapter the researcher addresses the research questions using results obtained from interview questions supported with data obtained from financial statements of those sample banks in order to capture the development, process and diffusion of IT investment in private commercial banks of Ethiopia.

4.1.1 IT capital in Banks

The first question raised for interview participants was what information technology investment means for commercial banks in Ethiopia and its relevance. IT investment in commercial banks is capital spend by banks on the combination of banking software and hardware infrastructures such as personal computers, ATM and POS machines, network servers and other IT related security systems and infrastructures.

From these hardware and software IT related investments, Core banking system is the biggest investment banks have made so far on IT. Core banking is a system that enables banks to deliver better quality customer service by allowing customers to access their account from all branches of a specific bank. Prior to the introduction of core banking, customers were only allowed to access their account from the branch their account is registered. In addition to core banking, most banks now a days are investing on mobile and internet banking services which allows their customers to access their account and get different baking services without coming physically to banks using their phones and computers via internet. Moreover, banks are applying various software either internally developed or purchased from suppliers to facilitate day to day activities.

So, why do banks invest huge amount of money on IT? There are a number of motivational factors for banks to invest millions of birrs on IT and related products. The major ones are discussed below:

- **Customer service** - improving the quality of Customer services is one of the main reason bank mangers emphasize on the interview for aggressive investments on IT. Banks are determined more to invest large amount of capital on IT in order to serve their customers with improved service quality by bringing different banking services to customers instead of forcing their customers to come to them. For example, if we look at core banking service, as it is stated above it helps banks to deliver better customer service by creating service accessibility through enabling customers to use any branch of a specific bank to access their account and get different banking services. The same is true for mobile and internet banking, since it avoids the physical presence of customers at bank branches to get a specific service.

- **Efficiency and effectiveness** - along with improving customer service delivery, commercial banks are motivated to invest on information technology in order to achieve efficiency and effectiveness on their day to day activity.

- **Competition** – the other major factor for IT investment for commercial banks is to stay competitive in the highly growing banking industry. Each bank tries to differ its service from the rest of its competition by trying to provide new and better banking experience for customers using different IT related services.

Since it is difficult to achieve all the above stated factors with manual banking system, investing in IT is a survival strategy for banks. The following table presents annual IT capital of the six sample banks for the last ten years. As we can see from the table, banks' capital investment on information technology products has been growing over the years.

Dashen bank is the leading bank on IT investment by followed by Awash, Wogagen and United bank respectively. Bank of Abyssinia and Nib international bank are the two least IT investing commercial banks under the study.

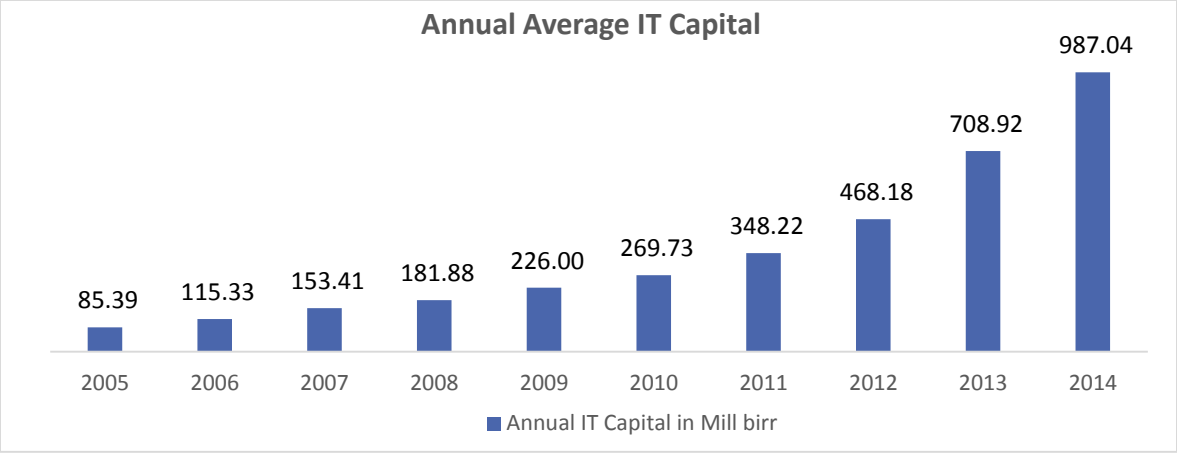
Table 4.1 Banks Annual IT Capital (in mill birr)

S.NO	BANKS	IT capital in Birr (Million)										AVG ANNUAL CAPITAL
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
1	AIB	28.23	34.90	39.15	42.35	42.35	46.44	53.37	61.51	121.31	173.33	64.29
2	DB	37.73	57.26	66.26	74.83	97.45	111.19	136.43	212.26	245.58	291.71	133.07
3	BOA	4.84	5.98	7.52	10.27	12.19	12.88	15.88	20.52	128.18	141.22	35.95
4	WB	9.67	10.91	9.06	16.63	18.79	34.67	60.86	72.90	91.65	116.91	44.20
5	UB	2.93	3.60	19.25	23.77	30.52	34.45	48.34	62.90	71.49	137.86	43.51
6	NIB	2.00	2.68	12.16	14.03	24.70	30.11	33.34	38.09	50.71	126.02	33.38

Source: Computation from banks financial Statements

The graph below shows the average investment on information technology of Ethiopian commercial banks for the last ten years, as it was explained earlier capital investment on IT has been growing continuously for the last ten years, and looking forward to grow even more with technological advancements and competitive environment.

Fig 4.1 Growth of IT capital



4.1.2 Distribution of IT Capital With Other Bank Assets

During the interview most of banks' managers characterized their IT investment as aggressive compared to other investments made by banks. As Eyob stated in 2010, the level of IT capital investment can be measured in relation to total asset, however; since banks total asset is highly dominated by cash and other non-cash liquid assets, it creates difficulty to measure level of IT diffusion. Most banks included their IT capital on fixed asset section of their balance sheet as a result IT diffusion is measured in relation to total fixed asset.

Table 4.2 IT capital distribution in relation to fixed asset

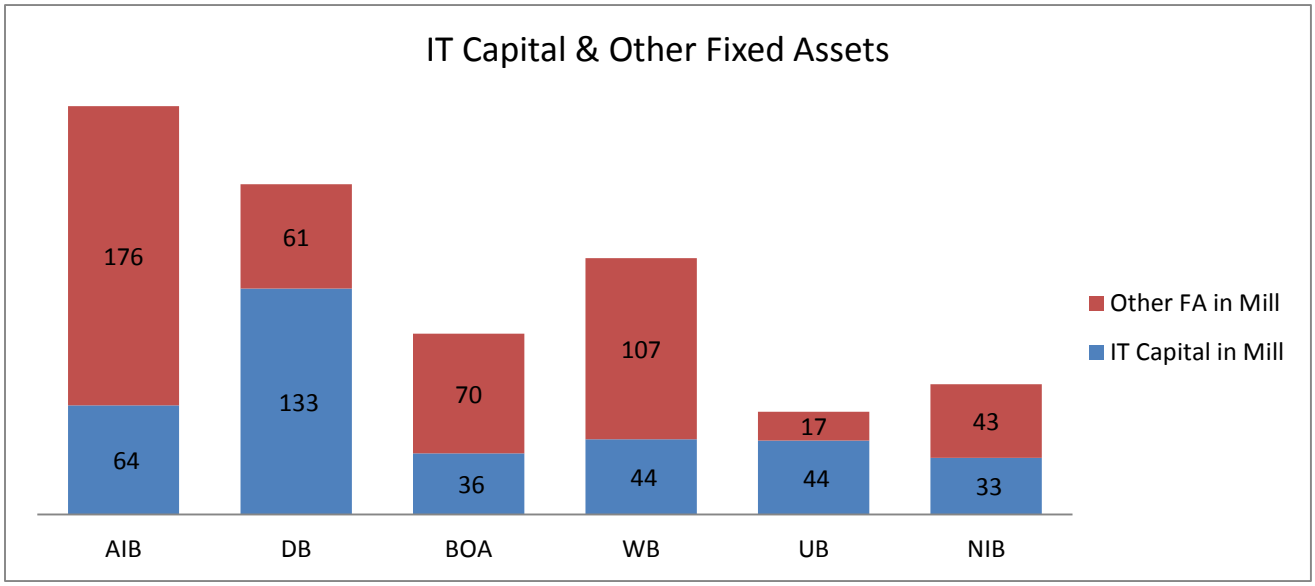
Name of the Bank	UB	DB	NIB	BOA	WB	AIB	Average
Percentage share of IT capital from the total Fixed Asset	72%	68%	43%	34%	29%	27%	46%

Source: Computation from banks financial Statements

United bank and Dashen bank are the two leading banks with high percentage share of IT capital distribution in relation with other fixed assets with 72% and 68% respectively, while AIB and WB are the two banks with the least IT capital to fixed asset percentage share with 27% and 29% respectively. As it is shown in the above table, on average 46% of banks total fixed asset is dominated by IT capital, which indicates the level of IT investment is almost half of fixed assets of banks.

The following graph also shows in detail the comparison between IT capital and other fixed assets of commercial banks from the total fixed asset.

Fig 4.2 IT capital in relation to Other Fixed Assets



Source: Computation on financial Statements

4.1.3 IT Capital Investment Decision

Evaluating capital investments before and after investment made is vital in any investment decision. However, evaluating the cost benefit of IT investment is difficult because most of information technology investments are appreciated from their qualitative aspects.

Commercial banks in Ethiopia have low experience of evaluating information technology investments prior and post investment. As it is described by finance mangers the trend of evaluating the return on IT investments is insignificant. The reason behind this experience is that the technological investment by itself is at early stage and that most of capital investments on IT is a preliminary requirement to stay competitive in the market. In addition to this the difficulty of measurement with the level of awareness and qualification of management are also mentioned as a problem.

However, it cannot be conclude that IT investment decisions are made blindly by banks. At the time of investment process, banks have a trend of evaluating the benefits that can be obtained from the investment in relation to solving organizations' problems that are needed to be addressed.

Based on managers' suggestion, banks are benefited and still are from the fruits of IT investment. They explained that if it wasn't for investment made on IT the survival of banking operation will be in question. Even though the quantitative benefits are not yet measured, the following benefits are materialized; Customer service is at some extent improved, Work efficiency and effective ness is achieved, Workers performance is upgraded and new products are launched as result of investment made on IT.

4.1.4 Managing IT Capital Investment

Investing capital is not the only solution, IT management, follow up and control is also required. On managing IT investments banks are relatively on good track. In order to capture all possible benefits of IT investment banks are carrying out the following efforts:

- Abroad and local employee training in order to upgrade employees level of awareness and understanding
- Making necessary organizational changes to make the system suitable
- Engagement with consultancy services to support the system operation
- Receiving customers feedbacks to evaluate the effectiveness and make possible adjustments

While trying to improve the banking industry with technological products banks are faced with various challenges on the way. Sometimes due to lack of good management and evaluation millions of birrs investment on IT is being underutilized. Both financial and IT managers of commercial banks point out the following challenges they are facing in relation to using IT products:

- Poor infrastructural developments like electricity power and network interruptions of the country affects the day to day utilization of IT infrastructures
- Resistance from both customers and employees as result of knowledge gap and low level of awareness
- Low quality of technological products and high consultancy and maintenance costs
- Poor management and control on installation, operation and follow-up phases

- Poor investment decisions while evaluating the necessity of investment made and its application.

The above listed and other observed problems are mentioned during the interview as problems for banks not to fully utilize the benefits of investments made on information technology. In general during interview bank managers' point out that investments made on IT are critical for their organization to survive and to be competitive in the market. Even though investment evaluation experience of banks is not considerable and paybacks are not realized as expected, banks are making effort so that they can benefit from IT advancements.

4.2 Quantitative Analysis Results

This section presents the impact of IT capital investment on the performance of private commercial banks in Ethiopia. The analysis is made using annual balanced panel data, where all the variables are observed for each cross-section and each time period. The study has a time series segment spanning from the period of 2005 up to 2014 and a cross section segment which considered six private commercial Banks. I.e. AIB, DB, WB, BOA, UB and NIB.

4.2.1 Descriptive Statistics

Table 4.4 presents the outcomes of the descriptive statistics for all variables involved in the regression model from 60 observations. The dependent variable is ROA and remaining are independent variables (IT, LA, CA, MC and IN). Key figures, including mean, median, standard deviation, minimum and maximum values are reported. This was generated to give overall description about data used in the model and served as data screening tool to spot unreasonable figures.

Table4.3 Descriptive Statistics Results

	ROA	IT	LA	CA	MC	IN
Mean	0.028357	17.33312	0.457460	0.125362	0.066500	0.170800
Median	0.029104	17.45062	0.391137	0.117075	0.061601	0.146500
Maximum	0.043636	19.49128	2.717477	0.192177	0.155819	0.364000
Minimum	0.003901	14.50979	0.210686	0.071022	0.000000	0.028000
Std. Dev.	0.006278	1.176412	0.321316	0.031605	0.028984	0.110152
Observations	**60**	**60**	**60**	**60**	**60**	**60**

Source: computation on Eviews 8.0

From the above table, it is shown that out of 60 observations made, commercial banks in Ethiopia obtained average of 2.8% profit in terms of ROA on the past decade, with maximum of 4.3% and minimum of 0.39% values respectively. That means the most profitable banks earned 4.3% of profit after tax for a single birr invested in the assets of the firm. On the other hand, the least profitable banks managed to earn 0.39% of profit after tax for each birr invested in the assets of the firm. The standard deviation statistics for ROA was 0.006, which indicates that the profitability variation between the selected banks was very small. The result implies that these banks need to optimize the use of their assets to increase the return on their assets.

While looking at the study variable IT capital, commercial banks have managed to invest average of 17.33 million birr on information technology related products for the past ten years. High intensive IT investing banks invests 19.49 million birr while banks found in low IT capital investing group witnessed 14.50 million birr investment. The standard deviation value of 1.176 shows there is bigger variation between the two groups.

4.2.2 Correlation Matrix of Variables

Correlation is used to identify the degree of linear association between variables. Values of the correlation coefficient are always ranged between +1 and -1. A correlation coefficient of +1 indicates that the existence of a perfect positive association between the two variables; while a correlation coefficient of -1 indicates perfect negative association. A correlation coefficient of zero, on the other hand, indicates the absence of relationship (association) between two variables

(Brook, 2008). The following table presents the correlation matrix among variables under study showing the relation of independent variables with the dependent variable.

Table 4.4 correlation matrix of dependent and independent variables

	ROA	IT	LA	CA	MC	IN
ROA	**1.000000**					
IT	0.194619	**1.000000**				
LA	-0.625412	-0.020983	**1.000000**			
CA	0.532317	0.000910	-0.096614	**1.000000**		
MC	-0.237015	0.055451	-0.016586	-0.589093	**1.000000**	
IN	0.188953	0.078375	0.072148	0.087790	-0.080160	**1.000000**

Source: computation on Eviews 8

From the above table, it is shown that except for labor and market concentration the rest explanatory variables have positive correlation with the dependent variable ROA. Capitalization is the most positively correlated variable with return on asset, showing that increase in equity capital of banks results increase in ROA. This is also true for inflation variable. On the other hand IT capital is also positively related with ROA, even though the coefficient of correlation is not significant.

Labor efficiency and market concentration appears to have negative correlation with ROA. Meaning that as labor related expense per net income increases ROA of banks decreases.

4.2.3 Hausman Fixed Random Effects Model Test

The results of the regression model is provided by the software program Eviews 8, using panel estimate approaches: the fixed effects model (FEM) and random effects model (REM). According to Gujarati (2004), if T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values of the parameters estimated by fixed effect model (FEM) and random effect model (REM).

In order to check of which of two models is appropriate, Hausman test is used on which the null hypothesis of the Hausman test proposing random effect model is appropriate. Table 4.6 shows that, the p-value for the test is > 0.05, which indicates that the **null hypothesis is not rejected**.

Table 4.5: Hausman fixed/random model test result

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

P value of the above table is 1.0000, that null hypothesis of Hausman test is failed to be rejected as a result random effect model (REM) is selected for interpretation.

4.2.4 Test of Classical Linear Regression Assumptions

There are five basic Classical Linear Regression Model assumptions needs to be encounter so that the estimation technique, OLS, had a number of desirable properties, and also the hypothesis tests regarding the coefficient estimates could validly be conducted (Brooks 2008). If these Classical Linear Regression Model **(CLRM)** assumptions hold, then the estimators determined by OLS will have a number of desirable properties, and are known as Best Linear Unbiased Estimators **(BLUE)**. Therefore, for the purpose of this study, diagnostic tests are performed to ensure whether the assumptions of the CLRM are violated or not in the model.

- **Test for Average Value of the Error Term is Zero (E (ut) = 0)**

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated. Therefore, since the constant term (i.e.$\boldsymbol{\beta}$) was included in the regression equation, the average value of the error term in this study is expected to be zero.

- **Test of Heteroscedastiy (var(ut) = σ2 <∞)**

The next assumption is homoscedasticity, it is a systematic pattern in the errors where the variances of the errors are constant. When the variance of the residuals is not constant it is referred as heteroscedasticity, which is undesirable.

The effect of using the correction is that, if the variance of the errors is positively related to the square of an explanatory variable, the standard errors for the slope coefficients are increased relative to the usual OLS standard errors, which would make hypothesis testing more 'conservative', so that more evidence would be required against the null hypothesis before it would be rejected.

Brooks (2008) suggest using heteroscedasticity-consistent standard error estimates as one method to avoid the presence of heteroscedastiy. On which most standard econometrics software packages have an option (usually called something like 'robust') that allows the user to employ standard error estimates that have been modified to account for the heteroscedasticity following White (1980).

Robust to cross-section heteroscedasticity and contemporaneous correlation among cross sections only affects the SE not the estimators and it is appropriate if N < T.]

Based on that the researcher used white cross section and robust the model in order to avoid presence of heteroscedastiy so that the no heteroscedastiy assumption of CLRM is not violated.

- **Test of Autocorrelation Cov(ui , uj) = 0 for i _= j**

The third assumption of CLRM is no autocorrelation, that the covariance between the error terms over time is zero.in other words it means that if error terms are correlated it is the presence of autocorrelation. Model with uncorrelated error terms is desirable.

In order to test this assumption the Durbin–Watson (DW) statistical test was applied. The DW test statistic has as its null and alternative hypotheses H0: ρ = 0 and H1: ρ≠ 0, thus If $\rho\hat{}$=0, DW = 2. So roughly speaking, do not reject the null hypothesis.

Table 4.6: Autocorrelation test: DW-test

Variables	DW-Test Result
All Bank, Industry and Macro-Economic Specific Variables	**1.91**

Source: computation on Eviews 8

Dw value of 1.91 which is approximate to 2 shows presence of no autocorrelation, to further strength the above result the DW result is analysed using the DW rejection and non rejection regions. According to Brooks (2008), DW has 2 critical values: an upper critical value (dU) and a lower critical value (dL), and there is also an intermediate region where the null hypothesis of no autocorrelation can neither be rejected nor not rejected.

From established 60 observations and 5 explanatory variables the value of Lower and upper 1% critical values for Durbin–Watson statistic is 1.25 and 1.60 respectively. The DW result of 1.91 of fall outside either of inconclusive regions. But DW value of 1.91 fails between the values of dU and 2.4 (4-dU=2.4) which is do not reject null hypothesis region where there is no autocorrelation. From this results it can be seen that there is no autocorrelation between error terms on which the third assumption of CLRM is not violated.

- **Test of Multicollinearity**

The fourth assumption of CLRM is the assumption of multicollinearity on which the relationship between independent variables should not be highly correlated. Or in other words dependent variables should not be related to one another.

Perfect multicollinearity occurs when there is an exact relationship between two or more variables. In this case, it is not possible to estimate all of the coefficients in the model. Perfect multicollinearity will usually be observed only when the same explanatory variable is inadvertently used twice in a regression Brooks (2008). And this will result in making no difference on the results if variables is changed or not. The simplest way to test multicollinearity is by seeing the correlation matrix of explanatory variables, the following table presents correlation of variables under the study.

Table 4.7: Correlation matrix of explanatory variables (Multicollinearity test)

	IT	LA	CA	MC	IN
IT	**1.000000**				
LA	-0.020983	**1.000000**			
CA	0.000910	-0.096614	**1.000000**		
MC	0.055451	-0.016586	-0.589093	**1.000000**	
IN	0.078375	0.072148	0.087790	-0.080160	**1.000000**

Source: computation on Eviews 8

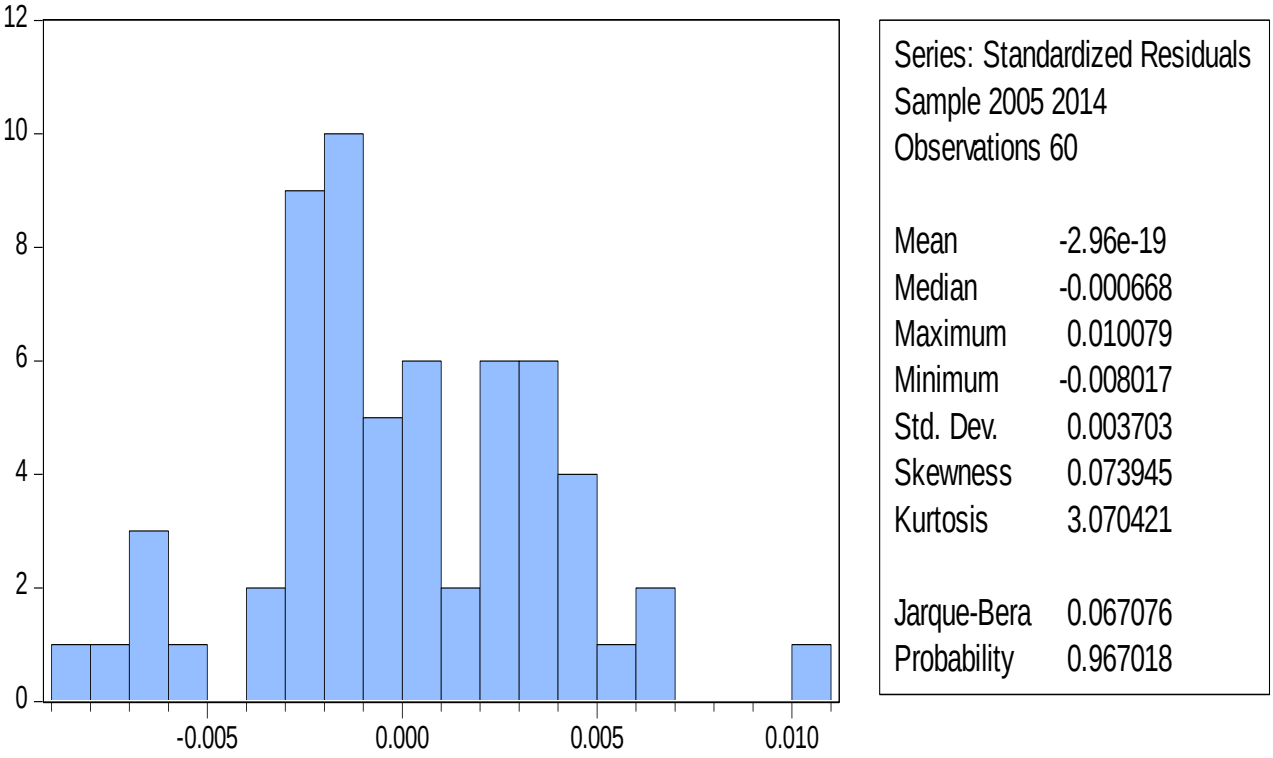
Form the above table the highest correlation between explanatory variables presented between CA and MC which is negative relation when one variable moves on one direction the other moves to the opposite. so it can be concluded that the presence of correlation among explanatory variables is impossible from results of the above table, on which the fourth assumption of CLRM is not violated.

- **Test of Normality (ut~ N (0, σ2)**

Brooks (2008) stated that the normality assumption ($ut\sim$ N (0, $\sigma 2$) is required in order to conduct single or joint hypothesis tests about the model parameters. One of the most commonly applied tests for normality is the Bera-Jarque (BJ) test. BJ uses the property of a normally distributed random variable that the entire distribution is characterized by the first two moments - the mean and the variance Brooks (2008). In case of this study, the researcher used BJ normality test to test the null hypothesis of normally distributed errors assumptions.

If the residuals are normally distributed, the histogram should be bell-shaped and the Bera--Jarque statistic would not be significant. This means that the *p*-value given at the bottom of the normality test screen should be bigger than 0.05 to not reject the null of normality at the 5% level. The standardized third and fourth moments of a distribution are known as its *skewness* and *kurtosis*. Skewness measures the extent to which a distribution is not symmetric about its mean value and kurtosis measures how fat the tails of the distribution are. A normal distribution is not skewed and is defined to have a coefficient of kurtosis of 3.

Fig 4.4: Test of Normality



Source: Computation on Eviews 8

P value of 0.967018 and kurtosis value of 3.07 shows that the null hypothesis of normality is failed to reject, means there is no normality problem on ROA as a result the last assumption of CLRM is not violated.

4.2.5 Regression Results and Interpretations

Here under the results from regression analysis is present with interpretation of coefficient results. Beta coefficient describes the explanatory variables influence on the dependent variable, it may be either positive or negative which describes the direction of relation and the respective P-value indicates at what percentage or precession level of each variable is significant. R^2 values indicate the explanatory power of the model and in this study adjusted R^2 value which takes into account the loss of degrees of freedom associated with adding extra variables were inferred to see the explanatory powers of the models.

ROA=β+β_1 Log (IT) +β_2 Log (LA) + β_3 (CA) + β_4 (MC) + β_5 Log (IN) +μ……..5

Where

ROA; Return on Asset

Log (IT); IT capital, Log (L); Labor, CA; capitalization, MC; Market concentration (banks share of loan), IN; Inflation.

β, β_1, β_2, β_3, β_4, β_5;coefficient of variables

As one measure of profitability of commercial banks the impact of information technology on ROA is regressed and the first hypothesis is tested.

From the regression output below it can be observed that out of five explanatory variables four of them have statistically significant effect on the ROA with 1% and 5% level of significance. The value of R^2 and adjusted R^2 which is 64% and 61% respectively shows the changes on independent variables explained 61% of changes on the dependent variable ROA. From the above values it can be indicated that the explanatory power of selected variables is good while explaining the effect on the dependent variable.

The null hypothesis of F-statistic (the overall test of significance) that the R^2 is equal to zero was rejected at 1% as the p-value was sufficiently low. P (F-statistics) value of 0.000 indicates strong statistical significance, which enhanced the reliability and validity of the model.

Table 4.8: Regression Analysis Result for Return on Asset (ROA)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016366	0.005424	3.017232	0.0039*
IT	0.000467	0.000421	1.109740	0.2720
LA	-0.010885	0.001618	-6.727048	0.0000*
CA	0.071390	0.028166	2.534649	0.0142**
MC	-0.027454	0.010408	-2.637692	0.0109**
IN	0.010293	0.004317	2.384305	0.0207**

R-squared	0.644169	Mean dependent var	0.012121
Adjusted R-squared	0.611221	S.D. dependent var	0.005191
S.E. of regression	0.003237	Sum squared resid	0.000566
F-statistic	19.55146	Durbin-Watson stat	1.912511
Prob(F-statistic)	0.000000		

**and **denote significance at 1%, 5% levels respectively.*

Source: Eviews output

Where our model with results became

ROA= 0.016366+0.000467**IT**-0.010885**LA**+0.071390**CA**-0.027454**MC**+0.010293**IN**

The following section presented with the summary of major findings and test of hypothesis constructed.

IT capital: coefficient of IT capital shows positive relation with ROA. On which holding other factors constant 1% increase on IT capital investment leads to ROA increases by 0.000467 units, but it is statistically insignificant. From this result it can be understood that even though commercial banks manage to generate positive return from capital investments on technological products the benefit they are getting is not significant. On the other hand positive relation between technological investments and profitability reverses the **"productivity paradox"** theory for commercial banks in Ethiopia.

Labor: man power is one of the major resources of a given organization, employee's efficiency in productivity is required in order banks to obtain maximum profit. Holding all other factors constant when labor cost per net income increases by 1% ROA will decreases by 0.010885 units and the relation is statistically significant at 1%. When referring to previous studies, Samuel Alemu (2015) found negative and insignificant relation between commercial banks employees' efficiency while Alemu and Mekuria (2013) found a significant negative relationship between labor efficiency and bank profits. The result shows that the Ethiopian Banking industry may not truly benefited from staff efficiency.

Capitalization: banks with highest equity – asset ratio are perceived to be less risker than those with low ratio, as a result the variable expected to have positive relation with ROA. Coefficient of capital which is measured by equity to total asset ratio is positive and statistically significant at 5%, which means increase in capitalization of Ethiopian commercial banks resulted increase on ROA. Earlier studies made in Ethiopian commercial banks also point out that capital has positive and dominant influence on the performance of commercial banks (Abebaw and Depaack 2011, Birhanu Tsehay 2012 and Samuel Alemu 2015). On the other hand Mulualem Getahun (2015) found negative relation between ROA and capital adequacy of Ethiopian commercial banks.

Market concentration: banks with high market share perceived to have better chance of profitability in relation to those banks with low market share. In non-competitive market larger banks with high loan concentration can increase their profitability by increasing their lending interest rate and decreasing interest rate on deposits. But large loan concentration can also result

risk of loan defaults, which may result in negative effect on the profitability of banks. Coefficient of banks loan concentration is negative and significant means larger banks are not benefited from their highest loan share of the industry.

Inflation: it is expected that increase on inflation rate has negative relation with performance of banks. Some studies disproves this argument by showing positive relation with inflation and banks profitability. Holding other factors constant, banks used 1% increase on inflation to increase ROA by 0.010293 units which is statistically significant at 5%.

Prior studies explained the rationale behind positive relation between inflation and banks profitability as once banks are able to anticipate inflation, it will give them chance to adjust interest rates accordingly as a result they will be able to increase revenues faster than increase in costs which will result in increase in profitability.

Table 4.9 Summary of actual and expected signs of explanatory variables on the dependent variables

Variable	Expected impact on ROA	Actual impact on ROA
IT Capital **(IT)**	+ve/Sig	+ve/in sig
Labor **(LA)**	-ve/ in Sig	-ve/Sig
Capitalization **(CA)**	+ve/Sig	+ve/Sig
Market Concentration **(MC)**	+ve/Sig	-ve/Sig
Inflation **(IN)**	-ve/Sig	+ve/Sig

4.2.6 IT Capital Investment and ROA Hypothesis Testing

The objective of the study is to evaluate the relationship between banks investment on information technology and its impact on the performance of commercial banks. In order to achieve this objective the researcher implemented both qualitative and quantitative research approaches. The following section presented brief analysis of IT capital variable result on regression analysis and

its impact on the performance of commercial banks by supporting it with empirical evidence from former studies.

The coefficient of IT capital is 0.000467 with p value 0.2720, implying positive relation between technological advancements and performance of banks. But looking at the p value positive impact of IT capital is not significant even at 10%.

Hitt and Brynjolfsson (1995) studied the relation between technological advancement and performance measurements and concluded that positive relation is observed on the study but they point out that even though IT has positive impact on the performance of commercial banks its contribution to profitability is insignificant.

Baba Prasad and Patrick Harker (1997) by using data collected through a major study of retail banking institutions in the United States, concludes that additional investment in IT capital may have no real benefits and may be more of a strategic necessity to stay even with the competition.

Study result from Eyob Dagne (2010) on capital investment decision on information technology and its impact on the performance of organization also point out that there exists insignificant difference on the performance of high IT capital investing banks and low IT capital investing banks. The study also point out that information technology investment decisions are not evaluated before and after capital investment decisions is made and banks experience on this area is slight.

Latest study made by Tadesse Kebede (2015) on the impact of accounting information system (AIS) and commercial banks performance reviled that performance of AIS infrastructure was not productive as expected and should have to consistent with the quality of AIS's service and appropriate implementation of AIS's software. But over all banks are benefiting from investment made on accounting information systems.

Test of Hypothesis

H1: Capital Investment on IT makes Positive contribution to profit of Ethiopian private commercial banks

The coefficient of IT variable in regression result shows IT capital investments make positive contribution to the performance of Ethiopian commercial banks.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary of Findings

In the context of the study the researcher examines the relationship between IT capital investments and performance of private commercial banks in Ethiopia. Using panel data from 6 commercial banks for 10 years period covering from 2005 to 2014 fiscal year. Applying qualitative and quantitative research approaches the researcher addresses both general and specific objectives of the study.

The following section provides summary of results obtained from the analysis made on both qualitative and quantitative research method used.

- ✓ It is observed that capital investments on Information technology has been increasing from time to time with more technological advancements in private commercial banks in Ethiopia. Banks are investing on IT related products and services such as: software, hard ware, infrastructure and networks, consultancy and maintenance services.

- ✓ Main motivational factors for banks to invest huge amount of money on IT include delivering quality customer services, increasing efficiency and effectiveness and to be competitive and leading in the fast growing banking industry.

- ✓ Looking at overall IT capital, it can be seen that technological products investment is holding large portion of overall capital investment decisions made, the average percentage of IT capital share in relation to total fixed asset of banks is near to 50%, which shows banks are investing on IT related products aggressively.

- ✓ It is observed that while investing on IT banks have limited experience of using capital investment appraisal tool or any other evaluating method to make cost benefit analysis of investment decisions before and after investments are made.

- ✓ From the regression output apart from IT capital the rest control explanatory variables have significant relationship with performance measure ROA of commercial banks on which labor efficiency and market concentration shows negative relation but the rest two variables capitalization and inflation shows positive relation with ROA.

- ✓ Looking at coefficient of IT capital from the regression result, it is confirmed that technological products have positive impact on the performance of commercial banks in Ethiopia but the degree of relation is insignificant when measured statistically.

Even though banks are getting positive return on IT investments made, there are a lot of factors observed restricting them from being advantageous as expected. There are many justifications stated on the study can be mentioned as a causes for the above results.

- ✓ At the beginning it is observed that in most private commercial banks investments on IT is at the early stage and made mainly for survival strategy. Most of the time banks are intended to serve customers with low service charges in order to mobilize deposits and to attract customers. On the other hand, the new technological futures banks are introducing such as internet banking are at early stage of implementation on which returns are not yet captured.

- ✓ Low performance of major infrastructural facilities like electricity and network coverage prohibits banks from fully utilizing IT infrastructures.

- ✓ In addition, banks poor management and lack of control over technology contributes for the low outcome. Employees' resistance to technology and lack of adequate knowledge to the system implemented significantly affected the function of IT related investment. Poor quality of IT infrastructure installation and implementation can also be mentioned as problems.

5.2. Conclusions

In general from the study result, the researcher concluded that information technology is essential resource in commercial banks in Ethiopia and even though the degree of impact is not significant, commercial banks are generating additional profit from capital investment decisions made on IT.

In addition the researcher concluded that information technology investments decision makings and management is poor among private commercial banks and banks are not working on full capacity in order to utilize those investments to the maximum limit.

Finally, it is believed that private commercial banks are on the right track for selecting and using Information technology as one survival strategy, as a means to enhance customer service quality and increase work efficiency. However, large amount of investment will continue to deliver less benefit if not managed well.

5.3. Recommendations

Based on the study findings, the researcher provided the following recommendations:

- ✓ If managed wisely, investments on information technology (IT) can improve organizational performance. It is recommended that relating banks with technological advancements will be helpful because as the living standards of individual's increases, banks' ability to serve their customers with same standard also will be improved.

- ✓ Commercial banks has to evaluate investments on information technology before and after investment is made. They must adopt various evaluation methods and criteria's in order to make sound decisions while selecting the appropriate type of investment that is suitable with organization objectives.

- ✓ Employees training and customer's awareness creation must be carried out more often in order to fill knowledge gap so that resistance from customers and employees can be avoided as a result banks can fully utilized their IT capacity.

- ✓ Continuous management and control must be done in order to evaluate whether the investment decision has paid off or not. Alignment of investments with organizational objectives and structure must be assessed and corrective measures must be taken from time to time.

- ✓ Finally banks must widen scope of technological investments to latest technology advanced products and services both for their customers and for internal work units in order generate more profits beyond the issue of survival.

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Appendices

Appendix 1 Regression Data

BANK	Year	ROA	TIT	LA	CA	MC	IN
AIB	2005	0.014587143	28225018	0.684552	0.082825	0.08389	0.061
AIB	2006	0.014949355	34899100	0.764839	0.080663	0.110648	0.106
AIB	2007	0.025838796	39148491	0.450854	0.092792	0.098841	0.158
AIB	2008	0.026478461	42354078	0.264938	0.100883	0.076905	0.253
AIB	2009	0.029981617	42354078	0.47072	0.106736	0	0.364
AIB	2010	0.027436347	46438569	0.378142	0.106323	0.0678	0.028
AIB	2011	0.032520087	53365105	0.335931	0.12052	0.063661	0.181
AIB	2012	0.030050786	61510323	0.380967	0.12576	0.057762	0.341
AIB	2013	0.024663205	121312986	0.567555	0.116185	0.065946	0.135
AIB	2014	0.027967852	173325785	0.552183	0.117475	0.065373	0.081
DB	2005	0.020806999	37726191	0.407536	0.071022	0.121238	0.061
DB	2006	0.029386143	57256113	0.298807	0.084882	0.142196	0.106
DB	2007	0.031119167	66261087	0.275561	0.090131	0.155819	0.158
DB	2008	0.030492323	74830380	0.303416	0.093192	0.124758	0.253
DB	2009	0.025674211	97454199	0.390106	0.093366	0.123633	0.364
DB	2010	0.026230642	111187127	0.355994	0.090934	0.108819	0.028
DB	2011	0.030835558	136430109	0.321119	0.095547	0.099338	0.181
DB	2012	0.037215214	212260243	0.291338	0.104332	0.085246	0.341
DB	2013	0.030726238	245575600	0.420906	0.103594	0.075802	0.135
DB	2014	0.032441386	291713007	0.440067	0.118277	0.068446	0.081
WB	2005	0.027370341	4839833	0.210686	0.113518	0.067029	0.061
WB	2006	0.028957604	5981926	0.299084	0.13325	0.088115	0.106
WB	2007	0.019522305	7522364	0.478584	0.11859	0.090072	0.158
WB	2008	0.003900624	10269658	2.717477	0.098381	0.079852	0.253
WB	2009	0.018326603	12188888	0.656673	0.094808	0.075237	0.364
WB	2010	0.022387241	12881314	0.563998	0.093238	0.067963	0.028
WB	2011	0.02451912	15883806	0.508887	0.090794	0.052949	0.181
WB	2012	0.026186992	20520504	0.492621	0.11003	0.040897	0.341
WB	2013	0.026058876	128184754	0.507172	0.109018	0.040218	0.135
WB	2014	0.024006915	141216732	0.639651	0.13559	0.036713	0.081
BOA	2005	0.029529629	9665959	0.420672	0.111521	0.054425	0.061
BOA	2006	0.031361637	10912038	0.419403	0.112708	0.071547	0.106
BOA	2007	0.031886814	9059881	0.350555	0.115854	0.084211	0.158
BOA	2008	0.03365846	16629731	0.362643	0.146779	0.06652	0.253
BOA	2009	0.043635663	18787539	0.40676	0.163416	0.058668	0.364
BOA	2010	0.031453212	34668018	0.411648	0.183166	0.05332	0.028

BOA	2011	0.040104235	60861057	0.372722	0.165903	0.046471	0.181
BOA	2012	0.040209307	72899134	0.43019	0.192177	0.037416	0.341
BOA	2013	0.032717343	91645221	0.540568	0.176107	0.040116	0.135
BOA	2014	0.027621403	116905684	0.764335	0.185988	0.032802	0.081
UB	2005	0.028818511	2931642	0.310056	0.116388	0.032192	0.061
UB	2006	0.027309916	3602580	0.317261	0.119632	0.045087	0.106
UB	2007	0.029446603	19254760	0.356155	0.164808	0.05511	0.158
UB	2008	0.028008729	23766267	0.377283	0.143948	0.052712	0.253
UB	2009	0.020115229	30518127	0.58426	0.111764	0.059795	0.364
UB	2010	0.02960569	34447112	0.388077	0.108129	0.056332	0.028
UB	2011	0.030008572	48336889	0.359146	0.116675	0.05233	0.181
UB	2012	0.033898203	62904921	0.395835	0.125382	0.042869	0.341
UB	2013	0.028259008	71492875	0.327009	0.120384	0.040292	0.135
UB	2014	0.023422144	137864535	0.297849	0.132639	0.036116	0.081
NIB	2005	0.026401986	2002265	0.25247	0.128739	0.061537	0.061
NIB	2006	0.027897179	2680141	0.298085	0.140611	0.066208	0.106
NIB	2007	0.029012405	12159352	0.325678	0.163104	0.071013	0.158
NIB	2008	0.030968604	14033343	0.314477	0.163865	0.059916	0.253
NIB	2009	0.03205206	24695574	0.347087	0.151633	0.061665	0.364
NIB	2010	0.033646458	30107352	0.383915	0.153506	0.054878	0.028
NIB	2011	0.034651244	33341595	0.392168	0.164622	0.044179	0.181
NIB	2012	0.034587344	38086639	0.404446	0.184631	0.038919	0.341
NIB	2013	0.031304739	50706058	0.489299	0.182177	0.038857	0.135
NIB	2014	0.029195103	126015955	0.617185	0.182777	0.03935	0.081

Interview Questions

1. How do you define your organization Information Technology investment?
2. What are the motives for your organization to invest on information technology?
3. Do you make evaluation before you made capital investment on information technology and after investment is made?
4. What kind of investment appraisal technique do your organization use to evaluate investments on information technology?
5. While evaluating investment on information what difficulty do you face?
6. As you said your organization used various investment appraisal technique for evaluating information technology investment decisions, how do you evaluate the technique used on evaluating investment on information technology?
7. How do you characterize your organization investment on information technology?
8. Do you believe investment on Information Technology made on your organization materialize?
9. What factors contribute for the outcome?
10. What are things your organization used or do to benefit from information technology investment?