ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL SCIENCE

SCHOOL OF INFORMATION SCIENCE

EXPLORING FACTORS THAT AFFECT THE DECISION TO ADOPT CLOUD COMPUTING TECHNOLOGY IN ETHIOPIAN BANKING SECTOR

SELAMAWIT BEKELE

OCTOBER, 2014

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SELAMAWIT BEKELE

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DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented as a partial degree requirement for a degree in any other university and all sources of materials used for the thesis have been duly acknowledged.

Selamawit Bekele

October 2014

The thesis has been submitted for examination with my approval as university advisor.

Dereje Teferi (PhD]

October, 2014

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BY

SELAMAWIT BEKELE

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Dedication

I would like to dedicate this thesis work to my mother, Mestawet Tesfaye, my father, Bekele Abay, my sister Beti and her son Doni, my brothers Abel and Wondye, my Fiance Abenezer, who has always been there for me, for your dedication, love, support, encouragement. I am lucky to have you all in my life!

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I would like to thank my family, Emodish, Bekele, Bety, Abel, Wondye, Doniye for your unconditional love, support, and encouragement. I love you all and God bless you all!

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I thank my friends Samri, Kalkidan, for your friendship, encouragement, and support.

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List of Abbreviations

ATM	Automated Teller Machines
B2B	Business to Business
CapEx	Capital Expenses
CBS	Core Banking Solutions
CIO	Chief Information Officer
CRM	Customer Resource Management
CSP	Customer Service provider
DOI	Diffusion of Innovation
ENISA	European Network and Information Security Agency
HTML	Hypertext markup language
IaaS	Infrastructure as a service
KMO	Kaiser-Meyer-Olkin
NIST	National Institute of Standards and Technology
OpEx	Operational Expenses
PaaS	Platform as a service
PCA	Principal Component Analysis
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
SaaS	Software as a Servcice
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model

TBA	Total Branch Automation
TOE	Technology, Organization, Environment
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

Abstract

As new technologies become dynamic, changing the way business is undertaken, firms need to make use of these technologies in order to survive in the market. Despite the fact that these technologies offer great opportunities to businesses, their adoption is based on an ad-hoc approach that leads to failure more often than not. Additionally research shows that Adoption of these technologies such as cloud computing is not as expected mainly because most researches focus on the technical aspects leading to inadequate researches on its adoption. Therefore, adoption of cloud computing solutions requires critical investigation, in order to understand its challenges and benefits that it has to offer.

The aim of the study is to explore the internal and external factors that have influenced IT executives and expert's decision on the adoption of cloud computing focusing on the Ethiopian banking sector. A mixed research method utilizing both qualitative and quantitative methodologies was used. Interview was used to gather qualitative data and survey was used to gather quantitative data. Principal Component Analysis (PCA) is used for analysis of the responses.

The result indicates that the internal factors: complexity, compatibility, employee skills, risk of failure and external factors: customer demand, external pressure, cost, and consistency of cloud computing were found to have a positive influence on decision to adopt cloud computing. However, the internal factors: organizational infrastructure, firm size, relative advantage and the external factors: competition, government rules, regulations, proclamations, security, cloud vendor's support, network bandwidth, and availability of cloud services were found not to have an influence on the adoption of cloud computing technologies in Ethiopian banking sector.

Based on the findings of the study, cloud computing adopters can focus on the most critical factors, vendors can adjust their services and marketing strategies, researchers can base their study to further investigate and design a framework for cloud computing adoption.

Keywords: Cloud Computing, TOE Framework, Ethiopian Banking Sector

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

In today's business world where there is fierce competition, economic globalization with interconnected global financial system, firms need to keep their pace by adopting state-of-the-art technologies in order to differentiate themselves from competitors and gain strategic advantages. Among the many firms the banking industry is one of them that make use of Information Technology (IT) (IBM, 2013). The banking industry's IT revolution has started in the middle of the 1980s where banks started computerizing their branches in a limited manner and in the early 1990s they implemented the Total Branch Automation (TBA). The middle and late 1990s witnessed the dynamic financial reforms, deregulation, globalization coupled with the advancement of communication technologies and evolution of novel concept of convergence of computer and communication technologies (Eshete, *et al.*, 2013). The major banking technology is the Core Banking Solutions (CBS) which is implemented by most banks (Viswanathan *et al*, 2012).

The banking industry has undergone drastic changes over the past years by adopting new technologies to its business models and operations. It is a must for banks to adapt to new technologies since there is fierce competition and customers are becoming more demanding and complex.

While the implementation of innovative technologies in banks is an enabler, the time and cost of implementing these technologies is a challenging factor since it deters to fulfill the strategic business needs. Therefore new tools need to be employed in order to focus the potential of IT to fulfill its goal. A recent technology to overcome these problems is to implement cloud computing. Cloud computing is the most recent technology that has gained important attention for the opportunities it offers (Ahmed, 2013).

The U.S. National Institute of Standards and Technology (NIST) defines cloud computing as “a pay-per-use model for enabling available, convenient, on-demand network access to a shared pool of configurable computing resources (e.g. network, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction (Garg, 2011).

The concept of the cloud is not new, it has evolved over the years when attempts to reduce organizations reliance on IT hardware started with the concept of virtualization, networking in the 1990s to grid computing systems in 2000s (Aleem *et al.* 2013). Grid computing, which emerged in the early 1990s, is a hardware and software infrastructure that provides dependable, consistent, pervasive, and inexpensive access to high-end computational capabilities (Zissis *et al.*,2012). In 1999 Salesforce.com introduced the idea of delivering applications via a simple website. It was a major step ahead for cloud computing followed by Amazon launching its EC2 cloud service in 2006 and finally the development of Web 2.0 in 2009. However it was in 2008 that cloud computing was listed as one of the ten most disruptive technologies that would be responsible for shaping the IT industry (Aleem *et al.* 2013).

Cloud computing is a relatively growing technology that can provide enormous advantages, both strategic and operational (Makena, 2013). It is being feted by the IT industry as the next (potential) revolution to change how the internet and information systems operate and are used by the world at large (Sharif, 2009). In fact, the future of computing lies in cloud computing, whose major goal is reducing the cost of IT services while increasing processing throughput, reliability, availability, and flexibility and decreasing processing time (Hayes, 2008).). The delivery of computing capabilities as a service has an implication for organizations to focus more on cloud computing so that they can focus on other values without having to worry about the hardware infrastructure, software development, and maintenance issues.

As Zissis, *et al*, (2012) described, there are three major deployment models for cloud architecture solutions

Private Cloud: cloud infrastructure is provided for a single organization where management is by the organization or a third party. This is usually preferable for organizations that need to control their own data in order to minimize management and security issues.

Public clouds: the cloud infrastructure is made available for the general public and the organization selling cloud services is responsible for the management.

Hybrid Cloud: the cloud infrastructure is a combination of both the private and public cloud features. Computing capabilities and resources are owned and maintained by both the organization and cloud provider.

Cloud computing has the following service models namely, Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) (Goscinski and Brock, 2010).

In SaaS category, there is a process by which different software applications are provided by the application service provider as a rental over the internet, leveraging cloud infrastructure and services released by Salesforce.com customer resource management (CRM), Google Apps, Oracle Siebel on Demand Microsoft BPOS.

The PaaS category represents clouds that access a range of computers, database, and storage functions within a virtualized platform provided over the internet and services released by Salesforce.com, Microsoft Azure, and Google App Engine.

The IaaS category is the delivery of computer infrastructure as a service. It is a provision model in which an organization outsources the equipment used to support operations, including storage, hardware, servers, and networking components (Low *et al.*, 2011). The cloud service providers are the ones owning the equipments and responsible for the overall system including housing, running, and maintaining it.

Cloud computing is transforming the way organizations purchase and manage computing resources, providing fundamentally different IT model in which a cloud provider might be responsible for a range of IT activities, including hardware and software installation, upgrades, maintenance, backup, data storage, and security. The result is that organizations can lower their IT capital expenditures and operating costs by purchasing on-demand technology resources (such as increased data storage, bandwidth, and processing power) while eliminating the need to maintain outdated equipment (Garrison, *et.al*, 2012). For its enormous advantages, cloud computing is being adopted by different organizations belonging to various industries such as educational institutions, hospitals, financial industries like banks and insurance. The study conducted by IBM (2010) showed that financial institutions are among the highest adopters of cloud computing services.

The cloud offers a number of opportunities for banks to build a more flexible, nimble and customer-centric business model that can drive profitable growth (Netmagic Solutions, 2012). Among the benefits of cloud computing offering for banks, a few of them are listed below:

- Moving to the cloud enables banks to increase their efficiency and decrease costs since it allows use on a pay-per-use manner.
- Enhances business agility where banks get the ability to react quickly to service requests both from internal and external customers. It enables banks to develop applications internally to procure, configure a development environment in less time and with reduced operational requirements. (Netmagic Solutions, 2012).
- Ensures a better customer centricity by responding immediately to customers' demands.
- Creates more flexible environment for introducing new services and products.
- Enables IT professionals and decision makers to focus on strategic business objectives.

Even though the potential of cloud computing is immense, its adoption should not be based on ad-hoc approaches since it may conflict with the overall organizational strategic goal. Therefore, the adoption and implementation of cloud solutions should be aligned with the strategic objectives and the process of adopting it should involve the top managers who are responsible for strategic decision making.

The major challenge for banks to adopt cloud computing is the issue of security and the fact that sensitive data may be in the hands of a third party and may be subject to leakage. However this should not stop decision makers to implement cloud computing since understanding and anticipating the risks associated will help manage the risks.

1.2 Statement of the Problem

The advancement of innovative technologies from time to time is changing the way organizations handle their business processes and the need to adopt these technologies is becoming critical for business organizations to be competitive in the market. However, decision makers are challenged when it comes to the decision of adopting or not adopting these technologies. The decision to adopt cloud computing or new technologies for that matter, is usually based on experts' experiences, vendor's recommendations, or word-of-mouth, without prior pre-adoption analysis to determine whether that particular technology meets the strategic goal of the organization or not. A survey by Convery, *et al* (2011), showed that many of the information management practitioners consulted felt that the adoption of cloud computing was often ad hoc and driven mainly by IT in response to changing business needs, shrinking budgets and overloaded IT systems. Additionally, despite the fact that cloud computing offers great deal of opportunities, its adoption is not as expected (Rahimli, 2013; Goscinski & Brock, 2010; Makena, 2013). Moreover, research on factors that influence the decision to adopt cloud computing is limited. This uncertainty can lead to a wrong decision making, unnecessary cost, and to major project failure.

Furthermore, despite the fact that the Ethiopian banks have great contribution to the economic development of the country, their development regarding adoption of modern technologies is still slow. This is mainly because banks are using traditional systems to deliver their services to their customers. The main reason that banks are not using innovative technologies is the hurdle of cost for development of customized banking solutions, investment of time and high quality resources. Even though the existence of modern technologies and the opportunities they bring to the economic development of the country is evident, the adoption of these new technologies is still poor. This result in dissatisfied customers and large portion of the country, the rural cities, are not getting banking services, and we are lagging behind only watching the developed countries improve their lives and enjoy modern technologies.

In order to avoid this, the best solution is to adopt new technologies such as cloud computing solutions. Cloud computing technologies are becoming the most disruptive technologies in the world. Cloud computing technologies enables banks to utilize state of the art technologies and experts, with less upfront capital expenses and directs them to focus on their business strategic goals rather than focusing on day to day routine tasks.

Cloud computing, as the latest technology that banks are adopting, comes with its own advantages and challenges. Therefore, in order to avoid the confusion and fear of decision makers to adopt this technology, a study of the factors that influence the adoption of cloud computing must be undertaken before actually implementing it.

This study focuses on exploring factors (technological, organizational, environmental) that affect the decision to adopt cloud computing in Ethiopian banks in order to improve understanding of decision makers on these solutions so that their decision can be on informed one. Additionally, vendors can focus on these factors so that their services can be more suited for the main objectives and goals of their customers in Ethiopia. Furthermore, this study aims to contribute to scientific knowledge since empirical research on adoption of cloud computing is limited.

For the purpose of this study, the factors are identified as internal factors and external factors and the following research questions discover the relationship that exists between these factors and the decision to adopt cloud computing technologies in Ethiopian banks.

- What relationship does exist between each of the aforementioned *internal factors* and the IT executive's and expert's decision to recommend an adoption of cloud computing solutions in Ethiopian banking sector?
- What relationship does exist between factors categorized as *external factors* and the IT executive's and expert's decision to recommend an adoption of cloud computing solutions in Ethiopian banking sector?

1.3 Objective of the Study

1.3.1 General Objective

The objective of this research is to explore the factors that affect the IT executives and expert's decision to adopt cloud computing technologies in the Ethiopian banking sector.

1.3.2 Specific Objectives

- Identifying the extent of cloud computing adoption in Ethiopian banking sector.
- Performing literature review to extract factors affecting decision of cloud computing adoption
- Collecting data (qualitative and quantitative) from IT executives and experts in the Ethiopian banking sector.
- Exploring the initial factors (internal and external) affecting IT expert's and executive's decision to adopt cloud computing solutions.
- Identifying the key factors (both internal and external) and their relationship with the decision to adopt cloud computing by using statistical tools.

1.4 Scope and Limitations of the study.

1.4.1 Scope

The main objective of this study is to explore factors that influence the adoption decision of cloud computing in Ethiopian banks. There are 19 banks in Ethiopia; however, this study focused on selected six banks. Additionally, the study explored a number of factors that affected decision makers' adoption decisions, however, major analysis of the study focused on selected (major) factors that are affecting the adoption decision.

1.4.2 Limitations

The limitation of the study is that it focuses only on one sector and extracts the decision of adoption factors on an organizational level, rather than on individual level. Future researches can focus on various sectors in order to advance research findings.

1.5 Significance of the study

This study will help both decision makers in Ethiopian banks and vendors to perform their decision on an informed manner. Decision makers in Ethiopian banks will make an informed decision in the process of adoption of cloud computing by evaluating their advantages and risks associated with this technology. The factors identified are aimed at providing the necessary considerations to be undertaken, be it the motivators or inhibitors that banks need to consider in their preliminary investigations of cloud computing adoption.

Additionally, it helps cloud vendors, by providing them country and sector specific factors which they need to consider in order to adjust their services and rethink their marketing strategies.

Review of literature show that most of the research regarding cloud computing focus on the technical aspects of it, and there is a gap in literature that focus on the business or organizational aspects of it (Hailu, 2012). Therefore, this study tries to fill this gap by investigating the factors that influence the adoption of cloud computing in Ethiopian banks.

Additionally, it avoids the uncertainties, confusion and fear of decision makers to implement this technology and avoid failure and bankruptcy by providing them with the information they need to know before deciding to go forward.

1.6 Organization of the thesis

The research report has four chapters, the first chapter, as shown above, discussed background issues on cloud computing basics, introduced the problem, listed the major objectives (general and specific), explained the scope, and the methodologies used to undertake this study.

In the second chapter critical literature review was undertaken including cloud computing and its characteristics, its challenges and benefits for the banking sector, its service and deployment models, its adoption issues and trends, Ethiopian banking sector and its technology utilization trends have been studied, factors that affect adoption of cloud computing was discussed using the Technology-Organization-Environmental (TOE) framework.

In chapter three, a detailed research methodology is covered, including a detailed presentation of the research hypotheses.

The fourth chapter presents the exploration of factors, statistical analysis, and the results of the study that was undertaken using qualitative and quantitative methods.

The final chapter, chapter five, summarizes the research findings and proposes recommendations and future research directions.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Cloud Computing Definitions

There are numerous definitions given to cloud computing by different authors, for example;

As Nitin Khanapurkar *et al,* (2011) put it, the cloud is the combination of Internet-based data access and exchange and Internet-based access to low cost computing and applications.

Klems *et al,* (2009), defines it as, building on compute and storage virtualization technologies, and leveraging the modern Web, Cloud Computing provides scalable and affordable compute utilities as on-demand services with variable pricing schemes, enabling a new consumer mass market. It provides a service where consumers can rent (virtualized) infrastructure as needed, deploy applications and store data on the infrastructure and access the applications and data via Web protocols on a pay-per-use basis.

Armbrust *et al,* (2010) refer to cloud computing as both the applications delivered as services over the internet and the hardware and systems software in the data centers that provide those services.

Aleem *et al.* (2013) define it as a form of utility computing where virtual servers are made available to businesses for carrying various activities.

Cloud Computing changes the way organizations purchase and manage computing resources, providing a fundamentally different IT model in which a cloud provider might be responsible for a range of IT activities, including hardware and software installation, upgrades, maintenance, backup, data storage, and security (Garrison, *et.al*, 2012). Organizations will be able to decrease their IT costs like acquisition, operating, and maintenance costs by acquiring their IT utilities on a pay-per-use basis while using state-of-the art hardware, software and platform technologies with the help of highly qualified personnel that will otherwise be too costly or hard to get.

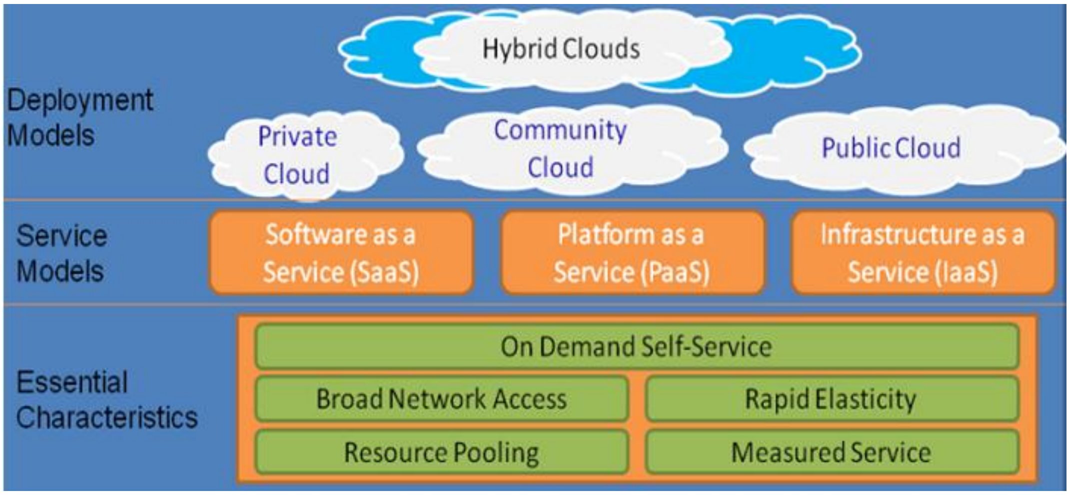

Figure 2.1. NIST Cloud definition framework. Adapted from "NIST definition of cloud computing" by P.Mell and T. Grance, 2011, National Institute of Standards and Technology (NIST special publication 800-145), Cited in Hailu (2012).

Cloud computing offers creative ways to address how organizations utilize IT, which in turn frees them up to focus on what matters most – their business objectives (Hartman, *et al.*, 2009).

However, despite its benefits, organizations face obstacles adopting cloud services such as uncoordinated adoption by stakeholders, inadequate business and technical insights, and data security (Garrison, *et.al*, 2012).

2.2. Cloud Computing Essential Characteristics.

The benefits of cloud computing goes far beyond just cost savings for organizations; it impacts organizations immensely in variety of ways. It enables organizations to focus on their core competencies and business objectives while the details of running the IT infrastructure will be left to the cloud service providers. It enables organizations to build virtual and open business processes, enabling its various stakeholders including customers, business partners, and suppliers, to connect and do business more seamlessly (Khanapurkar *et al.*, 2011). The enabling features of cloud computing includes: -

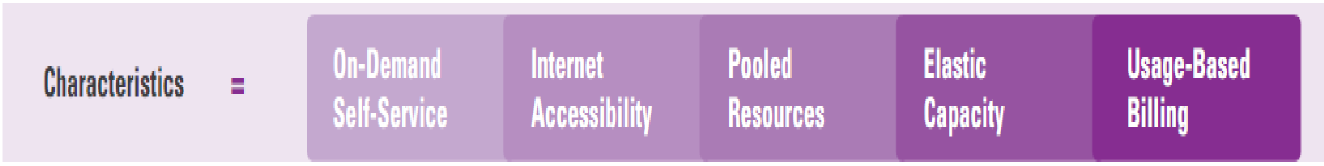

Figure 2.2 Characteristics of cloud computing

On-demand Self-Service

Unilateral provisioning of computing resources such as server time, storage or network bandwidth, without requiring human interaction with service providers. (Garg, 2011).

Ubiquitous network access

Access to systems independent from user location or device. i.e. it can be accessed via PC, mobile phone, tablet, etc. capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms.

Pooled Resources

Multi-tenancy that enables sharing of pooled resources and costs across a number of users, with different physical and virtual resources dynamically assigned and reassigned according to user demand.

Elastic Capacity

Quick scale up or scale down of resources through elastic provisioning or the release of capabilities in near real time. It provides scalable on demand computing capabilities (Cegielski, *et al.*, 2012).

Usage-Based Billing

Cloud computing lets an organization pay by the hour for computing resources, potentially leading to cost savings. It is often described as "converting capital expenses to operating expenses" (CapEx to OpEx) which is pay-as-you-go, that captures an economic benefit to the buyer (Armbrust *et al*, 2010; Arinze, 2010). This avoids an upfront capital expense which allows capital to be used for core business investment. It is an attractive concept for organization to pay only for the time they use a particular service for the growing businesses.

Measured service

Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service. Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

2.3. Cloud service and deployment models

The cloud system has three service and four deployment models (Lampe *et al.*, 2012), as shown in figure 2.3 below

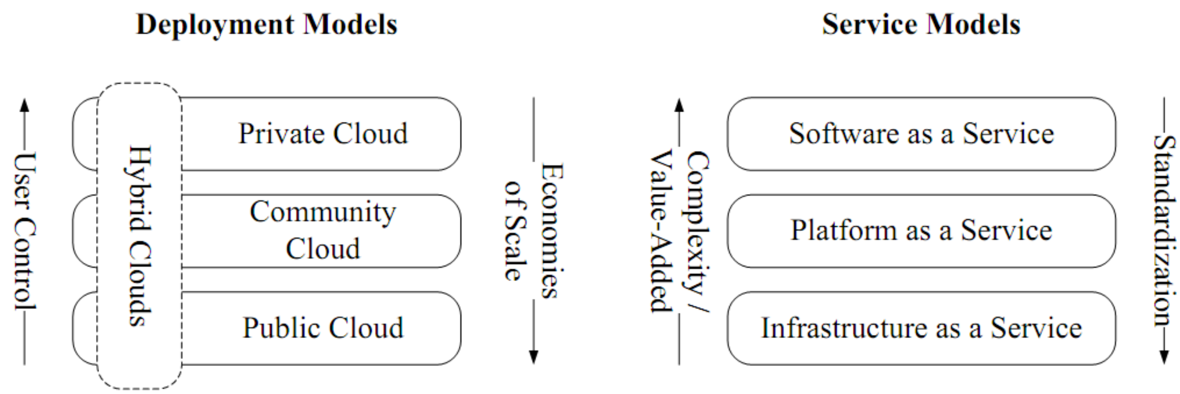

Figure 2.3 Common Cloud Service and Deployment Models [Source: Lampe, *et al.*, 2012]

2.3.1. Cloud Service Models

2.3.1.1. Software as a Service (SaaS)

In the SaaS, organizations have access to software hosted by the cloud vendor through a thin client where the vendor has full control over the application, including capabilities, updates, and maintenance (Garrison, *et.al*, 2012). It is a model where applications are hosted at the Cloud Service Provider (CSP) location and are accessed by the customers where consumers do not manage or control the infrastructure that the applications run on (Aleem *et al.* 2013). The software is offered by a cloud vendor, available on demand, usually through the internet configurable remotely. Examples include online word processing, spreadsheet tools, CRM services and web content delivery services (Salesforce CRM, Google Docs) (ENISA, 2009).

2.3.1.2. Platform as a Service (PaaS)

In the PaaS, the vendor provides the platform that allows the construction and deployment of applications and services the organization accesses through the internet. Organizations are able to application design, development, and testing without the complexity and cost of procuring, deploying, and managing the infrastructure in an application-hosting environment. (Garrison, *et.al*, 2012). Examples include, Microsoft Azure, Force and Google App engine.

2.3.1.3. Infrastructure as a Service (IaaS)

IaaS is cloud computing service model that operates on the lowest level of abstraction. Its main features are to provide processing, storage, network, and other fundamental computer resources. Entire hardware infrastructure is not in control of customer but he is able to deploy and run arbitrary software, which can include operating system or other system applications. Sometimes customer has an option to adjust necessary hardware settings to fully utilize specific solution (NIST, 2009).

The cloud vendor provides IT infrastructures such as the servers (like processing capability), storage (replication, backup, and archiving) and connectivity domains (firewalls and load balancing), with the client organization charged based on their use. (Garrison, *et.al*, 2012). Virtual machines and other abstracted hardware and operating systems which may be controlled through a service API, examples include, Amazon EC2 and S3, Terremark Enterprise Cloud,NYSE Euronext CMCP, Windows Live Skydrive and Rackspace Cloud (ENISA, 2009).

2.3.2. Cloud deployment models

2.3.2.1. Private

In the private cloud, services are provided exclusively only for a single client. This cloud might address the issue of security problems. These refer to internal data centers of a business or other organization, not made available to the general public (Armbrust, *et al*, 2010).

2.3.2.2. Public

In the public model, services are provided on a shared environment for any client or the general public. Service is available publicly for any organization that has subscribed (ENISA, 2009). Popular public clouds include Amazon EC2, Google App Engine and Microsoft Azure. It is usually used for operations and applications without sensitive data or supporting critical business processes.

2.3.2.3. Community Cloud

It refers to cloud infrastructure that is solely used only by community of users or organizations that are somehow connected by sharing specific concerns (e.g. security, mission, requirements, compliance, etc). It can exist on-premises as well as off-premises solution. (NIST, 2009).

The infrastructure is shared by several independent organizations with shared concerns, for example, similar security and regulatory requirements, legislation, etc. it may be organized and controlled by a third party and exists on site or off site (Aleem *et al.* 2013).

2.3.2.4. Hybrid

Deployment model that put together two or more clouds with preserved entity's sovereignty (e.g. private and public) - that is hybrid cloud. It is a way to bind different clouds together by standardized technologies and interfaces to enable data and application portability (NIST, 2009).

This model combines the above service-delivery models for organizations that want to make use of these models and it addresses the challenges of a pure public or private cloud environment (Garg, 2011).

It is critical for organizations to choose and implement appropriate deployment model that suits their strategic objectives. They need to first understand the reason for adopting cloud computing in order to choose the appropriate cloud deployment model. Organizations can employ one or combination of the models in order to fully realize the potential of cloud computing. If the main objective of using the cloud is to minimize costs and being fully scalable, they can use public clouds provided by reliable providers. They can use private cloud to minimize data security and privacy risks. They can also use the hybrid model in order to benefit from all of the deployment models.

2.4. Cloud Computing Adoption

Most of the researches on cloud computing focus on the technological aspects of it such as virtualization, security, and scalability of the technologies. The following are researches that focus on cloud computing adoption using different adoption theories. These theories are briefly discussed below:

Seo (2013), explored factors that influence the adoption of IaaS cloud service. This study focuses on the IaaS, key influencing factors were identified that affect the decision behaviors of companies based on an extension of the Technology Acceptance Model (TAM) framework. The TAM framework specifies the causal relationships between system design features, perceived usefulness, perceived security, perceived scalability and perceived ease of use, behavioral intention, and actual usage behavior. The findings revealed that only perceived security had significant effect on company's decision to adopt IaaS whereas perceived scalability and perceived ease of use didn't have a significant impact on adoption of IaaS.

Obeidat (2013), proposed a model called the Triple-T model, which is the integration of the social exchange theory and the technology acceptance model, in order to evaluate cloud computing adoption process from a multiple perspectives. This research investigates whether the advantages of cloud computing outweighs its disadvantages. A total of eight advantages, which are, cost savings, time savings, high automation, space savings, scalability, flexibility, remote implementation and business mobility and eight disadvantages: loss of control, lack of standards, lack of privacy, loss of data, intermittency, system outages, the Patriot Act and lack of privacy, were identified. Based on the results, the study concluded that the adoption of cloud computing leads to a net balance of benefits over costs and organizations should adopt cloud computing systems.

Essandoh, *et al*, (2014), assessed the factors influencing to small & medium sized enterprises (SMEs) to adopt cloud computing in developing economies. The study revealed that key factors like reduced cost for IT purchases and maintenance, improved communication internally and externally, scalability, business continuity and access to expertise are the key drivers for adoption and main barriers were lack of skill and knowledge, poor internet connectivity, security and data privacy, lack of trust and difficulty in integrating with in-house systems. Additionally, it was found that top management support, triability of cloud services, resistance to new technology, presence of existing infrastructure and compatibility with cloud services, competence of cloud provider and vendor support are the most influential organizational factors used in the adoption decisions.

Krishnan, *et al.* (2013), identified four key adoption inhibitors: vendor related risks, security related risks, no-gain risk and efficiency related risks in terms of four industry sectors- (SMEs) education, Banks and hospitals. The results indicate that the major risk associated within the SMEs is the vendor related risks and then the security risks. In the education sector the major risk associated was also the vendor related risks and then the efficiency risks and security risks. In the hospital and banking sector, the major risks were the security risks. The reason is that banks are data sensitive organizations and any loss of data, invasion of privacy, confidentiality loss, account hacking critically hinder banking operations. Similarly, health sectors are data sensitive as they should protect the confidentiality of their patient's information where loss of this data can make the sector legally and morally tenable.

Awosan, (2014), investigated the extent of cloud adoption and the perception of employees in IT and Telecommunication companies, identified the motivating and inhibiting factors, current issues of cloud computing adoption in Nigeria. The results show that large percentage of employees in the IT and telecommunication companies and users of devices that support cloud computing have some knowledge of cloud computing and that they agreed that cloud computing is the next computing technology even though it's adoption is very slow. According to these findings, the motivating factors for cloud adoption include: increased focus on primary services, collaboration and easy access of data, provision of basic infrastructure. Factors that slow adoption of cloud computing include: poor awareness of cloud computing, unstable power supply, high cost of bandwidth when transferring data-intensive application through the internet, unreliability of internet service due to distance barrier and low bandwidth capacity, security and privacy.

No.	Author	Objective	Methodology	Key Findings (factors)
1	Seo, Kwang-Kyu	Exploring Factors in IaaS cloud service adoptio n	Uses TAM framework	perceived security
2	Obeidat, Mohammad A.	Measuring and identifying the advantages and disadv antages of cloud computing adoption	Uses the Triple-T model	The advantages of cloud computing adoption outweigh its disadvantages.
3	Abdollahzadehgan, *et al.*,2009	Evaluating organizational success factors for adopting cloud computing in SMEs.	Qualitative methodology was used to gather data and evaluate it under the TOE framework	Organizational factors • Top management support • Firm size • Technical readiness
4	Morgan, Lorraine	Exploring factors that affect adoption of cloud computing technologies	Qualitative interview was used to collect data and analyzed usi ng open coding and axial coding under the TOE framework.	*Technological* Triability, relative advantage, compatibility, complexity *Organizational* *d*esire to improve collaboration and promote openness, increased traceability and auditability, losing control of IT environment *Environmental* Security and legal issues,

Table 2.1. Summary of Cloud adoption studies

2.5. Cloud Adoption Issues

Adopting a cloud service by itself doesn't guarantee success. For an organization to be successful by adopting cloud computing, it has to be able to differentiate itself from competitors and gain strategic advantages over them. Therefore, the different success or failure factors for adopting cloud computing and other critical issues need to be addressed before deciding to implement it.

2.5.1. Success Factors

As Garrison, *et.al*, (2012) described, IT-related success is described through three categories: Strategic, economic, and technological.

Strategic refers to the capacity of an organization to focus on its core objectives and business activities when deciding to move its IT functions (whole or in part) to the cloud.

Economic refers to an organization's ability to make an optimized use of the cloud vendor's services by reducing its in-house IT expenses.

Technological refers to an organization's access to state-of-the art technology and skilled personnel, eliminating the risk and cost of in-house technological obsolescence.

Optimizing the strategic, economic, and technological benefits derived from cloud computing is a function of an organization's ability to use its own IT-related resources and capabilities to leverage the resources of the vendor. Organization specific capabilities related to implementation, integration, and utilization of cloud services play a key role in deployment performance. These capabilities of an organization that pre determines the successful use of cloud computing includes: managerial, technical, and relational capabilities.

Technical capability includes the organization's physical equipment such as IT hardware, software, and collective resources. These are capabilities that give an organization competitive advantages and being able to respond to new technologies without being a hindrance to adapting to these technologies. The more advances the organization's technical capability, the easier it is for the organization to be agile and respond to changes quickly, and the more advantageous it is for the organization to be superior over its competitors.

Managerial capability refers to the capability of the manager to positively respond to new solutions. It includes the manager's skills and knowledge, systems thinking approach, technological awareness in order to integrate new technologies to existing systems, organizational knowledge. It's critical to have an IT manager who possess the above values so that the appropriate cloud services can be chosen to the organization in order to fully realize its potential and meet the strategic objective of the organization.

Relational capabilities refer to a continuous relationship between the organization and the vendor that is based on trust and a clear understanding of the services being delivered and consumed. The client organization must have trust in the vendor and the vendor must deliver the solutions as promised and must make sure that it has the necessary skills, resources, and abilities that are needed for the full realization of the cloud deployment. Therefore, indicators of trust can include: the cloud provider protecting the client's sensitive data, delivering reliable services, evenhandedness in the negotiation process, and timely and dedicated assistance. As relational trust increases with a cloud provider, the client organization realizes greater IT economies of scale and deployment success.

Garg (2011) states that a financial services firm that heavily relies on IT enabled services can benefit from cloud computing, despite its challenges. Perceived cost savings, ease of scaling-in and scaling-out, faster time to market for deploying systems, virtualization of enterprise-wide data as a service, enterprise technology standardization, and the ability to access data and applications on the move are all critical consideration factors that can drive financial services firms to adopt cloud computing.

2.5.2. Failure Factors/ key challenges

Cloud computing comes with its share of challenges, in terms of security, data privacy, compliance, availability, lack of standards, etc. (Garg, 2011). These challenges are highlighted more in a regulated and security-sensitive environment, such as financial services like banks.

In spite of the strong role for businesses to adopt cloud computing, there are some challenges that need to be dealt with before adopting it. The first issue is the security issue. The fact that data would be in the hands of a third party and its safety and security risk is still a major concern for organizations. (Khanapurkar *et al.*, 2011). A recent survey by the IT Governance Institute (2011), cited in Lampe *et al.*,(2012), confirmed that general security concerns and data privacy concerns constitute the most severe reasons for not using cloud computing.

Figure 2.4 Major Challenges of Adopting Cloud Computing [Source: Garg, 2011]

Security

The survey conducted by Convery *et al.* (2011) shows that lack of thrust was the main factor stalling the adoption of cloud computing. An organization's data is perceived as a major asset and handing over these data to a third party is a concern for organizations when trying to implement cloud computing. Any loss of corporate data could have reputational implications and lead to barrage of lawsuits from customers.

Even though data security is a major concern for customers, a Ponemon Institute survey sponsored by CA Technologies and released in April 2011, cited in Yang (2012), revealed that data security was not a major emphasis for most cloud computing providers. The providers consider that it is the customers' responsibility to safeguard whatever data they store in the cloud and that the providers' main priority is to deliver the features that their customers want such as low cost solutions and quick deployment.

Availability

Availability of a service deployed on a cloud is a concern since vendors generally provide services on standard terms, which tend to be for the benefit of vendors, including limited warranties and this creates a huge problem for the firm. (Garg, 2011).

Vendor lock-in

Most cloud providers provide access to their resources through proprietary APIs, web interfaces or command line tools and if a firm wants to shift to a different cloud vendor, there would be high cost involved to switch to new interfaces (Garg, 2011).

2.6. Opportunities and Challenges of Cloud computing in the banking industry

2.6.1. Cloud computing in the banking industry

The banking industry is facing unprecedented changes. Due to pervasive and steady growth of information and communication technology, the banking industry is entering into new phenomena of unprecedented form of competition supported by modern information and communication infrastructure (Khanapurkar *et al.*, 2011).

Competition is fierce and customers are more complex and demanding. Customers are attracted to technology-driven services where they can access the service they want at anytime and anywhere. Therefore it is important for banks to react to this new customer-driven environment with innovation in business models, operations and IT. Banks currently face challenges in a number of key areas:

Capital Inadequacy: that lowers the profit margins

Emboldened customers: that expects advanced and new services

Fierce competition: for customers are more complex, demanding, aware, and entrance of nontraditional firms

Changing business models: that have shifted from product-centric to customer-centric

Enhanced regulation: increased government oversight and intervention

Increasing social and government pressure: for financial inclusion (IBM, 2013)

Outdated legacy systems make it extremely difficult for banks to create and introduce new services and products and provide access to geographically dispersed customers, therefore in order to survive the competition and grow in banking, it is essential to use state-of-the-art technologies.

In the corporate sector particularly the financial market, it is next to impossible for business not to come across the concept of cloud computing (Aleem *et al.* 2013). Cloud technology offers secure deployment options that can help banks develop new customer experiences, enable effective collaboration and improve speed to market- all while increasing IT efficiency (IBM, 2013).

2.6.2. Opportunities of cloud computing for the banking industry

The many benefits of implementing cloud computing include: efficient use of business resources, the ability to increase data execution time, management of data storage (back up) and planning disaster recovery (Aleem *et al.* 2013). Banks that take advantage of cloud computing are better positioned to respond to economic uncertainties, interconnected global financial systems and demanding customers (IBM, 2013). Cloud computing offers benefits for banks in many areas as shown in figure 2.4 below. Among the many benefits of cloud computing, the following are mainly applicable for banks (Garg, 2011)

Driving Sales and profitability

Cloud computing offers a new way of running business models and operations for banks. It eliminates constraints around where physical IT resources are located or what specific technologies are employed, which makes it possible to deploy business services rapidly and at a lower cost (IBM, 2013). It enables banks to increase flexibility and streamline operations while working to create a more innovative customer-focused enterprise.

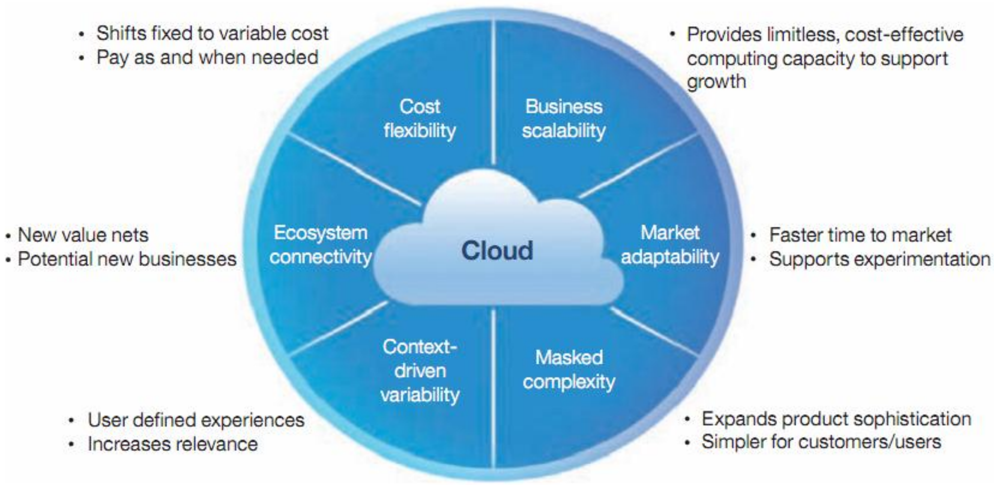

Figure 2.5 Opportunities of Cloud Computing for the Banking Sector [Source: IBM, 2013]

Build customer relationships

The closer the banks become to the customer, the better service they can provide which is a major objective for banks. Cloud computing enables banks to accelerate and optimize the capture and analysis of multi-channel data to allow banks to better monetize customer relationships. Because of its expanded computing power and capacity, a cloud can store information about user preferences, which can enable product or service customization. The context-driven variability provided using cloud computing makes it possible for banks to personalize customer interactions and adapt to subtle changes which leads to a more user-centric experience (IBM, 2013).

Masked Complexity

Using cloud, banks can hide the complex activities they undertake from end users which can help attract more customers. Because the complexity is not obvious to the customer, banks can expand their product and service sophistication without also increasing the level of end-user knowledge necessary to use or maintain the product or service (IBM, 2013).

Deliver IT flexibility

Among the greatest advantages of cloud computing is its flexibility (Cegielski, *et al.*, 2012). Cloud computing can help banks reduce their fixed IT costs by shifting from capital to operational costs. Usually IT capital expenses include software licenses, personnel, servers and networking equipment but with cloud applications, there is no need to pay these upfront expenses. Cloud allows shifting costs from capital to operational or from fixed to variable. The bank only pays for what it needs when it needs it.

Disaster Recovery

Organizations especially financial services companies like banks can benefit from cloud computing in their disaster recovery preparations. The cloud can be used for an active-standby setup, important backup data is stored in a virtual private data center and whenever a disaster occurs, the backup files go live and mission-critical can be accessed.

Business Agility

The cloud offers enhanced business agility to banks where they can react quickly to changes in the environment (it can be government or customer). Banks will be able to respond rapidly to service requests from customers which enhance customers' relationship and service quality and satisfaction. Furthermore, the flexibility of cloud-based systems lets banks experience shorter development cycles for new products.

Speeding up time to market

Time to market can be reduced by eliminating procurement delays for computing hardware and software, scaling up and down computing power for when existing applications need to handle peak loads, avoiding investing time and money in developing and implementing applications.

2.6.3. Challenges of Cloud Computing for the Banking industry

As Viswanathan, *et al*, (2012) describes, banks face these challenges when adopting the cloud. Among this, the main ones are the security, regulatory, and compliance issues.

Security

The confidentiality and security of financial and personal data and mission-critical applications is vital for banks and risking this would result in disaster (Sriram, 2011).

Regulatory and Compliance

Many banking regulators require that financial data for banking customers stay in their home country and certain compliance regulations require that data not be intermixed with other data, such as on shared servers or databases (Sriram, 2011). Therefore, banks must have a clear understanding of where their data is stored on the cloud.

Limited speed and availability

Cloud services highly rely on the adequate availability of internet connections and it is critical for organizations to assess the network latency and uptime and clarify this issue with the cloud provider (Viswanathan, *et al*, 2012)

Limited guarantee on service levels

Cloud services, the service levels and dispute resolution process will need to be clearly defined in the cloud service agreement and network service agreement Viswanathan, *et al*, (2012). For the effective use of cloud services, transparency of services and service levels is essential which has a huge implication for the collaboration of the service providers and consumers. Strong collaboration needs to work towards mutual flexibility, trust, shared risks (Willcocks, *et al.*, 2013). Unless there is adequate transparency and tight collaboration, it is impossible to realize the benefits of cloud computing.

Complex licensing/charging models

Licensing/charging models for cloud computing include single license, multiple users/shared license, temporary or fixed period use, pay-per-use and by subscription. Banks require a strong understanding of business's IT usage profile and implementation of an appropriate licensing/charging model accordingly (Viswanathan, *et al*, 2012).

Limited ability to customize and upgrade

Cloud service providers release their software and services in industry standard Application Programming Interfaces (API) which allows usage of these services through standard interfaces with predefined functionalities. This limits the level of customization and imposes a major challenge for banks (Viswanathan, *et al*, 2012).

2.7. *The Banking industry in Ethiopia*

There are 19 banks in Ethiopia that are controlled and licensed solely by the National Bank of Ethiopia, the state owned bank in the country. Banks need prior written approval of the National bank in order to transact a banking business, introduce new banking services including new banking technologies. Among the 19, the three banks: Commercial Bank of Ethiopia, Development bank of Ethiopia, and Construction and business bank S.C. are state owned banks whereas the rest 16; Awash International Bank, Dashen Bank, Bank of Abyssinia bank, Wegagen Bank, United Bank, Nib International Bank, Cooperative Bank of Oromia, Lion international Bank, Zemen Bank, Oromia International Bank, Berhan Bank, Bunna International Bank, Abay Bank, Addis International Bank, Debub Global Bank and Enat Bank are private banks.

According to the Federal Negarit Gazeta of the Federal Democratic Republic of Ethiopia (2008), "banks play an important role in economic development through mobilization of funds from within and outside the country and channeling such funds to various sectors of the economy, occupy central place in the payment and settlement system of the country's economy".

The financial sector in Ethiopia is for the most part dominated by the banking industry and has a key place in the contribution of the economic growth of the country (Eshete, *et al.*, 2013). Therefore banks need to function in an efficient and effective manner in order to increase their role for the growth of the country. For this to happen, banks need to implement innovative technologies in order to satisfy their customers, introduce new services, and enlarge their services in order to cover the underdeveloped and uncovered rural areas of the country.

Despite its major role for the economic development of the country, banking in Ethiopia is highly underdeveloped and among the least advanced sectors when it comes to implementing modern state of the art technologies (Asefa, *et al.,* 2011). They provide service to customers using traditional systems which lead to highly dissatisfied customers (Bultum, 2014). The banking sector is unable to improve customer service, design flexible and customized products, and customers are not able to enjoy the technological advancement where in the developed and developing countries these technologies are entertained (Worku, 2010). Banks are usually tied up with routine operational tasks and little attention is given to focus on the business objectives.

Even though the adoption of innovative technologies in Ethiopian banks is slow, nowadays, banks in Ethiopia are introducing new technologies, new services, and address their customer's needs (Eshete, *et al.,* 2013). Among them include, introduction of the core banking system, use of Automated Teller Machines (ATM) so that customers can withdraw cash, make deposits or transfer funds, Mobile Banking, Internet Banking and the like. Additionally, banks are now integrating some parts of their system in order to launch new services and to be able to afford to use technology and cover large areas of the country. However, the pace that these technologies are diffused is very slow compared to the rest of the world; therefore, it is inevitable for banks to consider the fast diffusion of technologies that the developed countries are now enjoying.

Worku (2010) states the challenges of ICT application in Ethiopian banks as:

- Poorly developed telecommunication infrastructure: there is a single telecom provider in the country that leads to poor internet penetration and unavailability of internet facilities in the rural areas where the majority of small and medium businesses are concentrated.
- Lack of suitable legal and regulatory framework in the country and do not accommodate electronic contracts and signatures.
- Inadequate banking system
- Political instabilities in neighboring countries
- High rates of illiteracy: in order to enjoy electronic banking systems in Ethiopia, people must be literates, not only to read and write but also they should possess the technology know-how for them to enjoy the services and this is a big hindrance for the full diffusion of technology.
- High cost of internet: the cost of adoption of technologies like start-up investment costs, costs of computers and telecommunication and licensing costs and requirements are high.

- Frequent power interruption which disturbs the smooth running of systems in Ethiopia is a major factor.
- Resistance to changes in technology among customers and staff because of lack of awareness, fear of risk, lack of trained staff, tendency to be content with existing structures, fear of losing employment and resistant to new payment mechanisms.
- Cyber security issue which is currently a global concern which requires global and multi-dimensional response with respect to policy, socio-economic, legal and technological perspectives. Systems that highly depend on ICT technologies are vulnerable to security threats and banks especially are data sensitive that requires strong security capabilities.

2.8. Technology Organization Environment (TOE) Framework.

Adoption of new technologies is complex and needs a thorough assessment and there are various adoption models proposed by different researchers. Among them include, Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovation (DOI), and the TOE framework.

Technology Acceptance Model describes an individual's acceptance of information systems which was first adapted from the Theory of Reasoned Action (TRA) (Ajzen and Fishbein (1980) cited in Lee, *et al.*, 2003). Based on this, an individual's information systems acceptance is determined by two major variables; Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU refers to the individual's perception of the technology as being useful and PEOU refers to the degree to which the technology is perceived as easy to use. Additionally, TAM states that an individual's intention to adopt the technology is influenced by external factors, behavioral intentions to use the technology, attitudes towards the technology, and actual use through mediated effects on perceived usefulness and perceived ease of use (Lee *et al.*, 2003).

UTAUT has extracted the critical factors and perceptions related to the prediction of behavioral intention to use a technology and technology use mainly in organizational contexts (Venkatesh *et al.*, 2012). According to Venkatesh *et al. (2012),* UTAUT has four key elements; performance expectancy, effort expectancy, social influence, and facilitating conditions that influence behavioral intention to use a technology. Performance expectancy refers to the degree to which using a technology will enhance performance of individuals. Effort expectancy refers to the degree to which the technology brings easy use to the individual. Social influence refers to the degree to which individuals perceive the society (family, friends) believe they should use the technology. Facilitating conditions refer to the individual's perceptions of availability of resources and support in order to perform a behavior. Performance expectancy, effort expectancy, and social influence are believed to influence behavioral intention to use a technology, while behavioral intention and facilitating conditions determine technology use.

Diffusion of Innovation by Everett Rogers (2003) is described the innovation-decision process as "an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation. This process involves five steps; Knowledge, persuasion, decision, implementation, and confirmation. On the first stage, the individual knows about the what, how, and why of the technology. On the persuasion stage, the individual develops a negative or positive attitude which does not directly lead to adoption or rejection of the technology. At the decision stage, the individual decides to adopt or reject the technology. At the implementation stage, the technology is put into practice. At the confirmation stage, the technology has already been put in place and the individual seeks for support towards the decision. Additionally, Rogers (2003) proposed attributes of innovations such as relative advantage, compatibility, complexity, triability, and observability of technology to be essential characteristics that individuals take into account when adopting new technologies.

The TOE framework was developed in 1990 (Tornatzky and Fleischer, 1990). It identifies the three contexts to analyze the IT adoption by firms: technological, organizational and environmental (Oliviera and Martins, 2011). The technological context identifies the firm's internal and external technologies. This includes technological practices and equipment within the firm and those that are available outside the firm. Relative advantage, compatibility, complexity, triability, and observability measures are the frequently used constructs of this context (Rogers (2003) cited in Morgan *et al.*, 2013). Relative advantage refers to the degree to which an innovation is perceived as being better than the idea it supersedes. The major characteristics of cloud computing; scalability and pay-per-use, make it fit the relative advantage context. Organizations benefit a lot by shifting their capital expenditures to operational expenditures; computing resources become scalable to fit the fluctuating business needs of organizations (Borgman *et al.*, 2013). Complexity refers to the degree to which an innovation is perceived as difficult to understand and use. Cloud computing hides the most complex aspects to the consumers. Compatibility refers to the degree to which an innovation is perceived as being consistent with the existing value, past experiences, and the needs of potential adopters. Triability refers to the degree to which the innovation can be tried and tested in small chunks over time while observability refers to the level to which the results of an innovation are visible to the technology adopter (Borgman *et al.* 2013, Morgan *et al.*, 2013).The organizational context identifies the organizational structure including the scope, size, centralization, formalization, and complexity of managerial structure and the quality of human resources, intra-firm communication process, and the amount of slack resources (Low and Chen 2011, Borgman *et al.*, 2013). The constructs for this context include firm size, top management support and IT skills of employees. The environmental context describes the firm's industry, competitors, access to resources supplied by others and government policy or intention (Oliviera and Martins 2011, Low and Chen 2011, Borgman *et al* 2013). The major constructs include the competition intensity, legislatory environment, and trading partner pressure. Competition intensity refers to the degree that the company is affected by competitors in the market and reacts by adjusting its offerings accordingly (Borgman *et al.*, 2013). Lumsden *et al.*(2013) refers to it as the level of pressure experienced by the organization from its competitors highlighting its importance as a strong incentive and adoption driver.

The legislator environment can have a beneficial or a detrimental effect on innovation. Governments can support technology innovation by providing tax advantages by introducing regulation that force firms to adopt certain technology standards or governments can also pass constraining regulation for example data security constraints in the health care and financial services industries which could make cloud computing less attractive (Borgman *et al.*, 2013).

The TOE framework provides a useful analytical framework that can be used for studying the adoption and implementation of variety of IT innovation. It has a solid theoretical basis, consistent with empirical support and the potential of application to IS innovation domains (Oliviera and Martins 2011). TAM, DOI, and UTAUT are popular models used in information systems technology adoption studies focusing on an individual level, however, the TOE framework was found to be appropriate for this study for the purpose of exploring the factors in a clear and concise ground. The chosen framework incorporates most of the constructs that are needed to meet the objectives of the study and helps to identify the factors in a more descriptive way, in an organizational level.

For these reasons, different IT innovation studies used TOE framework. Chau and Tam (1997) used the TOE framework to analyze the factors of open systems adoption which are characteristics of the innovation, organizational technology and external environment. Olivieria and Martins (2008) utilized this framework to describe the technological context and organizational context factors that influence the adoption of website for e-commerce. Pan and Jang (2008) used the TOE framework to analyze the factors that influence the adoption of ERP. These factors include technology readiness (technological context), size and perceived barriers (organization context), production and operations improvement; enhancement of products and services; competitive pressure; regulatory policy (environmental context). Teo *et al* (2006) adopted the TOE framework to describe the factors that influence the adoption of deployment of business to business (B2B) e-commerce: B2B firms versus non-B2B firms. Zhu *et al.* (2003) used this framework to describe the factors that are influencing E-business initiation, adoption and reutilization. Lin and Lin (2008) used the TOE framework to study the factors in the adoption of internal integration of e-business and external diffusion of e-business.

2.9. Factors that Influence the adoption of cloud computing

Technological Factors

A study conducted by Accenture (2009) pointed out three factors that have the potential to influence the decision to adopt new technologies like cloud computing in banking. The first one is the highly technology focused and sophisticated customer demand. The research points out that banks should target to meet these customer’s demand by approaching them with state-of-the art technologies including innovative new advertising formats, tailored offers pushed over new remote channels, and new packages relevant to their needs and their innovative communication means. The second factor is the cyber-security and IT risk. How decision makers of companies perceive security risks associated will clearly influence the pace of adoption of these technologies. The third one is the issue of sustainability.

Technological innovation is more likely to be adopted by an organization when it offers a clear advantage to that organization that the previous adopted technology couldn't offer (Alshamaileh & Papagiannidis, 2012; Makena, 2013). The higher the perceived advantage of cloud computing the more likely it is going to be adopted by organizations (Borgman *et al.*, 2013). The advantages of cloud computing must be clearly understood by organizations and this relative advantage highly influences the rate of its adoption. A case study conducted by Morgan *et al.* (2013) manifested four technological characteristics that influence the adoption decision: relative advantage, triability, compatibility, and complexity but observability was not seen as relevant. Relative advantage was seen in terms of cost savings (hardware and software costs). This was achieved by the pay-as-you-go characteristics of cloud computing and its ability to transfer the capital expense to operational expense. Additionally, relative advantage was perceived in terms of time-savings achieved through faster implementation time.

A major factor impacting cloud adoption is the security and legal issue including data jurisdictions, data confidentiality and security risks (Morgan *et al.*, 2013). The security risk is the most overwhelming risk for the data sensitive banking sector. The risks as sensitive data are outsourced to third parties for processing raise the issues such as data privacy, problems with data segregation in the cloud, and long term viability of vendors makes decision makers to hesitate to switch to the cloud (Tan, *et al.*,2012). Fears of data loss, privacy invasion, confidentiality loss, account hacking are major fears for the banking sector that critically hinder the adoption of cloud computing. (Lyer, *et al*, *2013*)

Organizations are not sure of how their data is handled and where it is stored. This leads to another factor; the geo-restriction which is considered when adopting cloud computing (Alshamaileh and Papagiannidis, 2012). Organizations especially those with sensitive data such as financial institutions like banks need to make sure that their data is safe, secure and protected. They can't risk for their data to be lost or abused since their survival and reputation depends on it. They need to be confident that the cloud vendors will protect their data and keep its privacy.

This leads to the issue of data security and privacy to be a primary concern of decision makers whether to adopt cloud computing or not.

Cloud computing adopters expect the services to be compatible with the existing system and easy to use (Willcocks, *et al.*, 2013). Early adopters of the cloud expressed their satisfaction with the level of compatibility and complexity of the cloud services and the prospective users also expressed their expectations of the services to be easy and comfortable to use. The cloud service providers also claimed for their services to be consistent with the firm's values and technology needs (Alshamaileh and Papagiannidis, 2012). The survey of Morgan *et al.* (2013) also adds to this since the cloud technologies were found to be consistent with the technologies, skills and tasks of various adopters in the study. Furthermore, it was found that issue of bandwidth and connectivity are concerns.

Another technological factor is the complexity of cloud computing. Complexity refers to the degree to which an innovation is perceived as difficult to understand and use. (Borgman *et al.*, 2013). Organizations are more prone to adopt cloud computing if it is simple to implement. The more complex organizations perceive cloud computing, the lesser the adoption will be.

Organizational Factors

IBM's survey (2010) indicates that the key enabler for cloud adoption in general, and public clouds in particular are cost savings and faster time to value where the level of cost savings depends on factors like workloads concerned, the selected service and delivery models and the efficiency of the available infrastructure that is supposed to be added or replaced by the cloud. In the financial services industry, decision makers at banks pointed out their top two drivers for adopting the cloud which are lower labor costs and improved systems reliability/availability. Additionally the cloud features like pay-as-you go services, software license savings, reduced IT support needs and rapid deployment were among the drivers. Furthermore, top management support and firm size influence the adoption of cloud computing (Low and Chen, 2011). This indicates that firms with strong management support and larger firms have a higher probability of adopting cloud computing because they have more resources better suited to adopt cloud computing and may be better able to take on risks. On the other hand, start-ups and small businesses were found to be inclined to adopt cloud services that are able to change direction quickly and to be more flexible if needed (Alshamaileh and Papagiannidis, 2012).

Another important factor which is the top management support indicates that organizations with strong top management support are more likely to adopt cloud computing (Alshamaileh and Papagiannidis 2012, Borgman *et al.* 2013). When an organization's top management is dynamic and creative, it is more likely to introduce new ways of doing things and new technologies to the organization in order to take advantage of innovations and win the fierce competition. This is especially important for banks in that the top managers need to be aware and utilize new technologies in order to satisfy their customers since customers' demands are increasing and their technological awareness also is advancing and they need to cope with their customers and satisfy their needs in order to survive and be leaders of innovation. This is such an opportunity for developing countries like Ethiopia to make use of these technologies and leap frog to those countries that has gone far from us in innovative technologies.

The technological readiness of an organization including technological infrastructure and IT human resources has an effect on the adoption of new IT innovations (Low and Chen, 2011). For an organization to implement and integrate a new cloud computing service, it needs to have sufficient human resources with the necessary skills, experience, and knowledge. Additionally, the organization needs to have an already installed and in use enterprise systems and network technologies which provide the platform for new cloud computing applications to be built upon. This implies that organizations that have the technological readiness are better positioned to adopt cloud computing (Lumsden *et al.*, 2013).

Environmental Factors

High competition intensity motivates organizations to decide to adopt cloud computing (Borgman *et al.*, 2013). Competitive pressure has resulted in many organizations outsourcing their IT infrastructure to not only improve effectiveness but also to enable lower prices to be offered, as an attempt to increase their market share (Lumsden *et al.*, 2013). In order for organizations to keep pace with the advancement of technology and their competitors adopting these technologies and leading the competition intensifies their need to adopt to these technologies in order to survive in the market or gain a competitive advantage over their competitors. These technologies like cloud computing offer businesses new ways of doing things and focus on their business processes rather than their routine tasks and come up with new services and products that enables them to attract new customers and retains the existing ones which enables them to be leaders in the market.

Many organizations depend on trading partners (and cloud vendors) for their IT design and implementation of tasks (Low and Chen, 2011). The reputation, expertise and marketing activities of these trading partners can have a significant impact on an organization's decision as to whether or not to adopt new IT innovations (Lumsden *et al.*, 2013).

As Accenture (2009) indicates, among the factors that influence adoption of IT in banking is the sustainability factor. The concern of global warming resulted in organization's change in policies and regulations regarding IT adoptions therefore companies are moving to adopt technologies that support sustainable development.

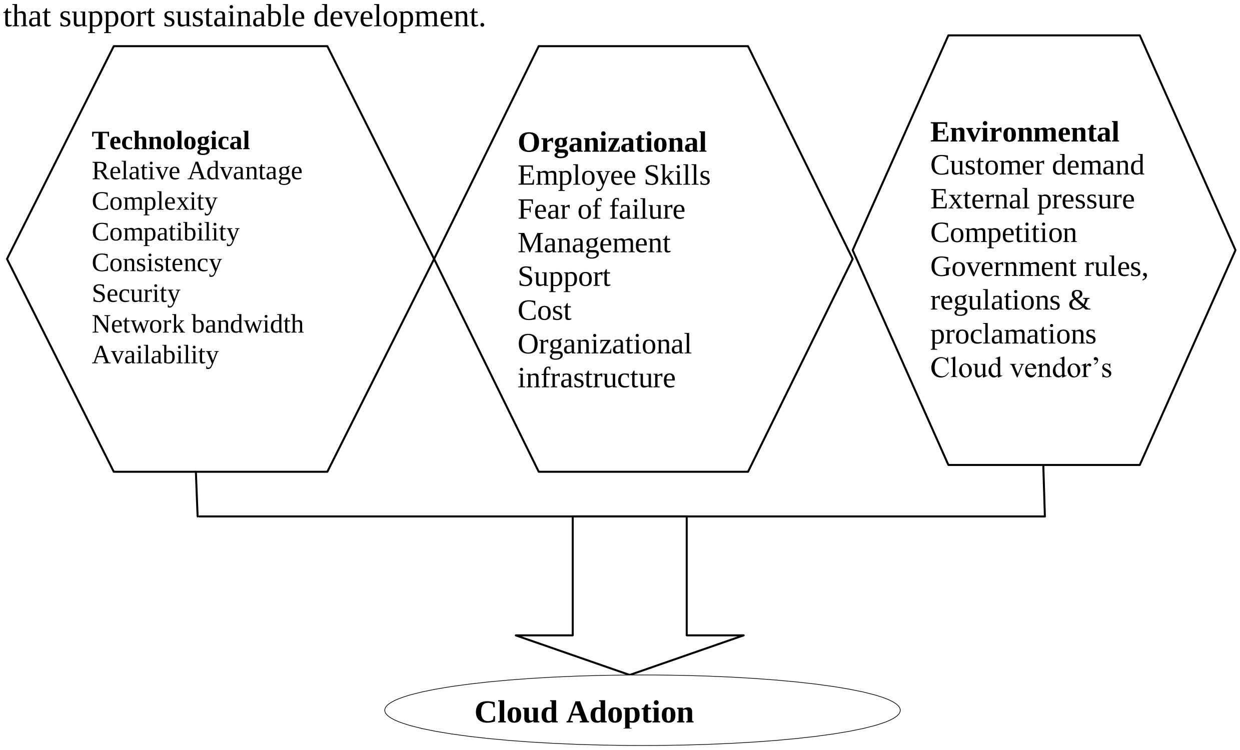

Figure 2.6 TOE factors affecting cloud adoption decision in Ethiopian banking sector

CHAPTER THREE

METHODOLOGY

The purpose of this study is to explore and examine the major factors affecting Ethiopian banking sector to use cloud computing banking solutions instead of buying ready-made applications or having them made from scratch. The study considered six selected banks out of 19 banks, as a context for the research and IT executives and experts as a subject of the study basing on the understanding that it is this group's recommendation and decision that matters when it comes to technology adoption in organizations. The study intends to lay a foundation for various future works, which possibly emanate due to the findings and efforts of this work, such as a general framework for adopting cloud solutions in different organizations in Ethiopia, the investigation of advantages of adopting cloud computing solutions for certain organizations, which cloud solution ascertain organization has to adopt in order to succeed in their businesses.

Intensive individual interview with some core IT employees in different Banks and literature review on the subject matter uncovered some of the many essential factors that have played and have been playing a major role in hindering or influencing Ethiopian Banks' motivation and decision to adopt cloud computing solutions in their organizations. The following list contains these factors that have been playing a crucial role in determining the fate of cloud computing solution adoption in Ethiopian banking sector: relative advantage, compatibility, existing infrastructure, complexity, firm size, management support, employee skill, fierce competition, external pressure, customer demand, government rules, proclamations, and regulations, security, cloud vendor's support, network bandwidth, electric power, cost, consistency, and availability are the factors identified. Based on the findings from a literature review, individual interviews and further contextualization of relevant concepts, the study was conducted to further investigate and analyze the aforementioned factors to find out if these factors really played a role in hindering the adoption of cloud computing solutions in Ethiopia, if so, which of these factors have played the major roles.

The prime parameter and the underpinning concept of this study is the very idea, which has been investigated and argued by several researchers, that IT executives and experts play a major role in Organization's decision to adopt new technologies. Hence, the study went on investigating IT executives and expert's thoughts regarding what they think is the reason why Ethiopian banking sector didn't make a move for cloud computing solutions yet and how they feel about recommending the adoption of cloud computing solutions to their organizations, given the current situation. By doing this, the researcher intends to draw up on the findings of this study to extrapolate the result by making extensive analysis.

Since the adoption of cloud service in organizations can be factored in terms of service type, intensity, role…etc., contextual definition has been set in order to guide the study and help the audience of this study understand the very essence of cloud computing services adoption in Ethiopian banking sector. Therefore, the concept of cloud computing solutions/services adoption is as the overall practice of using either third party or private cloud for getting virtualized computing resources, such as hardware, software, storage…etc., for conducting organization's specific business activities.

As a matter of fact there exist very few, if not none, study that investigate the adoption of cloud solutions in Ethiopian banking sector, therefore, the researcher couldn't base study either on the findings of such studies or make comparison; instead, the researcher decided to conduct individual interviews and a literature review that is aimed to uncover some of the facts that help the effort of this work bear fruit and finally take the output of the above methods, to conduct a survey in order to examine and refine the factors that influence decision of IT executives and experts to recommend cloud computing solutions to their organizations.

The survey is followed by a correlation analysis between IT executives and expert's motivation to recommend the adoption of cloud computing solutions and the aforementioned factors, which from now on are categorized as internal and external classes of factors. Categorization of these factors as internal and external is based on understanding that it would make it easier to identify the factors where they belong and to know the level of influence they can put on IT executives and expert's decision to recommend the technology. Internal factors are defined, in this study, as anything that influence IT executives and expert's decision to recommend cloud computing services adoption in organizational environment; they include organization's structure, property, management, size, business operations…etc. Internal factors are further categorized as structural, strategic and internal consistency. On the other hand, Factors beside the aforementioned ones, which are beyond the control of the organization, are considered to be external factors.

Therefore, the internal factors include: relative advantage, compatibility, existing infrastructure, complexity, firm size, management support, employee skill and the external factors include: fierce competition, external pressure, customer demand, government rules, proclamations, and regulations, security, cloud vendor's support, network bandwidth, electric power, cost, consistency, availability, and failure risk.

3.1. Research Hypotheses

Based on the research questions, and this study context, the researcher formulated and tested the following hypotheses. These research hypotheses are summarized in table 1 below.

Hypothesis #	Type	Hypothesis description	Corresponding factors
Hypothesis 1	H0	IT Executive's and Expert's decision to recommend the adoption of cloud computing services in Ethiopian banking sector does not depend on the corresponding internal factors:	H11: Relative Advantage H12:Compatibility H13:Existing Infrastructure H14:Complexity H15: Firm Size H16: Management Support H17: Employee Skill
	Hα	IT Executive's and Expert's decision to recommend the adoption of cloud computing services in Ethiopian banking sector depends on the corresponding internal factors:	H11-H17
Hypothesis 2	H0	IT Executive's and Expert's decision to recommend the adoption of cloud computing services in Ethiopian banking sector does not depend on the corresponding external factors:	H21: Competition H22:External Pressure H23:Customer demand H24: Government rules, regulations, and Proclamations H25:Security H26:Cloud Support H27: Network H28: Electric Power H29:Cost H210:Consistency H211:Availability H212: Risk of Failure
	Hα	IT Executive's and Expert's decision to recommend the adoption of cloud computing services in Ethiopian banking sector depends on the corresponding external factors:	H21-H212

Table 3.1 Research Hypotheses

3.2. *Research method and strategy*

For the purpose of this study, mixed method approach, which uses both qualitative and quantitative methods, was used. This follows a sequential procedure, where the researcher seeks to elaborate on or expand the findings of one method with another method. The study was done in two phases (phase I & II). The first phase was aimed and designed to gain some insights about cloud computing services usage directions in Ethiopian banking sector and explore some of the factors that have been affecting the adoption of cloud computing services in the specified organizations. Besides, phase one consists of literature review; which was mainly done to review and explore different factors that have been mentioned or referenced in different literatures, academic and nonacademic. Journal databases such as EBSCO host, Emerald, IEEE, AJOL, MIS Quarterly, IJESE were used using keywords like cloud computing, cloud computing adoption, cloud computing for banking industry, cloud computing for the financial industry were used. and an interview for meticulous investigation of organizations' status quo on cloud computing solutions use for facilitating business process by interviewing some selected IT personnel with management role. From the interview, contextualized 18 initial factors are extracted and these factors are directly used to gather quantitative data comprising all the survey questions to measure the level of influence they have on adoption decision. Figure 3.1 Shows the steps in first phase of the study.

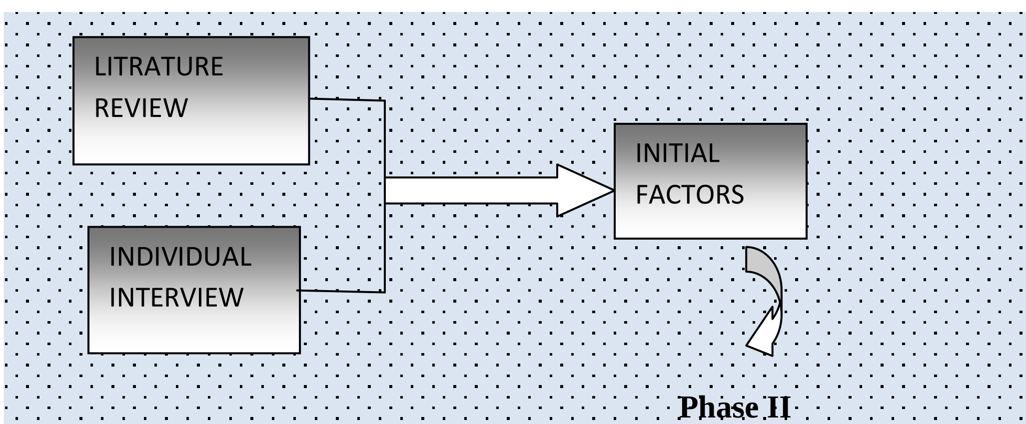

Figure 3.1Visual model of the steps for the first phase of the study

The 2nd phase consists of a survey study, which is based on the findings from the first phase (the literature review and interview questions). The output from the first phase; initial factors, are used to construct the survey questions that are used to gather quantitative data from 97 subjects.

The task of the 2nd phase of this study is composed of the following 5 sub-activities that are intended for producing the last output that is the goal of this study. The first activity is devising an instrument for measuring the potential variables or factors, which are identified in 1st phase of this study, in order to examine if the identified factors really affected the adoption of cloud computing solutions in Ethiopian banking sector. The following activity is focused on gathering the kind of information needed for the study by using the devised instrument in the previous part. The third step produced initial factors subjected for further examination or testing. The 4th part plays a major role in testing and refining the factors, which have already been identified and explored in the aforementioned parts; it determines each variable's actual influence on organizations' cloud computing adoption behavior and help to identify the real factors that have been influencing banks' decision whether to conduct an adoption of cloud computing solutions. The final part wraps us all the activities done in the previous parts and summarized the outcome of each step. Figure 3.2 shows the second phase of the study.

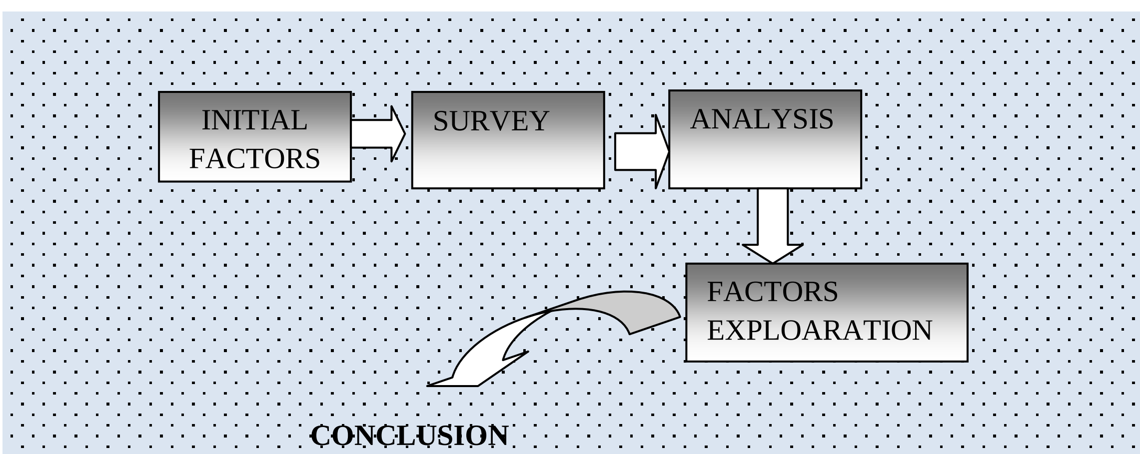

Figure 3.2 Visual model of the steps for the second phase of the study

During each phases of the study, mixed method research is used as a research design (methodology) where the researcher collects, analyzes, and mixes both quantitative and qualitative data in a single study or a multiphase program of inquiry (Cresswell, 2003). Johnson *et al.* (2007) generally defines it as the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches for the main purposes of breadth and depth of understanding and corroboration. Similarly Webb *et al.* (1966) emphasized the use of mixed method strategy for enabling the researcher to go beyond the options that are available if a single research design is used. Attewell & Rule (1991) described it as a method that fulfills requirements of information technology research by providing adequate tools to gather and analyze different kinds of data. There are also many other researchers who share same view on a mixed research strategy (such as, Newman and Benz, 1998; punch, 2006; 2005; Martens, 2003). The method is best known by different names e.g. multi-methods (Brannen, 1992), multi-strategy (Bryman, 2004), mixed methods (Cresswell, 2003; Tashakkori and Teddlie, 2003).

When it comes to the use of mixed method in information technology, there are very limited resources available; however, Gutek (1991) explains the degree of freedom and level of accuracy that can be enjoyed by employing several methods of data collection and analysis strategies in information technology researches.

According to Newman and Benz (1998), Martens (2003) Punch (2006) and Cresswell *et al.* (2008), there are several advantages to employing multi-methods in one study. The advantages are: First, different methods can be used for different purposes in a study, for example, a researcher may wish to employ interviews in order to get a feel for the key issues before embarking on a questionnaire. Second, the approach may enable triangulation to take place. Third, the approach helps to explain on quantitative results with subsequent qualitative data or vice versa. Fourth, it uses qualitative data to develop a theory that is subsequently tested, and lastly, the multi-method approach enhances a study with supplemental data set, either quantitative or qualitative.

Even though there is a definite research design in this study, there are no explicitly stated particular requirements for any research design to use a particular method of data collection (Vaus, 2001). However, as suggested by Vaus (2001), the researcher proved the relevance of used methods in the study.

Therefore, the qualitative method is used to extract initial factors and a quantitative method is used to measure the actual level of influence they have on adoption decision. This method is chosen in order to get the best of both qualitative and quantitative methods. Cloud computing is somehow a new concept and experience in our country, therefore, using these mixed methods is best in order to explore and understand the factors influencing the adoption of cloud computing. Therefore, through interviews, the researcher can get an in depth understanding of the factors and through survey questionnaires; these factors will be further explored and measured by involving the larger population.

3.3. Sampling Techniques

3.3.1. Purposeful sampling

Purposeful sampling, which is the most common type of non-probability sampling used by qualitative researchers, is used. The main reason for purposeful sampling lies in selecting information rich cases for in depth study. Information rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research. (Patton, 1990). Thus in order to get a deeper insight and understanding into the factors that influence the decision to adopt cloud computing, purposeful sampling was used.

3.3.2. Sampling Composition

There are 19 banks in Ethiopia and data was obtained from six Ethiopian Banks; National Bank of Ethiopia, Commercial Bank of Ethiopia, Dashen Bank, Awash International Bank, Zemen Bank and Nib International Bank. National bank of Ethiopia is a state owned bank and the controlling body of all Ethiopian Banks. Commercial bank of Ethiopia is the largest bank in the country. The rest banks are private banks that have a reputation of using modern technologies and have formed a union in order to adopt new technologies and share responsibilities. Currently, Banks in Ethiopia are getting ready for the forthcoming technology changes, requiring studies such as this one to be done before the supposed technology change commence. Cloud computing technology is among the many technologies that are expected to be adopted and used in Ethiopian banking sector; however, currently, none of the selected banks are using or have adopted any significant cloud solutions for conducting day to day business activities. Even though neither of these banks have adopted cloud solutions yet nor feeling immense pressure that force them to conduct cloud computing solutions in their environmental settings, there is no guarantee that things continue in the same way as it is today. As it is made clear by many researchers, the future of computing world is highly gravitated towards some technological discoveries, such as cloud computing, hence its adoption is inevitable. That is why studies such as this one are striving to lay a foundation for future work by carefully studying and presenting the past trend on adopting cloud computing solutions in the specified sector.

Eight interviewees; IT managers, Application and Infrastructure managers, IT operation and System managers, who are directly involved in the decision of technology adoption were interviewed and allowed to participate in the survey.

3.3.3. Data Collection

This study used a mixed method approach, therefore, an interview was used to gather qualitative data in order to extract initial factors and eSurv was used to collect quantitative data; the initial factors, and measure their influence on adoption decision.

Interviews are among the most used strategies to collect qualitative data. The interview was conducted to eight interviewees, selected based on the fact that they were responsible for decision making when it comes to adopting new technologies. This was an adequate sample for interview as the information gained became saturated. The researcher used a semi structured in-depth interview with the selected interviewees. Semi-structured in-depth interviews are the most widely used interviewing format for qualitative research and can occur either with an individual or in groups. This allows the interviewer to investigate deeply into social and personal matters (Crabtree *et al.*, 2006). This helped the researcher to explore and understand the factors that influence the decision of the banks whether to adopt or reject cloud computing solutions. This helps to understand the experiences, if any, the attitudes and the motivations of the interviewees towards this new technology.

The online tool that was used to collect the quantitative data is eSurv. eSurv is a web-based survey tool for data collection. It is a free online survey tool that is funded by educational and research institutions. Web-based surveys, for their worldwide nature, have the potential to reach participants very quickly, creating an international view of the subject under study (Edmunds

(1999) cited in Hailu, 2012). Web-based surveys have the capability of automatically verifying and storing survey responses using database technologies and an HTML (hypertext markup language) user interface (Andrews *et al.*, 2003). Survey participants can quickly respond and it's a convenient way for the researcher to utilize this technology rather than using the traditional way of collecting survey data. The capacity of the survey tool to store the responses in a database which was later exported to an excel format made it readily available for analysis. Moreover, using this technology helped to get more reliable data. The eSurv tool has the capacity of only accepting one response from one respondent which ensures the reliability and validity of the data.

The survey composed of 31 questions, which are constructed based on the initial factors that were extracted from first phase, with a 5- point likert scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree). The first 30 questions involve the 20 independent variables and measure the degree to which these variables influence the adoption decision. The last question measures the dependent variable, which is the decision to adopt or not to adopt cloud computing solutions.

During the data collection process, interviewees recommended other participants to contribute to the research. Additionally, it was perceived that all the interviewees were aware of the concept of cloud computing which made it easier for the researcher to conduct the interview.

3.3.4. Data Analysis

The quantitative data that was obtained from the survey using eSurv was exported to Microsoft Excel 2007 and imported into SPSS version 20.

The survey data was analyzed using Principal Component Analysis (PCA). Principal component analysis is a variable reduction procedure where data is obtained on a number of variables where these variables are correlated with one another and create redundancy. Because of this, it's possible to reduce the observed variables into a smaller number of principal components that will account for the most of the variance in the observed variables. This reduction is accomplished by identifying the principal components, with the variation in the data is maximal. (Ringer, 2008).

PCA which is a factor reduction method reduced the factors and these factors were again tested for their influence on the adoption decision by using a Chi-Square test.

CHAPTER FOUR

ANALYSIS AND RESULT

This study evaluated the internal and external factors that have an impact on the decision of IT managers and executives in Ethiopian banking sector. The study aims at laying a ground work for future researches that are aimed at the adoption of cloud computing in developing countries like Ethiopia. Furthermore, it enables decision makers to focus on the critical issues relating to their organization when deciding to adopt or not to adopt cloud solutions in order to base their decision on an informed manner. Additionally, it also helps cloud vendors to align their marketing strategies and services with the current concerns of decision makers for adoption decision.

This chapter starts by showing the results in a simple descriptive statistics using mean and standard deviation. Since this data is not enough to describe the nature of the survey items and their relationships, inter-item correlation analysis is done in order to understand the relationships and their strength among the survey items. Furthermore, in order to study the main factors that have influence on adoption decision, principal component analysis was undertaken in order to reduce components and finally, a chi-square test was done in order to accept or reject the hypotheses.

4.1. Descriptive Statistics

Descriptive statistics show the relationships that exist between the items in the data. The survey items' means and standard deviations are shown in table 2 showing varying scores for each survey item. The means ranged from 1.77 to 4.56. It can be seen that five of the survey items scored more than 4, fifteen of them scored nearly 3 which is neutral.

The standard deviation ranged from 0.612 to 1.264. The higher the standard deviation, the higher the dispersion of the data. Even though summary statistics gives some information like variability, average score, it doesn't give much information about the hidden patterns of the data, and therefore, methods like correlation analysis and principal component analysis were used.

Survey items	N (total population)	Minimum	Maximum	Mean	Std. Deviation
Q1	97	1	5	1.87	1.017
Q2	97	1	5	3.64	.892
Q3	97	1	5	1.77	.771
Q4	97	1	5	2.78	1.023
Q5	97	1	5	2.82	1.051
Q6	97	1	5	2.05	.928
Q7	97	1	5	2.45	1.090
Q8	97	1	5	3.96	.865
Q9	97	1	5	3.29	1.172
Q10	97	1	5	2.05	.795
Q11	97	1	5	3.28	1.264
Q12	97	1	5	2.13	.772
Q13	97	1	5	2.59	1.038
Q14	97	1	5	3.19	1.074
Q15	97	1	5	2.12	.857
Q16	97	1	5	4.31	1.084
Q17	97	1	5	3.09	1.173
Q18	97	2	5	3.53	.855
Q19	97	1	5	3.35	.842
Q20	97	1	5	4.48	.779
Q21	97	2	5	4.51	.752
Q22	97	2	5	4.52	.679
Q23	97	2	5	4.56	.612
Q24	97	1	5	3.98	.803
Q25	97	2	5	3.80	.909
Q26	97	1	5	3.13	.623
Q27	97	1	5	3.57	.706
Q28	97	1	5	3.35	.737
Q29	97	1	5	3.03	1.055
Q30	97	1	5	2.82	1.061
Q31	97	1	5	3.61	.942
Valid N (listwise)	97				

Table4.1 Means and Standard Deviations.

Correlation Matrix

In order to investigate more about the hidden behaviors of the responses, inter item correlation matrix was computed to identify the relationships that exist between each survey items and understand how strong those relationships are. Table 3 shows the inter item correlation matrix of each survey item.

Inter-item correlation matrix was used to analyze inter item correlation property. Big values indicate strong correlations whereas small values indicate weak correlations. A rule of thumb for correlation analysis here is that no correlation item should exceed correlation coefficient value of .90, which is an indication for multi-co linearity (Tabachnick & Fidell, 2001). And inter item correlations that measure the same construct should be between .30 and.60. (Kraiser, 1958). Examination of the matrix indicated that no item exceeded .90. Additionally, some of the variables are positively correlated while some of them are negatively correlated which indicates that the analysis will not be a straight forward analysis.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31
Q1	1	.004	.107	.052	.114	-.004	.225	.088	-.098	.150	-.068	.169	-.171	-.187	.019	-.142	.089	-.146	-.115	-.220	-.169	-.201	-.163	-.220	-.028	-.021	.063	-.062	-.132	.094	-.262
Q2	.004	1	-.135	.028	.165	-.279	-.205	.089	-.238	-.194	-.086	-.171	-.095	-.060	-.227	.127	-.017	-035	.018	.134	.213	.224	.238	.106	.053	-.137	.047	-.202	-.121	-.101	.028
Q3	.107	-.135	1	.043	-.024	.351	.359	-.311	-.019	.240	.033	.034	.064	.240	.201	-.364	-.011	-.133	-.294	-.266	-.160	-.192	-.215	-.226	-.198	-.283	-.240	-.152	.047	-.189	.235
Q4	.052	.028	.043	1	.846	.220	.098	-.093	-.225	-.050	-.501	.063	-.369	-.276	.173	.221	.503	-.023	.077	.015	-.005	-.093	-.038	.121	.088	.177	.316	.064	-.303	.416	-.349
Q5	.114	.165	-.024	.846	1	.287	.188	-.054	-.280	-.114	-.425	-.061	-.372	-.266	.233	.158	.453	-.035	.129	.028	.126	-.062	-.057	.230	.182	.243	.374	-.027	-.267	.486	-.449
Q6	-.004	-.279	.351	.220	.287	1	.378	-.205	-.014	.053	-.216	.005	-.151	.093	.280	-.109	.187	.149	.043	.037	.022	-.109	-.234	-.068	.111	.024	.162	-.103	`-.236	.358	-.132
Q7	.225	-.205	.359	.098	.188	.378	1	.223	.100	.285	.187	.100	-.063	-.126	.207	-.411	-.058	-.013	-.198	-.311	-.270	-.376	-.414	-.299	-.004	-.060	-.121	-.044	-.058	-.129	.053
Q8	.088	.089	-.311	-.093	-.054	-.205	-.223	1	.217	-.254	-.085	-.226	.097	.154	-.190	.358	-.027	.185	.235	.262	.321	.338	.300	.194	.109	.146	.158	.203	.127	-.019	-.097
Q9	-.098	-.238	-.019	-.225	-.280	-.014	.100	.217	1	.207	.339	-.135	.099	.412	-.160	-.005	-.270	.294	.213	.256	.211	.073	.151	.194	.122	.160	-.250	.183	.313	-.085	.217
Q10	.150	-.194	.240	-.050	-.114	.053	.285	-.254	.207	1	.296	.396	.114	.172	.250	-.285	-.016	.113	.019	-.327	-.131	-.165	-.167	-.259	-.029	-.014	-.090	.289	-.002	-.063	.139
Q11	-.068	-.086	.033	-.501	-.425	-.216	.187	-.085	.339	.296	1	.015	.429	.338	-.157	-.330	-.551	-.108	-.122	-.128	-.117	-.133	-.216	-.087	-.106	-.140	-.354	.196	.446	-.429	.478
Q12	.169	-.171	.034	.063	-.061	.005	.100	-.226	-.135	.396	015	1	0290	-.244	.148	.037	.170	-.139	-.105	-.300	-.315	-.014	-.160	-.314	-.007	-.016	.012	-.010	-.159	.054	.073
Q13	-.171	-.095	.064	-.369	-.372	-.151	-.063	.097	.099	.114	.429	.290	1	.228	-.059	-.080	-.250	-.093	-.024	-.253	-.184	.068	-.127	-.173	-.274	-.236	-.275	.000	.287	-.199	.376
Q14	-.187	-.060	.240	-.276	-.266	-.093	-.126	.154	.412	.172	.338	-.244	.228	1	-.014	-.077	-.295	.074	-.038	.041	.115	.125	.190	.198	-.037	-.084	-.237	.128	.455	-.273	.330
Q15	.019	-.227	.201	.173	.233	.280	.207	-.190	-.160	.250	-.157	.148	-.059	-.014	1	-.244	.206	-.004	.069	-.153	-.211	-.236	-.292	-.223	-.129	-.012	.244	.162	-.050	.288	-.172
Q16	-.142	.127	-.364	.221	.158	-.109	-.411	.358	-.005	-.285	-.330	.037	-.080	-.077	-.244	1	.379	.025	.314	.475	.484	.489	.429	.546	.295	.262	.245	-.007	-.036	.175	-.135
Q17	.089	-.017	-.011	.503	.453	.187	-.058	-.027	-.270	-.016	-.551	.170	-.250	-.295	.206	.379	1	.117	.230	.110	.147	.109	.145	.113	-.022	.254	.313	-.038	-.339	.448	-.429
Q18	-.146	-.035	-.133	-.023	-.035	.149	-.013	.185	.294	.113	-.108	-.139	-.093	.074	-.004	.025	.117	1	.609	.317	.312	.067	.151	.077	.201	-.036	.070	.151	.063	.195	-.065
Q19	-.115	.018	-.294	.077	.129	.043	-.198	.235	.213	.019	-.122	-.105	-.024	-.038	.069	.314	.230	.609	1	.390	.376	.209	.224	.273	.023	.307	.346	.320	.117	.349	-.193
Q20	-.220	.134	-.266	.015	.028	.037	-.311	.262	.256	-.327	-.128	-.300	-.253	.041	-.153	.475	.110	.317	.390	1	.787	.508	.608	.582	.342	.122	.177	.010	-.031	.167	-.094
Q21	-.169	.213	-.160	-.005	.126	.022	-.270	.321	.211	-.131	-.117	-.315	-.184	.115	-.211	.484	.147	.312	.376	.787	1	.628	.650	.656	.314	.099	.122	.053	.019	.125	-.041

Q22	-.201	.224	-.192	-.093	-.062	-.109	-.376	.338	.073	-.165	-.133	-.014	.068	.125	-.236	.489	.109	.067	.209	.508	.628	1	.832	.440	.182	.057	.058	-.032	-.037	-.018	.075
Q23	-.163	.238	-.215	-.038	-.057	-.234	-.414	.300	.151	-.167	-.216	-.160	-.127	.190	-.292	.429	.145	.151	.224	.608	.650	.832	1	.469	.161	.130	.009	-.114	-.059	-.073	.039
Q24	-.220	.106	-.226	.121	.230	-.068	-.299	.194	.194	-.259	-.087	-.314	-.173	.198	-.223	.546	.113	.077	.273	.582	.656	.440	.469	1	.437	.276	.205	.153	.222	.204	-.052
Q25	.028	.053	-.198	.088	.182	.111	-.004	.109	.122	-.029	-.106	.007	.274	-.037	-.129	.295	-.022	.201	.023	.342	.314	.182	.161	.437	1	.212	.159	.057	-.026	.126	.019
Q26	-.021	-.137	-.283	.177	.243	.024	-.060	.146	.160	-.014	-.140	-.016	-.236	-.084	-.012	.262	.254	-.036	.307	.122	.099	.057	.130	.276	.212	1	.347	.237	.025	.225	-.282
Q27	.063	.047	-.240	.316	.374	.162	-.121	.158	-.250	-.090	-.354	.012	-.275	-.237	.244	.245	.313	.070	.346	.177	.122	.058	.009	.205	.159	.347	1	.375	-.024	.482	-.368
Q28	-.062	-.202	-.152	-.064	-.027	-.103	-.044	.203	.183	.289	.196	-.010	.000	.128	.162	-.007	-.038	.151	.320	.010	.053	-.032	-.114	.153	.057	.237	.375	1	.334	.119	.005
Q29	-.132	-.121	.047	-.303	-.267	-.236	-.058	.127	.313	-.002	.446	-.159	.287	.455	-.050	-.036	-.339	.063	.117	-.031	.019	-.037	-.059	.222	-.026	.025	-.024	.334	1	-.209	.337
Q30	.094	-.101	-.189	.416	.486	.358	-.129	-.019	-.085	-.063	-.429	.054	-.199	-.273	.288	.175	.448	.195	.349	.167	.125	-.018	-.073	.204	.126	.225	.482	.119	-.209	1	-.591
Q31	-.262	.028	.235	-.349	-.449	-.132	.053	-.097	.217	.139	.478	.073	.376	.330	-.172	-.135	-.429	-.065	-.193	-.094	-.041	.075	.039	-.052	.019	-.282	-.368	.005	.337	-.591	1

Table 4.2 Inter-Item Correlation Matrix

4.2. *Principal Component Analysis*

The first step in PCA is determining the number of components to keep. These components are likely the ones that have been influencing IT executives and managers decision not to recommend an adoption of cloud computing services in their organizations. The components are identified based on their Eigen value score, which is >= 1. Having identified the principal components, the focus would be on determining the total variance explained by each component,. In order to reduce the natural stance of variables being correlated to some extent despite the varying nature of concept they represent, oblique rotation method with Direct Oblimin was employed in order to reduce the natural effect. Oblique rotation unlike orthogonal rotation allows for the components to be correlated. However, this oblique rotation can also yield in orthogonal solution, therefore, oblique rotation method was used.

The first step is to assess the suitability of the data for analysis. This was done by calculating the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO measure of sampling adequacy should be >.600 and Bartlett's test of sphericity should be <.05. SPSS provides this information and indicates that the sampling adequacy was good and Bartlett's test of sphericity was .000 which shows that PCA can be undertaken. Table 4.3 shows this result.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.608
	Approx. Chi-Square	1671.410
Bartlett's Test of Sphericity	Df	465
	Sig.	.000

Table 4.3 KMO and Bartlett's Test

To determine how many factors to extract, Kaiser (1958), suggested identifying components that have eigenvalue of greater than or equal to 1 in the total variance explained. Table 4.5 shows the total variance explained. In this study, nine components recorded eigenvalues of greater than one (5.869, 4.789, 2.640, 1.960, 1.630, 1.438, 1.390, 1.156, 1.107). These nine components explain a total of 70.89 percent of the total variance. Therefore, these nine components are extracted for further analysis.

Component Matrix

Component matrix, presented in table 4.4 shows each variable's loadings on each component before rotation is applied. This result only shows each item's loadings on each component, which doesn't show conceptual meaning and is very difficult to interpret, hence, rotation is required to yield a more interpretable and meaningful patterns. Therefore, by applying oblique rotation method with direct oblimin, principal component analysis yielded the following solutions.

Based on the recommendation of Comrey & Lee (1992), components that have factor loadings on the component structure matrix (Table 4.4) of greater than or equal to |.60| on four factors are the ones to keep, therefore components 1 & 2 are retained for analysis. More than four factors load strongly (>=.60) on component 1 (.712, .679, .765, .864, .880, .635) and five factors load strongly on component 2 (.788, .827, .656, .684, .665). The rest of the components don't qualify for this therefore, they are omitted and the two components are chosen for further analysis.

	Component								
	1	2	3	4	5	6	7	8	9
Q1	-.207	-.091	-.128	.050	.179	.105	-.043	.799	.043
Q2	.235	-.057	-.072	-.151	-.204	.050	-.075	.050	.800
Q3	-.253	-.012	-.153	.816	.169	.162	.119	-.108	-.018
Q4	-.008	-.788	-.220	-.033	-.004	.019	-.215	.113	-.082
Q5	-.027	-.827	-.147	-.040	-.114	-.038	-.318	.164	-.019
Q6	-.220	-.352	-.357	.360	.032	-.283	-.199	-.150	-.448
Q7	-.540	-.016	-.149	.489	.255	-.002	-.298	.171	-.142
Q8	.450	.130	.290	-.268	-.357	-.156	.104	.428	-.104
Q9	.178	.456	.360	.247	-.101	-.301	-.256	.072	-.425
Q10	-.230	.079	.238	.388	.729	-.190	-.052	.131	-.051
Q11	-.221	.656	.478	.235	.177	.128	-.059	-.202	.083
Q12	-.103	-.051	-.142	-.127	.860	.170	.115	-.009	-.124
Q13	.002	.446	.225	.051	.335	.167	.480	-.349	-.055
Q14	.220	.362	.509	.520	-.174	.021	.116	-.151	-.068
Q15	-.334	-.447	.059	.249	.270	-.215	.246	-.074	-.184
Q16	.712	-.237	.026	-.483	-.163	.000	-.171	-.025	-.162
Q17	.238	-.684	-.287	-.166	.145	-.168	.083	.175	-.217
Q18	.132	.034	.048	.006	-.084	-.868	-.113	-.002	-.095
Q19	.304	-.205	.290	-.286	-.084	-.757	.013	.020	-.196
Q20	.679	-.039	-.002	-.180	-.455	-.432	-.368	-.110	-.070
Q21	.765	-.056	.085	-.037	-.367	-.404	-.367	-.039	.033
Q22	.864	.061	.011	-.135	-.100	-.091	-.053	-.079	.091
Q23	.880	.071	-.017	-.098	-.242	-.137	-.108	.036	.134
Q24	.635	-.169	.315	-.167	-.441	-.085	-.476	-.165	-.132
Q25	.240	-.071	.033	-.170	-.069	-.111	-.790	.027	-.087
Q26	.167	-.289	.273	-.366	-.072	-.028	-.288	.244	-.484
Q27	.065	-.628	.239	-.407	-.050	-.265	-.078	.134	-.114
Q28	-.048	-.081	.741	-.132	.133	-.302	-.037	.070	-.183
Q29	.010	.334	.739	.137	-.160	.037	.061	-.222	-.100
Q30	.016	-.665	-.105	-.292	-.041	-.405	-.032	.095	-.379
Q31	.029	.584	.233	.350	.200	.224	-.058	-.487	.233

Table 4.4 Component Structure Matrix

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.869	18.932	18.932	5.869	18.932	18.932	4.748
2	4.789	15.447	34.379	4.789	15.447	34.379	4.625
3	2.640	8.515	42.894	2.640	8.515	42.894	2.667
4	1.960	6.321	49.215	1.960	6.321	49.215	2.757
5	1.630	5.257	54.473	1.630	5.257	54.473	2.599
6	1.438	4.639	59.111	1.438	4.639	59.111	2.523
7	1.390	4.483	63.594	1.390	4.483	63.594	1.980
8	1.156	3.728	67.322	1.156	3.728	67.322	1.599
9	1.107	3.571	70.893	1.107	3.571	70.893	1.795
10	.969	3.125	74.017				
11	.950	3.064	77.082				
12	.781	2.519	79.601				
13	.759	2.448	82.048				
14	.689	2.221	84.270				
15	.614	1.981	86.250				
16	.559	1.802	88.052				
17	.483	1.557	89.609				
18	.456	1.472	91.081				
19	.365	1.178	92.259				
20	.361	1.166	93.425				
21	.322	1.040	94.465				
22	.310	1.001	95.466				
23	.273	.879	96.345				
24	.261	.842	97.187				
25	.206	.664	97.851				
26	.179	.577	98.428				
27	.153	.495	98.923				
28	.125	.405	99.328				
29	.107	.346	99.674				
30	.067	.217	99.892				
31	.034	.108	100.000				

Table 4.5Total Variance Explained (Before)

Extraction Method: Principal Component Analysis

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Inter correlations

Table 4.6 presents the component correlation matrix. It is a matrix that shows the inter correlations among components. Table 4.6. Shows that there is a weak correlation between the components.

Component	1	2	3	4	5	6	7	8	9
1	1.000	.020	.080	-.217	-.257	-.115	-.110	-.030	.011
2	.020	1.000	.183	.165	.002	.134	.078	-.124	.132
3	.080	.183	1.000	-.023	-.032	-.093	-.002	-.038	-.100
4	-.217	.165	-.023	1.000	.100	.017	-.007	-.107	-.001
5	-.257	.002	-.032	.100	1.000	.064	.124	-.012	-.045
6	-.115	.134	-.093	.017	.064	1.000	.082	-.043	.169
7	-.110	.078	-.002	-.007	.124	.082	1.000	-.058	.059
8	-.030	-.124	-.038	-.107	-.012	-.043	-.058	1.000	-.033
9	.011	.132	-.100	-.001	-.045	.169	.059	-.033	1.000

Table 4.6 Component Correlation Matrix

Rotated Solutions

The rotated component pattern matrix is presented in Table 4.8. It shows the final extracted two components with their respective loadings. The rotated component structure matrix with loadings on the two components is presented in Table 4.9. The two components are shown to load on most of the items very strongly. The rotated component structure matrix is shown in table 4.9. It is suggested by different researchers that using component pattern matrix would be better if the intention of the researcher is interpreting and naming the components (Pett, *et al.*, 2003). On the other hand, Pett, *et al.* (2003) argued that component structure matrix should be used if the focus of the study is identifying and interpreting the components, hence, the researcher chose the latter one. Table 4.10 shows the component correlation matrix, showing that the two extracted components as being orthogonal to each other. Table 4.11, the component score coefficient matrix shows the two components and their loadings on the survey items.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.869	18.932	18.932	5.869	18.932	18.932	5.591
2	4.789	15.447	34.379	4.789	15.447	34.379	5.079
3	2.640	8.515	42.894				
4	1.960	6.321	49.215				
5	1.630	5.257	54.473				
6	1.438	4.639	59.111				
7	1.390	4.483	63.594				
8	1.156	3.728	67.322				
9	1.107	3.571	70.893				
10	.969	3.125	74.017				
11	.950	3.064	77.082				
12	.781	2.519	79.601				
13	.759	2.448	82.048				
14	.689	2.221	84.270				
15	.614	1.981	86.250				
16	.559	1.802	88.052				
17	.483	1.557	89.609				
18	.456	1.472	91.081				
19	.365	1.178	92.259				
20	.361	1.166	93.425				
21	.322	1.040	94.465				
22	.310	1.001	95.466				
23	.273	.879	96.345				
24	.261	.842	97.187				
25	.206	.664	97.851				
26	.179	.577	98.428				
27	.153	.495	98.923				
28	.125	.405	99.328				
29	.107	.346	99.674				
30	.067	.217	99.892				
31	.034	.108	100.000				

Table 4.7 Total Variance Explained (After)

	Component	
	1	2
Q1	-.277	-.222
Q2	.254	-.012
Q3	-.461	.098
Q4	-.014	-.740
Q5	.038	-.769
Q6	-.203	-.394
Q7	-.540	-.076
Q8	.508	.101
Q9	.253	.429
Q10	-.357	.122
Q11	-.187	.720
Q12	-.343	-.100
Q13	-.153	.523
Q14	.158	.557
Q15	-.352	-.340
Q16	.684	-.228
Q17	.133	-.691
Q18	.321	-.040
Q19	.491	-.196
Q20	.798	-.059
Q21	.814	-.020
Q22	.717	.107
Q23	.767	.094
Q24	.749	-.057
Q25	.374	-.136
Q26	.281	-.307
Q27	.228	-.564
Q28	.122	.049
Q29	.118	.522
Q30	.139	-.695
Q31	-.074	.697

Table4.8. Rotated Component Pattern Matrix

	Component	
	1	2
Q1	-.274	-.218
Q2	.254	-.015
Q3	-.462	.104
Q4	-.004	-.740
Q5	.049	-.769
Q6	-.198	-.392
Q7	-.539	-.069
Q8	.507	.094
Q9	.248	.425
Q10	-.358	.127
Q11	-.197	.723
Q12	-.342	-.095
Q13	-.160	.525
Q14	.150	.555
Q15	-.347	-.336
Q16	.687	-.238
Q17	.143	-.693
Q18	.322	-.045
Q19	.494	-.203
Q20	.799	-.070
Q21	.814	-.031
Q22	.715	.097
Q23	.765	.084
Q24	.749	-.067
Q25	.376	-.142
Q26	.285	-.310
Q27	.236	-.567
Q28	.122	.048
Q29	.111	.520
Q30	.149	-.697
Q31	-.084	.698

Table 4.9. Rotated Component Structure Matrix

Component	1	2
1	1.000	-.014
2	-.014	1.000

Table 4.10 Component Correlation Matrix

	Component	
	1	2
Q1	-.053	-.048
Q2	.046	.001
Q3	-.082	.013
Q4	-.013	-.147
Q5	-.004	-.152
Q6	-.042	-.081
Q7	-.099	-.023
Q8	.093	.027
Q9	.052	.089
Q10	-.063	.019
Q11	-.023	.140
Q12	-.063	-.025
Q13	-.020	.102
Q14	.036	.113
Q15	-.068	-.073
Q16	.120	-.036
Q17	.014	-.135
Q18	.057	-.003
Q19	.086	-.032
Q20	.143	.000
Q21	.146	.008
Q22	.131	.031
Q23	.140	.030
Q24	.134	-.001
Q25	.066	-.022
Q26	.046	-.057
Q27	.033	-.109
Q28	.023	.012
Q29	.029	.105
Q30	.015	-.136
Q31	-.003	.137

Table 4.11. Component Score Coefficient Matrix

4.3. Factor analysis Summary

As shown above, the 31 items were subjected to PCA using SPSS version 20. PCA revealed the presence of nine components with Eigen values exceeding 1. Using Comrey & Lee (1992) recommendation, components with at least 4 loading scores of >=|.6| should be retained and two components have been retained. To aid the interpretation of the components, Oblique rotation method with Direct Oblimin was employed. As we can see in table 4.10 of the component correlation matrix, the rotation method used yielded two orthogonal components that are negatively correlated as shown in table 4.10. Table 4.11 shows the component score coefficient matrix.

4.4. Hypothesis Testing

Based on the analysis that was done on the survey items the following results were obtained:

Research Question 1

What relationship does exist between each of the aforementioned internal factors categories and the IT executive's and expert's decision to recommend an adoption of cloud computing solutions in Ethiopian banking sector?

H110: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on relative advantage of cloud computing.

H11α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on relative advantage of cloud computing.

			Q31		Total
			1.00	2.00	
Q1	1.00	Count	28	60	88
		Expected Count	29.0	59.0	88.0
		% within Q1	31.8%	68.2%	100.0%
		% within Q31	87.5%	92.3%	90.7%
	2.00	Count	4	5	9
		Expected Count	3.0	6.0	9.0
		% within Q1	44.4%	55.6%	100.0%
		% within Q31	12.5%	7.7%	9.3%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q1	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.12 Crosstabulation for Hypothesis 11

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.589[a]	1	.443		
Continuity Correction[b]	.156	1	.693		
Likelihood Ratio	.565	1	.452		
Fisher's Exact Test				.472	.336
Linear-by-Linear Association	.583	1	.445		
N of Valid Cases	97				

Table 4.13 Chi-Square Tests for Hypothesis 11

Hypothesis 11 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on relative advantage of cloud computing. This hypothesis was evaluated using items 1 & 31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was .589 with 1 degree of freedom at .05 significance level. The P-value was .443 which is greater than .05, the null hypothesis was accepted. Therefore it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on relative advantage of cloud computing. The crosstabulation and chi-square tests of hypothesis 11 are shown in table 4.12 and 4.13 respectively

H120: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on compatibility of cloud computing with existing systems.

H12α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on compatibility of cloud computing with existing systems.

			Q31		Total
			1.00	2.00	
Q2	1.00	Count	16	14	30
		Expected Count	9.9	20.1	30.0
		% within Q2	53.3%	46.7%	100.0%
		% within Q31	50.0%	21.5%	30.9%
	2.00	Count	16	51	67
		Expected Count	22.1	44.9	67.0
		% within Q2	23.9%	76.1%	100.0%
		% within Q31	50.0%	78.5%	69.1%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q2	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.14 Crosstabulation for Hypothesis 12

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.131[a]	1	.004		
Continuity Correction[b]	6.853	1	.009		
Likelihood Ratio	7.901	1	.005		
Fisher's Exact Test				.009	.005
Linear-by-Linear Association	8.047	1	.005		
N of Valid Cases	97				

Table 4.15 Chi-Square Tests for Hypothesis 12

Hypothesis 12 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on compatibility of cloud computing with existing systems. This hypothesis was evaluated using items 2 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 8.131 with 1 degree of freedom at .05 significance level. The p-value was .004 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on compatibility of cloud computing with existing systems. The crosstabulation and chi-square tests of hypothesis 12 are shown in table 4.14 and 4.15 respectively.

H130: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on existing infrastructures.

H13α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on existing infrastructures.

			Q31		Total
			1.00	2.00	
Q3	1.00	Count	32	61	93
		Expected Count	30.7	62.3	93.0
		% within Q3	34.4%	65.6%	100.0%
		% within Q31	100.0%	93.8%	95.9%
	2.00	Count	0	4	4
		Expected Count	1.3	2.7	4.0
		% within Q3	0.0%	100.0%	100.0%
		% within Q31	0.0%	6.2%	4.1%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q3	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.16 Crosstabulation for Hypothesis 13

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.054[a]	1	.152		
Continuity Correction[b]	.792	1	.373		
Likelihood Ratio	3.287	1	.070		
Fisher's Exact Test				.299	.195
Linear-by-Linear Association	2.033	1	.154		
N of Valid Cases	97				

Table 4.17 Chi-Square Tests for Hypothesis 13

Hypothesis 13 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on existing infrastructures. This hypothesis was evaluated using items 3 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 2.054 with 1 degree of freedom at .05 significance level. The p-value was .152 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on existing infrastructures. The crosstabulation and chi-square tests of hypothesis 13 are shown in table 4.16 and 4.17 respectively.

H140: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on complexity of cloud solutions.

H14α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on complexity of cloud solutions.

		Q31		Total
		1.00	2.00	
Q5 1.00	Count	12	49	61
	Expected Count	20.1	40.9	61.0
	% within Q5	19.7%	80.3%	100.0%
	% within Q31	37.5%	75.4%	62.9%
Q5 2.00	Count	20	16	36
	Expected Count	11.9	24.1	36.0
	% within Q5	55.6%	44.4%	100.0%
	% within Q31	62.5%	24.6%	37.1%
Total	Count	32	65	97
	Expected Count	32.0	65.0	97.0
	% within Q5	33.0%	67.0%	100.0%
	% within Q31	100.0%	100.0%	100.0%

Table 4.18 Crosstabulation for Hypothesis 14

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.186[a]	1	.000		
Continuity Correction[b]	11.613	1	.001		
Likelihood Ratio	13.065	1	.000		
Fisher's Exact Test				.001	.000
Linear-by-Linear Association	13.051	1	.000		
N of Valid Cases	97				

Table 4.19 Chi-Square Tests for Hypothesis 14

Hypothesis 14 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on complexity of cloud solutions. This hypothesis was evaluated using items 5 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 13.186 with 1 degree of freedom at .05 significance level. The p-value was .000 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on complexity of cloud solutions. The crosstabulation and chi-square tests of hypothesis 14 are shown in table 4.18 and 4.19 respectively.

H150: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on organization's firm size

H15α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on organization's firm size

			Q31		Total
			1.00	2.00	
Q6	1.00	Count	26	60	86
		Expected Count	28.4	57.6	86.0
		% within Q6	30.2%	69.8%	100.0%
		% within Q31	81.2%	92.3%	88.7%
	2.00	Count	6	5	11
		Expected Count	3.6	7.4	11.0
		% within Q6	54.5%	45.5%	100.0%
		% within Q31	18.8%	7.7%	11.3%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q6	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.20 Crosstabulation for Hypothesis 15

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.608[a]	1	.106		
Continuity Correction[b]	1.624	1	.203		
Likelihood Ratio	2.453	1	.117		
Fisher's Exact Test				.170	.103
Linear-by-Linear Association	2.581	1	.108		
N of Valid Cases	97				

Table 4.21 chi-Square Tests for Hypothesis 15

Hypothesis 15 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on organization's firm size. This hypothesis was evaluated using items 6 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 2.608 with 1 degree of freedom at .05 significance level. The p-value was .106 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on organization's firm size. The crosstabulation and chi-square tests of hypothesis 15 are shown in table 4.20 and 4.21 respectively.

H160: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on management support.

H16α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on management support.

			Q31		Total
			1.00	2.00	
Q8	1.00	Count	9	8	17
		Expected Count	5.6	11.4	17.0
		% within Q8	52.9%	47.1%	100.0%
		% within Q31	28.1%	12.3%	17.5%
	2.00	Count	23	57	80
		Expected Count	26.4	53.6	80.0
		% within Q8	28.8%	71.2%	100.0%
		% within Q31	71.9%	87.7%	82.5%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q8	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.22 Crosstabulation for Hypothesis 16

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.712[a]	1	.05		
Continuity Correction[b]	2.698	1	.100		
Likelihood Ratio	3.525	1	.060		
Fisher's Exact Test				.086	.053
Linear-by-Linear Association	3.673	1	.055		
N of Valid Cases	97				

Table 4.23 Chi-Square Tests for Hypothesis 16

Hypothesis 16 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on management support. This hypothesis was evaluated using items 8 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 3.712 with 1 degree of freedom at .05 significance level. The p-value was .05 which is threshold value, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on management support. The crosstabulation and chi-square tests of hypothesis 16 are shown in table 4.22 and 4.23 respectively.

H170: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on employee’s skills.

H17α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on employee’s skills.

Hypothesis 17 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on employee’s skills.

			Q31		Total
			1.00	2.00	
Q9	1.00	Count	22	19	41
		Expected Count	13.5	27.5	41.0
		% within Q9	53.7%	46.3%	100.0%
		% within Q31	68.8%	29.2%	42.3%
	2.00	Count	10	46	56
		Expected Count	18.5	37.5	56.0
		% within Q9	17.9%	82.1%	100.0%
		% within Q31	31.2%	70.8%	57.7%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q9	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.24 Crosstabulation for Hypothesis 17

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	13.724[a]	1	.000		
Continuity Correction[b]	12.152	1	.000		
Likelihood Ratio	13.845	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	13.582	1	.000		
N of Valid Cases	97				

Table 4.25 Chi-Square Tests for Hypothesis 17

This hypothesis was evaluated using items 9 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 13.724 with 1 degree of freedom at .05 significance level. The p-value was .000 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on employee’s skills. The crosstabulation and chi-square tests of hypothesis 17 are shown in table 4.24 and 4.25 respectively.

Research Question 2

What relationship does exist between factors categorized as *external factors* in this study and the IT executive's and expert's decision to recommend an adoption of cloud computing solutions in Ethiopian banking sector?

H210: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on competition.

H21α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on competition

Hypothesis 21 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on competition.

			Q31		Total
			1.00	2.00	
Q10	1.00	Count	29	61	90
		Expected Count	29.7	60.3	90.0
		% within Q10	32.2%	67.8%	100.0%
		% within Q31	90.6%	93.8%	92.8%
	2.00	Count	3	4	7
		Expected Count	2.3	4.7	7.0
		% within Q10	42.9%	57.1%	100.0%
		% within Q31	9.4%	6.2%	7.2%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q10	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.26 Crosstabulation for Hypothesis 21

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.332[a]	1	.564		
Continuity Correction[b]	.025	1	.874		
Likelihood Ratio	.320	1	.572		
Fisher's Exact Test				.681	.421
Linear-by-Linear Association	.329	1	.566		
N of Valid Cases	97				

Table 4.27 Chi-Square Tests for Hypothesis 21

This hypothesis was evaluated using items 10 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was .332 with 1 degree of freedom at .05 significance level. The p-value was .564 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on competition. The crosstabulation and chi-square tests of hypothesis 21 are shown in table 4.26 and 4.27 respectively.

H220: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on external pressure.

H22α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on external pressure

Hypothesis 22 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on external pressure.

			Q31		Total
			1.00	2.00	
Q11	1.00	Count	24	14	38
		Expected Count	12.5	25.5	38.0
		% within Q11	63.2%	36.8%	100.0%
		% within Q31	75.0%	21.5%	39.2%
	2.00	Count	8	51	59
		Expected Count	19.5	39.5	59.0
		% within Q11	13.6%	86.4%	100.0%
		% within Q31	25.0%	78.5%	60.8%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q11	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.28 Crosstabulation for Hypothesis 22

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	25.721[a]	1	.000		
Continuity Correction[b]	23.526	1	.000		
Likelihood Ratio	26.168	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	25.456	1	.000		
N of Valid Cases	97				

Table 4.29 Chi-Square Tests for Hypothesis 22

This hypothesis was evaluated using items 11 and 31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 25.721 with 1 degree of freedom at .05 significance level. The p-value was .000 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on external pressure. The crosstabulation and chi-square tests of hypothesis 22 are shown in table 4.28 and 4.29 respectively.

H230: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on customer demands.

H23α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on customer demands.

Hypothesis 23 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on customer demands.

			Q31		Total
			1.00	2.00	
Q13	1.00	Count	29	39	68
		Expected Count	22.4	45.6	68.0
		% within Q13	42.6%	57.4%	100.0%
		% within Q31	90.6%	60.0%	70.1%
	2.00	Count	3	26	29
		Expected Count	9.6	19.4	29.0
		% within Q13	10.3%	89.7%	100.0%
		% within Q31	9.4%	40.0%	29.9%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q13	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.30 Crosstabulation for Hypothesis 23

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.596[a]	1	.002		
Continuity Correction[b]	8.190	1	.004		
Likelihood Ratio	10.934	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	9.497	1	.002		
N of Valid Cases	97				

Table 4.31 Chi-Square Tests for Hypothesis 23

This hypothesis was evaluated using items 13 and 31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 9.596 with 1 degree of freedom at .05 significance level. The p-value was .002 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on customer demands. The crosstabulation and chi-square tests of hypothesis 23 are shown in table 4.30 and 4.31 respectively

H240: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on government's rules, regulations, and proclamations.

H24α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on government's rules, regulation, and proclamations.

Hypothesis 24 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on governments rules, regulations, and proclamations.

			Q31		Total
			1.00	2.00	
Q15	1.00	Count	30	61	91
		Expected Count	30.0	61.0	91.0
		% within Q15	33.0%	67.0%	100.0%
		% within Q31	93.8%	93.8%	93.8%
	2.00	Count	2	4	6
		Expected Count	2.0	4.0	6.0
		% within Q15	33.3%	66.7%	100.0%
		% within Q31	6.2%	6.2%	6.2%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q15	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.32 Crosstabulation for Hypothesis 24

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.000[a]	1	.985		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.000	1	.985		
Fisher's Exact Test				1.000	.649
Linear-by-Linear Association	.000	1	.985		
N of Valid Cases	97				

Table 4.33 Chi-Square Tests for Hypothesis 24

This hypothesis was evaluated using items 15 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was .000 with 1 degree of freedom at .05 significance level. The p-value was .985 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on government's rules, regulations, and proclamations. The crosstabulation and chi-square tests of hypothesis 24 are shown in table 4.32 and 4.33 respectively

H250: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on security of cloud solutions.

H25α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on security of cloud solutions

Hypothesis 25 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on security of cloud solutions.

			Q31		Total
			1.00	2.00	
Q16	1.00	Count	7	11	18
		Expected Count	5.9	12.1	18.0
		% within Q16	38.9%	61.1%	100.0%
		% within Q31	21.9%	16.9%	18.6%
	2.00	Count	25	54	79
		Expected Count	26.1	52.9	79.0
		% within Q16	31.6%	68.4%	100.0%
		% within Q31	78.1%	83.1%	81.4%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q16	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.34 Crosstabulation for Hypothesis 25

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.348[a]	1	.555		
Continuity Correction[b]	.097	1	.755		
Likelihood Ratio	.341	1	.559		
Fisher's Exact Test				.586	.371
Linear-by-Linear Association	.344	1	.557		
N of Valid Cases	97				

Table 4.35 Chi-Square Tests for Hypothesis 25

This hypothesis was evaluated using items 16 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was .348 with 1 degree of freedom at .05 significance level. The p-value was .555 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on security of cloud solutions. The crosstabulation and chi-square tests of hypothesis 25 are shown in table 4.34 and 4.35 respectively.

H260: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on support of cloud vendors.

H26α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on support of cloud vendors

Hypothesis 26 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on support of cloud vendors.

			Q31		Total
			1.00	2.00	
Q19	1.00	Count	16	35	51
		Expected Count	16.8	34.2	51.0
		% within Q19	31.4%	68.6%	100.0%
		% within Q31	50.0%	53.8%	52.6%
	2.00	Count	16	30	46
		Expected Count	15.2	30.8	46.0
		% within Q19	34.8%	65.2%	100.0%
		% within Q31	50.0%	46.2%	47.4%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q19	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.36 Crosstabulation for Hypothesis 26

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.127[a]	1	.721		
Continuity Correction[b]	.020	1	.888		
Likelihood Ratio	.127	1	.721		
Fisher's Exact Test				.829	.444
Linear-by-Linear Association	.126	1	.723		
N of Valid Cases	97				

Table 4.37 Chi-Square Tests for Hypothesis 26

This hypothesis was evaluated using items 19 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was .127 with 1 degree of freedom at .05 significance level. The p-value was .721 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on support of cloud vendors. The crosstabulation and chi-square tests of hypothesis 26 are shown in table 4.36 and 4.37 respectively.

H270: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on network bandwidth.

H27α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on network bandwidth.

Hypothesis 27 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on network bandwidth.

			Q31		Total
			1.00	2.00	
Q21	1.00	Count	4	3	7
		Expected Count	2.3	4.7	7.0
		% within Q21	57.1%	42.9%	100.0%
		% within Q31	12.5%	4.6%	7.2%
	2.00	Count	28	62	90
		Expected Count	29.7	60.3	90.0
		% within Q21	31.1%	68.9%	100.0%
		% within Q31	87.5%	95.4%	92.8%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q21	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.38 Crosstabulation of Hypothesis 27

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.991[a]	1	.158		
Continuity Correction[b]	.987	1	.320		
Likelihood Ratio	1.858	1	.173		
Fisher's Exact Test				.214	.160
Linear-by-Linear Association	1.970	1	.160		
N of Valid Cases	97				

Table 4.39 Chi-Square Test of Hypothesis 27

This hypothesis was evaluated using items 21 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 1.991 with 1 degree of freedom at .05 significance level. The p-value was .158 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on network bandwidth. The crosstabulation and chi-square tests of hypothesis 27 are shown in table 4.38 and 4.39 respectively.

H280: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on electric power.

H28α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on electric power

Hypothesis 28 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on electric power.

			Q31		Total
			1.00	2.00	
Q23	1.00	Count	3	1	4
		Expected Count	1.3	2.7	4.0
		% within Q23	75.0%	25.0%	100.0%
		% within Q31	9.4%	1.5%	4.1%
	2.00	Count	29	64	93
		Expected Count	30.7	62.3	93.0
		% within Q23	31.2%	68.8%	100.0%
		% within Q31	90.6%	98.5%	95.9%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q23	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.40 Crosstabulation for Hypothesis 28

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.331[a]	1	.068		
Continuity Correction[b]	1.644	1	.200		
Likelihood Ratio	3.094	1	.079		
Fisher's Exact Test				.103	.103
Linear-by-Linear Association	3.296	1	.069		
N of Valid Cases	97				

Table 4.41 Chi-Square Tests for Hypothesis 28

This hypothesis was evaluated using items 23 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 3.331 with 1 degree of freedom at .05 significance level. The p-value was .068 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on electric power. The crosstabulation and chi-square tests of hypothesis 28 are shown in table 4.40 and 4.41 respectively.

H29o: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on the cost of cloud computing.

H29α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on the cost of cloud computing

Hypothesis 29 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on the cost of cloud computing.

			Q31		Total
			1.00	2.00	
Q24	1.00	Count	9	8	17
		Expected Count	5.6	11.4	17.0
		% within Q24	52.9%	47.1%	100.0%
		% within Q31	28.1%	12.3%	17.5%
	2.00	Count	23	57	80
		Expected Count	26.4	53.6	80.0
		% within Q24	28.8%	71.2%	100.0%
		% within Q31	71.9%	87.7%	82.5%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q24	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.42 Crosstabulation for Hypothesis 29

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.712[a]	1	.05		
Continuity Correction[b]	2.698	1	.100		
Likelihood Ratio	3.525	1	.060		
Fisher's Exact Test				.086	.053
Linear-by-Linear Association	3.673	1	.055		
N of Valid Cases	97				

Table 4.43 chi-Square Tests for Hypothesis 29

This hypothesis was evaluated using items 24 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 3.712 with 1 degree of freedom at .05 significance level. The p-value was .05 which is threshold value, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on the cost of cloud computing. The crosstabulation and chi-square tests of hypothesis 29 are shown in table 4.42 and 4.43 respectively.

H2100: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on consistency of cloud computing services.

H210α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on consistency of cloud computing services.

Hypothesis 210 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on consistency of cloud computing services.

			Q31		Total
			1.00	2.00	
Q27	1.00	Count	8	35	43
		Expected Count	14.2	28.8	43.0
		% within Q27	18.6%	81.4%	100.0%
		% within Q31	25.0%	53.8%	44.3%
	2.00	Count	24	30	54
		Expected Count	17.8	36.2	54.0
		% within Q27	44.4%	55.6%	100.0%
		% within Q31	75.0%	46.2%	55.7%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q27	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.44 Crosstabulation for Hypothesis 210

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.230[a]	1	.007		
Continuity Correction[b]	6.109	1	.013		
Likelihood Ratio	7.507	1	.006		
Fisher's Exact Test				.009	.006
Linear-by-Linear Association	7.156	1	.007		
N of Valid Cases	97				

Table 4.45 Chi-Square Tests for Hypothesis 210

This hypothesis was evaluated using items 27 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 7.230 with 1 degree of freedom at .05 significance level. The p-value was .007 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on consistency of cloud computing services. The crosstabulation and chi-square tests of hypothesis 210 are shown in table 4.44 and 4.45 respectively.

H2110: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on availability of cloud services.

H211α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on availability of cloud services

Hypothesis 211 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on availability of cloud services. Crosstabulation and chi-square tests for hypothesis 211 are presented in table 47 and table 48 below.

			Q31		Total
			1.00	2.00	
Q28	1.00	Count	23	35	58
		Expected Count	19.1	38.9	58.0
		% within Q28	39.7%	60.3%	100.0%
		% within Q31	71.9%	53.8%	59.8%
	2.00	Count	9	30	39
		Expected Count	12.9	26.1	39.0
		% within Q28	23.1%	76.9%	100.0%
		% within Q31	28.1%	46.2%	40.2%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q28	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.46 Crosstabulation for Hypothesis 211

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.899[a]	1	.089		
Continuity Correction[b]	2.198	1	.138		
Likelihood Ratio	2.976	1	.084		
Fisher's Exact Test				.123	.068
Linear-by-Linear Association	2.869	1	.090		
N of Valid Cases	97				

Table 4.47 Chi-Square Tests for Hypothesis 211

This hypothesis was evaluated using items 28 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 2.899 with 1 degree of freedom at .05 significance level. The p-value was .089 which is greater than .05, the null hypothesis was accepted. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on availability of cloud services. The crosstabulation and chi-square tests of hypothesis 211 are shown in table 4.46 and 4.47 respectively.

H2120: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on risk of failure.

H212α: decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on risk of failure

Hypothesis 212 stated (null) that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector does not depend on risk of failure.

This hypothesis was evaluated using items 30 and31 on the survey. Chi-square analysis was performed and the Pearson chi-square value was 23.007 with 1 degree of freedom at .05 significance level. The p-value was .000 which is less than .05, the null hypothesis was rejected. Therefore, it can be concluded that decision to recommend adoption of cloud computing solutions in Ethiopian banking sector depends on risk of failure. Table 4.48 and table 4.49 present the crosstabulation and chi-square test for hypothesis 212 respectively.

			Q31		Total
			1.00	2.00	
Q30	1.00	Count	11	54	65
		Expected Count	21.4	43.6	65.0
		% within Q30	16.9%	83.1%	100.0%
		% within Q31	34.4%	83.1%	67.0%
	2.00	Count	21	11	32
		Expected Count	10.6	21.4	32.0
		% within Q30	65.6%	34.4%	100.0%
		% within Q31	65.6%	16.9%	33.0%
Total		Count	32	65	97
		Expected Count	32.0	65.0	97.0
		% within Q30	33.0%	67.0%	100.0%
		% within Q31	100.0%	100.0%	100.0%

Table 4.48 Cross Tabulation for hypothesis 212

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23.007[a]	1	.000		
Continuity Correction[b]	20.857	1	.000		
Likelihood Ratio	22.727	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	22.770	1	.000		
N of Valid Cases	97				

Table 4.49 Chi-Square Tests for hypothesis 212

4.5. Summary of Analysis Results under the TOE framework

From the analysis above, the technological factors complexity, compatibility, and consistency of cloud computing solutions were found to have an influential power on IT executives and experts decision to adopt cloud computing in the Ethiopian banking sector. They showed a significance level of less than .05 that made the null hypothesis to be rejected.

The organizational factors, employee skills, fear of failure, management support, and cost of cloud computing solutions were found to have an influential power on IT executives and experts decision to adopt cloud computing in the Ethiopian banking sector.

The environmental factors, customer demand and external pressure were found to have an influential power on IT executives and experts decision to adopt cloud computing in the Ethiopian banking sector.

However, the technological factors; relative advantage, security, network bandwidth, and availability of cloud solutions, organizational factors; existing infrastructure and firm size, environmental factors; competition, government rules, regulations and proclamations, cloud vendor support and electric power supply were not found to be influential factors for decision of cloud computing adoption.

4.6. Discussions

The purpose of this study is to explore the factors that affect the decision to adopt cloud computing or not in the Ethiopian banking sector. This helps decision makers to make an informed decision and focus on the critical factors while for the adoption decision of cloud computing for their organizations. Additionally, it helps cloud vendors to focus more on what really is affecting the adoption decision of cloud computing in Ethiopian banks and adjust their services and marketing strategies accordingly. This study also tries to fill the gap that exists in literature on factors that affect cloud computing solutions in developing countries like Ethiopia.

The study bases its investigation on two research questions. The first question explores the relationship that exist between each of the aforementioned *internal factors* categories and the IT executive's and expert's decision to recommend an adoption of cloud computing solutions in Ethiopian banking sector.

The second question investigates the relationship that exist between factors categorized as *external factors* in this study and the IT executive's and expert's decision to recommend an adoption of cloud computing solutions in Ethiopian banking sector.

The research findings indicated that there are a number of factors that influence the decisions to adopt or not to adopt cloud solutions in the country's banking sector. The study indicated that the internal factors; complexity of cloud solutions, compatibility of cloud solutions with existing systems, management support, employee skills of the organizations, and risk of failure have influence on the decision to adopt cloud computing solutions while the external factors; customer demands, external pressure exerted to adopt cloud computing solutions, consistency, and cost of cloud computing solutions are important factors that have influence on the decisions to adopt the technology. Organizations tend to prefer technologies that are simple to use, adopt and implement, and this is what this study proved. Complexity of cloud computing solutions actually has an impact on the decisions to adopt it in the context of Ethiopian banks. It shows that the more complex the technology is, the more difficult it will be to understand and use which lead to a lesser adoption because decision makers would fear failure to adopt it. However, this finding is inconsistent with Makena (2013). In relation to this, the fear of risk of failure factor was found to be significant while deciding to adopt cloud computing. It is obvious that new technologies bring about both opportunities and challenges. However, decision makers need to be risk takers (in an informed manner), considering the challenging factors, in order to appreciate the levels of advantages that the cloud can offer. The study also shows that compatibility also plays a role in adoption decision which agrees with the findings of Morgan, *et al, (2013)*. New technologies need to be compatible with existing systems, values, objectives, and easy to use in order to be adopted. Employee skills of organizations are also important consideration because the employee's need to be aware of new technologies, need to be dynamic and willing to use this new technology. They need to have the necessary skills to run this technology since cloud solutions offer state of the art technologies and services. Similarly, management support was found to be an influencing factor indicating that this finding is consistent with Makena (2013), Alshamaileh & Papagiannidis (2012). Organizations that support adoption of new technologies and aware of new innovations are more prone to adopt cloud computing. It was also found that the external pressure that was exerted on Ethiopian banks was a factor for decision. Cloud vendors, IT agencies need to exert some pressure for banks to adopt it because whether we want it or not, the world is moving to the use of cloud computing solutions and we cannot be an exception. For this reason, it seems that the external pressure was not significant for banks to adopt cloud computing solutions.

Banks are becoming more and more customer centric, and customers are becoming more and more demanding. This study proved that by considering customer demand factor as an important consideration. Banks need to take advantage of new technologies like cloud computing in order to satisfy their customer's demand and stay in the market. Similarly, consistency was found to be an important factor. Cloud computing services need to be consistent especially, in the service rendering sectors like banks. Banks cannot afford for their services to be inconsistent therefore, the cloud's consistency is really crucial.

Last but not least is the cost factor. Whenever banks invest in new technologies, the return on investment is what really matters. Review of literature explains the main advantage of the cloud to be the cost advantage that shifted the capital expenses which are very costly to operational expenses. Therefore, the cost of cloud computing solutions should be significantly advantageous for banks to adopt this solution. This result is similar with Hailu (2012) that showed that the decision to adopt cloud computing technology is related to the decision maker's perception of its cost effectiveness.

However, the internal factors; organizational infrastructure, firm size, and relative advantage and the external factors; competition (consistent with findings of Alshamaileh & Papagiannidis, (2012), government rules, regulations , proclamations, security, cloud vendor's support, network bandwidth capacity, consistency of electric power, and availability of cloud solutions were not found to be influential factors on the decision to adopt cloud computing solutions. This finding is inconsistent with Hailu's (2012), Rahimli (2013), and Awosan (2014).

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Adoption of new technologies such as cloud computing is complex. The adoption decisions need to be thoroughly investigated for the opportunities it delivers and the related challenges it brings.

The study showed that adoption of cloud computing is affected by many factors, each of which, need to be considered by adopters and vendors. The major factors that affect IT executives and experts decision to adopt cloud computing technologies were complexity, compatibility, consistency, employee skills, fear of failure, management support, cost, customer demand, and external pressure.

The technological factors; complexity, consistency, and compatibility were found influential when adopting cloud computing. This shows that decision makers are concerned with the technology being easy to use and consistent with their current system, values, and objectives where the system streamlines consistently without interruption since banks give service to their customers 24/7.

The organizational factors reveal the need of cloud computing adoption on employee skills, fear of failure, management support, and cost. Banks adopt cloud computing technologies in order to satisfy their customers hence maximizing revenue. Therefore, the cost of cloud computing technologies for banks was found to be a concern for decision makers. As a matter of fact, it's empirically supported that the main advantage of cloud computing to be its cost effectiveness since its pay-as-you-go model where cost is only for the services used. This can save banks from investing huge amount of capital expenditure on resources, experts, and time and use modern technologies as a utility which can save large upfront expenses. This way, banks can retain their customers, attract new customers, and increase revenue. Employee skills are also concern for decision makers since the cloud offers state of the art technologies, banks need the right personnel who possess the necessary skills and knowledge to operate on such an environment.

Additionally, management must support cloud computing technologies. Adopting cloud computing changes the way IT is utilized, which might create fear of failure and uncertainty towards the technology, therefore, the management must be able to understand the technology, support it, and be a risk taker considering and investigating the potential outcomes.

The environmental factors, customer demand and external pressure were also found to have an effect on bank’s decision makers to adopt cloud computing. Customers are becoming more demanding, increasing, more technology aware, and they want the service whenever they want wherever they want. Therefore, in order to satisfy customers, banks need to be customer centric, and the way to do that is using modern technologies such as cloud computing.

In contrast, the study did not find the factors such as, security, network bandwidth, availability, existing infrastructure, firm size, competition, government rules, cloud vendor support and electric power supply to be influential on the decision to adopt cloud computing.

5.2. Recommendations

Few studies have been conducted in cloud computing adoption decision factors, especially in developing countries, therefore, in order to fill this gap and increase the adoption, further study can be conducted on factors that influence cloud computing adoption.

Researchers can conduct their study by focusing on different sectors like hospitals, government offices, educational institutions and the like to get a better understanding of cloud computing and the immense advantages that it has to offer. Based on the findings of this study, an adoption framework for different sectors can be developed in order to maximize cloud computing adoption successfully.

Additional factors can be discovered or the factors that were explored in this study can be studied more by utilizing different adoption instruments, methods, and techniques.

The issue of cloud computing and its adoption is at its embryonic stage especially in Ethiopia despite its advantages, therefore, undertaking this kinds of researches on a larger scope can enhance the adoption decision.

For adopters, cloud computing brings great deal of opportunities to different organizations belonging to various industries, at the same time, the challenges are also high. Therefore, adoption of cloud computing requires an intensive investigation and these factors can help organizations to make the right decisions when implementing cloud computing. Decision makers can focus on the critical factors and adjust their cloud adoption decision in a way that meets their strategic objectives. This way, decision makers will have the necessary knowledge and understanding of the technology.

Cloud vendors can focus on these factors and adjust their marketing strategies and services.

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Appendix A: Interview Questions

You are invited to participate in this semi structured interview aimed at exploring and examining factors that have been affecting and likely to impact the adoption and use of cloud computing technologies in Ethiopian Banking sector. The general purpose of this study is to lay a foundation work for a complete and utter understanding of the factors acting upon the fate of cloud computing technology adoption by Ethiopian banking sector.

The interview consists of semi structured questions and the approximate time to answer all the 6 questions is about 30 minutes. Your participation in this study is completely voluntary and your response to the questions will be strictly confidential. Finally, I would like to deeply thank you for taking the time to answer these interview questions.

1. How the technology adoption and use is is governed in Ethiopia?
    - Government regulations?
    - Technology Act?
    - Agreements (between the government of Ethiopia and other technology regulatory bodies in an international level)
2. How do you think it is the current cloud computing trend in Ethiopia, specifically, Ethiopian banking sector?
3. Are there restrictive regulations, acts, or agreements resulting in difficulty of adopting or using cloud computing technologies in Ethiopian banking sector?
4. What kinds of technological barriers do you think are serving as stumbling blocks/ or have the potential to affect the adoption and use of cloud computing technologies in Ethiopian banking sectors?

    (Telecom companies capability, service quality, cost etc, capability and quality of current systems? Reliability and cost of current systems?)
5. What economic conditions do you think are greatly influencing the adoption and use of cloud computing technology in Ethiopian banking sector?
6. What market factors do you think as barriers / potential barriers for adopting or using cloud computing technology in Ethiopian banking sector?

    (Less demand of service from customers, restrictive market policy (closed for free and fair competition)

Appendix B. Survey Questions

The survey is undertaken as part of a research work on “Exploring Factors that influence the adoption of cloud computing solutions in Ethiopian Banking Sector” by Selamawit Bekele, Addis Ababa University for the partial fulfillment of the requirement for the Degree of Master of Science in Information Science.

The following survey questions are about the adoption and use of cloud computing services in Ethiopian Banking sector. The questions used 5 point likert scale to gauge the variables of interest. Therefore, you are required to indicate your answer for each question by selecting one among the given 5 options. The numbers on scale represent the degree to which you agree with each item presented.

1. I believe that the relative advantage of cloud computing solutions is not significant enough to motivate adoption of the technology in my organization.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

2. There is a compatibility issue between existing IT infrastructures in my organization and some of cloud computing solutions.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

3. Most of IT infrastructures in my organization are outdated and has very limited capabilities.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

4. I think that cloud computing solutions are very complex to be configured and used in my organization

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

5. I feel that employing cloud computing solutions in my organization could cause unnecessary complications.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

6. My organization is too small in size to require the use of cloud computing solutions.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

7. There is no top management support for adopting or using cloud solutions.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

8. Top management usually prefers the use of its own IT infrastructures, rather than paying for the use of 3rd party infrastructures.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

9. My organization lacks skilled work force to deal with cloud computing.

   1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

   4. Agree ☐ 5. Strongly Agree ☐

10. I believe my organization is performing well with its existing systems because it is not facing any kind of challenge from its competitors.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

11. The external pressure is not strong enough to cause my organization use or adopt cloud solutions.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

12. I believe my organization has always been capable of fulfilling all the demands or requirements from its customers.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

13. There are always similar kinds of demands from customers of my organizations.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

14. Government's rules and regulations are one of the major hindrance mechanisms causing my organization not to use cloud computing solutions.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

15. There is an act, policy, proclamation, signed agreement or any kind of binding document which is restricting or influencing the adoption and use of cloud computing solutions in Ethiopia.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

16. Cloud computing solutions security is highly vulnerable to attack the nature business that my organization is performing that requires a strong security assurance mechanisms than cloud computing promises to provide.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

17. Existing security options are strong enough to fulfill the current security demands of my organization.

    1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

    4. Agree ☐ 5. Strongly Agree ☐

18. Cloud solution vendors mostly do not offer sufficient support that facilitates cloud computing solutions adoption in Ethiopian banking sector.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

19. It is hardly possible to get appropriate help if something goes seriously wrong from the cloud vendors.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

20. Network bandwidth assigned for my organization is not sufficient enough for data transmission between hosts and servers of the required services.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

21. Cloud computing solutions are bandwidth intensive that Internet service providers cannot provide organizations with enough network bandwidth.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

22. It has always been the case that in consistency of electric power supply affects the use and adoption of cloud computing.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

23. Inconsistency in power supply has been affecting data communication between different sources and ends.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

24. The initial cost of adopting cloud computing solutions in organizations such as ours is very expensive that its adoption can cause failure.

1 Strongly Disagree☐ 2. Disagree☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

25. Return on adoption investment through time is not worth doing it in the current context of my organization.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

26. The consistency of cloud computing solutions is highly unsteady.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

27. The quality and uniformity of cloud services are highly affected by many factors.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

28. Cloud solutions are not sufficiently available for different business operations in my organization .

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

29. Most of top management members and IT adoption decision makers are usually change resistant.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

30. I think making change on existing operation trend would call fall unprecedented risk of failure.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐

31. I would confidently suggest my organization to adopt the use of cloud computing solutions.

1 Strongly Disagree ☐ 2. Disagree ☐ 3. Neutral ☐

4. Agree ☐ 5. Strongly Agree ☐