ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

BENEFITS AND CHALLENGES OF CLOUD-BASED ENTERPRISE RESOURCE PLANNING (ERP): A CASE OF BANK OF ABYSSINIA

BY

DESALEGN LUNGA

A THESIS SUBMITTED TO THE DEPARTMENT OF PROJECT MANAGEMENT AS A PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS (MA) DEGREE IN PROJECT MANAGEMENT

June, 2021

ADDIS ABABA, ETHIOPIA

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CERTIFICATION

As members of the examining Board, We certify that we have read and evaluate the research project prepared by Desalegn Lunga entitled "Benefits and challenges of Cloud-Based ERP (Enterprise Resource Planning): A case of Bank of Abyssinia" and complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Dereje T/Mariam (Associate Professor). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Desalegn Lunga Sidamo

Signature _____

Date _____

St.Mary's University

Addis Ababa

June, 2021

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Table of Contents

Certification ----------i

Declaration----------ii

Acknowledgements----------iii

Table of Contents----------iv

List of Tables----------vii

List of Figures----------ix

List of Acronyms and Abbreviations----------x

Abstract----------xi

CHAPTER ONE----------1

INTRODUCTION----------1

1.1 Background of the Study----------1

1.2 Statement of the problem----------2

1.3 Research Question----------4

1.4 Objective of the Study----------5

1.4.1 General Objective----------5

1.4.2 Specific Objective----------5

1.5 Significance of the Study----------5

1.6 Scope of the Study----------5

1.7 Limitation of the Study----------6

1.8 Organization of the Research Paper----------6

CHAPTER TWO----------7

REVIEW OF RELATED LITERATURE----------7

2.1 Theoretical Review----------7

2.1.1 Definition of ERP----------7

2.1.2 Cloud Computing----------11

2.1.3 Cloud-Based ERP----------15

2.1.4 Cloud-Based ERP major vendors----------17

2.1.5 Cloud computing and ERP----------19

2.1.6 ERP on premise vs ERP in cloud----------20

2.1.7 ERP in Bank of Abyssinia ----------21

2.2 Empirical review----------22

2.2.1 Insight of Employees on Cloud-Based ERP considered are----------23

2.2.2 Benefits and challenges of ERP on cloud----------24

2.3 Conceptual Framework----------29

CHAPTER THREE----------33

RESEARCH METHODOLOGY----------33

3. Research Approach and Design----------33

3.1 Research Approach ----------33

3.2 Research Design----------33

3.3 Data type and sources ----------33

3.3.1 Primary data type and sources----------33

3.3.2 Secondary data type and sources----------34

3.4 Sampling size and sampling design----------34

3.4.1 Sampling design----------34

3.4.2 Sample size determination----------34

3.5 Data collection methods and tools----------35

3.6 Data Analysis and Presentation----------35

3.7 Validity----------36
3.8 Reliability----------36
3.9 Ethical Standards and Procedures----------37
CHAPTER FOUR ----------38
RESULTS AND DISCUSSION ----------38
4.1 Introduction ----------38
4.2 Participation Rate ----------38
4.3 Respondent's Demographic information ----------39
4.3.1 Gender Information of Respondent's ----------39
4.3.2 Age Information of Respondent's ----------39
4.3.3 Educational Status of Respondent's ----------40
4.3.4 Year of Service of Respondent's ----------41
4.3.5 Department of Respondent's ----------42
4.3.6 Position of Respondent's ----------43
4.4 Data Related to Insight of Employee's on Cloud-Based ERP Implementation -------43
4.5 Data Related to the Benefits of Cloud-Based ERP Implementation ----------49
4.6 Data Related to the Challenges of Cloud-Based ERP Implementation ----------58
CHAPTER FIVE ----------68
SUMMARY, CONCLUSION AND RECOMMENDATION ----------68
5.1 Summary of Findings ----------68
5.2 Conclusion ----------69
5.3 Recommendation ----------70
REFERENCES----------72
APPENDIX----------76

List of Tables

Table 2.1 Comparison of Conventional ERP and Cloud ERP----------20

Table 2.2 Traditional ERP and Cloud ERP Comparison----------21

Table 2.3 Benefits and Challenges of ERP cloud (a)----------25

Table 2.4 Benefits and Challenges of ERP cloud (b)----------26

Table 2.5 Benefits and Challenges of ERP cloud (c)----------27

Table 2.6 Summarized Benefits and Challenges of Cloud-Based ERP ----------28

Table 3.1 Reliability Statistics of insight of employees----------36

Table 3.2 Reliability Statistics of Benefits of cloud-based ERP ----------37

Table 3.3 Reliability Statistics of Challenges of cloud-based ERP ----------37

Table 4.1 Gender information of Respondent's ----------39

Table 4.2 Age information of Respondent's----------40

Table 4.3 Educational Status information of Respondent's ----------40

Table 4.4 Year of Service information of Respondent's ----------41

Table 4.5 Department information of respondents they are working ----------42

Table 4.6 Position information of respondents in the Company ----------43

Table 4.7 The insight of Respondents on Cloud-Based ERP ----------44

Table 4.8 Cloud-Based ERP Benefits regarding with Cost ----------50

Table 4.9 Cloud-Based ERP Benefits regarding with Security ----------52

Table 4.10 Cloud-Based ERP Benefits regarding with Customization ----------54

Table 4.11 Cloud-Based ERP Benefits regarding with Implementation ----------55

Table 4.12 Cloud-Based ERP Challenges regarding with cost ----------58

Table 4.13 Cloud-Based ERP Challenges regarding with Security ----------60

Table 4.14 Cloud-Based ERP Challenges regarding with Customization ----------62

Table 4.15 Cloud-Based ERP Challenges regarding with Implementation ----------63

List of Figures

Figure 2.1 Cloud computing models----------13

Figure 2.2 Cloud computing deployment models----------14

Figure 2.3 BOA ERP High level Architecture----------15

Figure 2.4 Conceptual framework of the study----------30

List of Acronyms and Abbreviations

BOA	Bank of Abyssinia
CIO	Chief Information Officer
CSP	Cloud service provider
ERP	Enterprise resource planning
HRD	Human Resource Development
HRM	Human Resource Management
IaaS	Infrastructure as a Service
IS	Information Systems
IT	Information Technology
MRP	Material Requirements Planning
NIST	National Institute of Standards and Technology
PaaS	Platform as a Service
PDAs	Personal Digital Assistants
ROI	Return on Investment
SaaS	Software as a Service
SMEs	Small and Medium-sized Enterprises
SOA	Service-oriented architecture

Abstract

In today dynamic world, organizations use Enterprise Resource Planning (ERP) to integrate business functions to the organization by joining the core process under a single database and it assist the enterprise to use the same information and transfer data between all functions. Many organizations in Ethiopia implement their ERP on premise. However, because of the high cost of dedicated and customized ERP software, cloud-based ERP is viable for organizations. Therefore, Bank of Abyssinia implemented its ERP system in cloud. The major objective of this study is to assess insight of employees on cloud-based ERP, the benefits and challenges of cloud-based ERP project implantation in the bank and to identify the gap and recommend the best solution. Data was collected from target group by means of questionnaires and interviews including observation. The data was analyzed with the help of SPSS version 20 and then presentation, interpretation and discussion was done by using table, percentage and mean values. The researcher used descriptive research method. Accordingly, the paper focused on insight, benefits and challenges of cloud-based ERP. Regarding insight of employees on cloud computing and cloud-based ERP, some of respondents were aware of it. But, the majority of respondents were not highly aware of cloud computing, cloud-based ERP and concepts related with them. The study also considered and identified that cloud-based ERP project implementation has many benefit and challenges related with cost, security, customization and implementation. Finally, the researcher discussed his possible recommendation and suggestions like: filling the knowledge gap of employees about cloud computing and cloud-based ERP, large organizations should know and understand, as there are more customization or modify their process to standard one For cloud-Base ERP project, the bank should integrate ERP with data ware house on premise and the bank should be certain to meet compliance issue not to put customer data in the cloud. Finally further study is necessary since it is a new technology and not practiced well in Ethiopia.

Keywords**: **ERP, Cloud-Based ERP, IaaS, PaaS, SaaS

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Enterprise Resource Planning (ERP) is critical commercial software implemented in all major enterprises and is a suitable instrument to manage the available resources, information and activities to complete the business process (Appandairajan, Zafar, & Madiajagan, 2017). According to (Raheela, *et al*., 2020) ERP system comprises manufacturing, distribution, accounting, financial management, human resources, project management, inventory management, services, transportation providing accessibility, maintenance, and visibility through the enterprise's consistency. Mohamed, Eman and Mervan (2017) state Enterprise Resource Planning (ERP) systems avail extensive assistances and services to the whole enterprise. ERP systems assist the enterprise to use the same information and transfer data between all functions' units inside and outside the enterprise. Using the same data and information across enterprise departments helps in many aspects and aims to attain their own objectives.

The term 'cloud' has been used to refer to platforms for decentralized computing- a cluster of servers, network, software, interface, etc. which are available for the user to execute a particular task. 'Computing' means the provision of this cluster as a service to the consumer where the customer can use it as and when needed. The customer is reassured from owning a big computing infrastructure and requiring upfront investment in it. Somewhat, it allows the consumer to use the same infrastructure owned by another customer at his/her own choice and pay only for the time it is being used. This pay-per-use model allows suitable and on-demand network access to a shared pool of configurable computing resources such as servers, storage, applications, and services (Mohsen, Sharmin, & Bilge, 2017). They also mentioned that there are different types of cloud deployment models, which are: Public Cloud, Private Cloud and Hybrid Cloud and Community Cloud and Cloud Service Model architectures: Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

Companies identify the need to adopt Enterprise Resource Planning (ERP) in order to be more competitive, efficient, and productive, also the adoption and implementation of an ERP system is an expensive and risky work. Now a days, cloud computing has become a feasible and competitive means by which most organizations, especially Small and Medium-sized Enterprises

(SMEs), can implement an ERP system in a short time frame and cost-effective way (Amir, Anand, & Hamed, 2018).

Appandairajan, Zafar, and Madiajagan, (2017) argue that ERP is delivered as a service and also it is included in the category of SaaS. Because of the high cost of dedicated & customized ERP software, ERP in the cloud will be commercially viable for the small and medium sized companies (SME). For large organizations, the customization level has more task and hence the ERP on the cloud needs to be modified a lot to suit their requirement. This is an important limitation for adopting Cloud ERP for large organizations.

In today's extremely competitive business environment, the objective for organizations is to emphasis on their resources and efforts on what they can get best from them and pass the supportive services to third parties, who are more specialized. The world's economic model in IT today is moving from "buy and own" (on-premise) to a subscription based, pay per-use (cloud-based) model. The journey from traditional (on-premise) ERP to cloud-based ERP could help organizations to achieve their costs efficiency and improve their operations. Thus, deploying ERP software in a hosted or on-demand environment could support organizations to improve their business processes and continue competitive (Pablo, Oswaldo, & Sergio, 2017).

Therefore, all the above theoretical and practical problems encountered, a continuous research need on cloud-based ERP implementation project that affects the entire organization with regard to cost, security, customization and implementation. Particularly, the researcher initiates to perform this paper by focusing on the investigation up on the insight of employees, benefits and challenges while implementing cloud-based ERP. In doing so, the research is to answer the specified major research questions mentioned in this research paper.

1.2 Statement of the problem

Grabski, *et al*. (as cited in Karim, 2014) stated the emerging of cloud computing has a significant impact and radically change the ERP environment. The data and the application are no longer exist on-premise; rather a cloud provider provide access to the allocation which can be customized to meet the user's needs and the cloud provider also hosts the data securely somewhere on the Internet.

David Linthicum, chief cloud strategy officer at Deloitte Consulting (as cited in Ben, 2019) argued that it will be very hard for organizations to gain the value of the upgrade, if cloud and ERP modernization aren't part of a larger digital transformation strategy. David Linthicum also added that "There needs to be a holistic vision that considers the additional business agility, the strategic use of data and analytics, and opportunities for removing a lot of the manual processing that is still part of so many enterprises today. These capabilities can ultimately help companies better defend themselves against competitors and changes in the marketplace" (Ben, 2019; p.2). Ben, also added that innovative executives realize substantial business and technical value linking ERP upgrades with moves to the cloud. Whereas the potential is huge, ERP modernization has traditionally been complex, time-consuming, and resource-intensive. These projects still need complete planning, but IT and business staff can smooth the way with the right cloud platform.

A study for ERP implementation on-premise in Mesfin Industrial Engineering Pvt. Ltd. done by Abiot, & Jorge, (2012) was identified that there were some project risks: unavailability of reliable IT hardware and infrastructure both before and during the implementation and maintenance difficulties, which can avoid by implementing cloud-based ERP are:.

Moreover IT executives understand that the cloud's on-demand ability provides new resources in a fraction of the time it may take to purchase, implement, and test additional capacity in an on-premises data center or at a managed service provider, which could seek weeks. The cloud's on-demand capabilities deliver new resources in a fraction of time. The bottom line: business units stay productive, optimize costs, and can quickly react to new market opportunities. Additionally, by contracting with cloud providers for infrastructure services, enterprises reduce the pressure on internal IT team related with managing complex ERP applications. With cloud, enterprises aren't responsible for maintenance contracts, patching servers, capacity planning, and storage elasticity and has made technically bright staff members to focus on more strategic projects for the business.

Because of the cost of ERP systems on premise, they are not commonly used in small and medium-sized enterprises. A cloud-based ERP platform is suggested to meet the low-cost needs for these enterprises. This platform uses SOA (service-oriented architecture) to send message between different modules. It takes advantage of elasticity, high reliability, and high scalability of cloud compute technology (Taizhi, Jun, & Yong, 2018).

Beside its benefits, Karim, (2014) mentioned that implementing or updating an ERP on premise is very expensive and problematic (need to renew the technical infrastructure, to redesign business processes, etc.). However Leading cloud providers give service level agreements with availability levels higher than 99% plus capabilities for live upgrades and rapid recoveries (Ben, 2019).

Hence, the main BOA ERP project goal is implementation of ERP application that suite at BOA to support its strategic objectives and to automate its support processes: namely, Human Resource Management, Finance and accounting, Procurement (Supply chain management), Strategy Management (Strategy Planning and Monitoring) which was included in the RFP but not include in the contract document and same time not implemented. The bank's support processes were managed by in-house developed legacy systems. However those legacy systems could not provide the required information timely and communally. So it was mandatory to implement ERP system to facilitate back office processes. The bank also decided to implement cloud-based ERP system, to have the advantage of it and to avoid the disadvantage of ERP on premise.

Meanwhile, Cloud computing and Cloud-Based ERP adoption in Ethiopian financial institutions is not a practice at the time this study was done, however most organizations and financial institutions have implemented ERP system on-promise. Hence following to ERP in cloud implementations, researches have been conducted internationally in order to realize practices, benefits, challenges and the features of the adoption. As far as the researcher knowledge is concerned, it is very hard to find out a research done on ERP in cloud in Ethiopia. This study, therefore, examined the benefits and challenges of ERP in cloud.

1.3 Research Question

In this regard, the aim of this paper is to identify the various benefits and challenges to the implementation of cloud-based Enterprise Resource Planning (ERP) software system in BOA. Specifically, this paper tried to answer the following:

1. What was the insight of employees on Cloud-Based ERP Implementation?
2. What are the major benefits of Cloud-Based ERP project implementation to address the areas that the bank needs to be improved?
3. What were the major challenges that the bank faced in implementing Cloud-Based ERP Project?

1.4 Objective of the Study

1.4.1 General Objective

The general objective of this study is to examine the benefits and challenges of Cloud-Based Enterprise resource planning implementation (ERP) project in Bank of Abyssinia.

1.4.2 Specific Objective

The specific objective of the study is:

1. To assess the insight of employees on Cloud-Based ERP Implementation;
2. To identify the benefits of Cloud-Based ERP system implementation in connection with addressing the areas that the bank needs to be improved;
3. To identify the challenges and problems which affect the Cloud-Based ERP project implementation and to recommend possible solutions;

1.5 Significance of the Study

This study has significant contribution to Small and Medium-sized Enterprises (SMEs) and large organizations those; which wants to adopt Cloud-Based ERP as a project. It may specially help financial institutions which wants to implement their ERP project in cloud environment. The study may help institutions to identify benefits, challenges and gap in the project, why they need to deploy their ERP in cloud and what are the benefits, how Cloud-Based ERP is used for competitive factor. It may also help Vendors, Implementers/Consultants, and Scholars/Academicians to be aware before implementing such project in Ethiopian context.

Finally, to produce document which is used as a reference material for further research with finding and possible recommendations.

1.6 Scope of the Study

The study focuses on the benefits and challenges of Cloud-Based ERP Project implementation in Bank of Abyssinia. Specifically it focuses in the process of the cloud-based ERP project related with cost, security, customization and implementation of its benefits and challenges. It narrows down the study on the support processes of the bank, which are: Human Resource Management, Finance and accounting and Procurement (Supply chain management). The study is looking into

the perceptions of both management and employees; which are Business and technical team members and participated in the ERP project namely, Project management, Accounts and Finance, Procurement, Facilities management, HRM, HRD, Infrastructure Management, and Application Management.

1.7 Limitation of the Study

In spite of the intensive efforts, the researcher assumed that there was a quite limitation so as to finalize the paper. For instance, the feedbacks received from the respondents were based on their limited experience only related with their department's involvement. Getting information from cloud provider, ERP vendor and project implementer was not easy, because COVID-19 pandemic and they were working online from abroad. Besides this, not getting fast and timely qualitative and quantitative collection of data which is due to the interaction with the end-users, support-users and managerial staff involved in key modules of the ERP implementation provided not an ample information related to processes and challenges experienced by active users of the system, during distribution of questionnaires through paper print out or SmartSurvey to get primary data it might take long time and even the respondents can also reluctant to provide relevant information and in this case the researcher encountered to collect the questionnaires as well as the failure of few respondents to return questionnaire.

1.8 Organization of the Research Paper

This research paper includes five chapter. Accordingly chapter one includes the introductory part and contains: background of the study, background of the organization, statement of the problem, research questions, objectives of the study, significance of the study, scope of the study and limitation of the study; whereas chapter two includes: related literature review and then chapter three includes: research methodology; then chapter four includes: main part of the paper and in this section data presentation, analysis and interpretation are conducted. Finally in chapter five summary of findings, conclusion and recommendation are presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Theoretical Review

The speed and agility of regulations, customer behavior and technology in today's competitive environment, the future banking is not expected to continues as of yesterday. New technologies will transform banking industry together with benefits and challenges. In fact cloud computing is shaping future of banking and has quickly become mainstream in banking, with most banks look for the optimal of mixing traditional IT, public and private cloud.

2.1.1 Definition of ERP

ERP is defined as the technology that brings the integrated business function to the organization by joining the core processes under a single database (Mutongwa & Rabah, 2013). Ahmed & Moutaz, (2012) explains ERP systems can be traced back to the early accounting and inventory systems in the 1960s. The latter systems have evolved during the 1970s to material requirements planning (MRP) systems. MRP systems have been heavily used within manufacturing companies in order to handle production and inventory planning operations and through the years, ERP systems have evolved and advanced since the emergence of material requirements planning (MRP) and manufacturing resource planning (MRPII) systems. The primary difference between an ERP system and its predecessors is that ERP spans the whole organization and business function processes, not only the production related operations.

Mutongwa & Rabah considers that ERP now is go through the revolution that will make it highly integrated, more intelligent, more collaborative, web-enabled, and even wireless. The ERP system has vulnerability and high confidentiality in which the security is critical for it to operate. Armand & Roger, (2016) explained that organizations facing the increasing demand from the market, and they need to anticipate their customer's needs, to establish customer loyalty and advance their business. However, especially African organizations are expected to be unable to satisfy their customers. They also seem to be some barriers that hamper their competitiveness in local and global markets. To overcome these barriers and become more competitive, a solution might be the adoption and implementation of robust information systems (IS) like Enterprise Resource Planning

(ERP). They added that most developing countries faced low economic capabilities, inadequate infrastructure, inadequate human skills, and a particular organizational and environmental culture with ERP systems complexities and risk related issues can play difficulty role for ERP project implementation. Because of these problems, ERP systems and their corresponding implementations must change to cope with the new trends in technology e.g. SOA, cloud, in-memory analytics, social networks, and crowd sourcing. (Ahmed & Moutaz, 2012).

According to Mohamed, Eman and Mervat, (2017) ERP systems encountered a lot of development and upgrade processes to improve its functionality and increase the integration capabilities. The vendors of ERP like Oracle, SAP, PeopleSoft, J. D Edward, etc. developed different modules to cover and support all functional units of the enterprise. They identified there are two type of traditional ERP systems, which are on-premise ERP and hosted ERP. Each ERP module is designed to handle specific business function and helps to access the data and support processes for each functions to do their job. Each module plugs into the ERP system and the system provides a single source of data and it is possible to add new modules. We can consider the ERP system the toolbox, the modules are different tools in the box, which have specific uses (Ian, 2020).

Ian also explained that the modular design of ERP allows it to handle the unstable needs of a business and it is a big reason, this software has become pervasive. An organization can buy only the modules relevant to its business model, operations and key challenges. Later the organization can add ERP modules to address new needs or challenges as the organization grows. The author addresses the following 13 major ERP modules.

1. **Finance:** The finance and accounting module is one of the main ERP modules, because it allows businesses to know their existing financial state and future position. Important features of this module include tracking accounts payable (AP) and accounts receivable (AR) and handling the general ledger. It also creates and stores crucial financial documents like balance sheets, payment receipts and tax statements.
2. **Procurement:** The procurement module, also known as the purchasing module, used by organizations to secure the materials or products it needs to manufacture and/or sell goods. On the benefit of this module Companies can possess a list of approved vendors in this module and tie those suppliers to certain items. The module can automate requests for a quote, then track and analyze the quotes that come in.

3. **Manufacturing:** The manufacturing module benefits manufacturers plan production and facilitates them to know, if they have everything they need for planned production runs, like raw materials and machinery capacity. Throughout the manufacturing process, it can inform the status of goods-in-progress and help companies track actual output against forecasted production and capturing a real – time information on items.
4. **Inventory Management:** The inventory management module supports inventory control by tracking item quantities and location towards to individual SKUs (Stock Keeping Unit). This module gives a complete picture of not only current but also incoming inventory, through an integration with the procurement module. It helps to manage inventory costs, to handle sufficient stock, can weigh sales trends against available product, and it can help to prevent stock outs and delays.
5. **Order Management**: An order management module tracks orders from receipt to delivery. It passes all orders to the warehouse, distribution center or retail store after customers place them and tracks their status as they're prepared, fulfilled and shipped to the customer. This module averts orders from being lost and increases on-time delivery rates to keep customers satisfaction and avoid unnecessary expenses for expedited shipping.
6. **Warehouse Management**: A warehouse management module can competently guide warehouse employees through all warehouse processes based on the layout of the facility, from put away when shipments reach to picking to packing and shipping. The warehouse management module can provision different picking strategies like batch picking, wave picking and zone picking based on which is utmost effective for a given business, and some modules can suggest employees the most effective pick path.
7. **Supply Chain Management**: A supply chain management module capture each step in the movement of supplies and goods during the supply chain, from sub-suppliers to suppliers to manufacturers to distributors to retailers or consumers. It can also handle any materials or products returned for refund or replacement. Supply chain management can include a wide range of modules like procurement, inventory management, manufacturing, order management and warehouse management.

8. **Customer Relationship Management (CRM):** It retains all customer and prospect information. That comprises the company's communication history with a person—the date and time of calls and emails, for example—and their purchase history. A CRM increases customer service because employees can simply access all the information they need when working with a customer. More robust CRM modules may provision customer segmentation (enabling more targeted marketing) and advanced contact managers and reporting tools.
9. **Professional Service Automation (Service Resource Management):** It allows an organization to plan and manage projects. Services-based businesses often use this module. The application tracks the status of projects, managing human and capital resources during the project, and allows managers to approve expenses and timesheets.
10. **Workforce Management**: It is similar to a human resource management module but is designed for companies with more hourly than salaried employees. It can monitor workers' attendance and hours and measure things like employee productivity and absenteeism. Payroll could also include in this module.
11. **Human Resource Management (HRM):** A human resource management (HRM) or human capital management (HCM) module usually includes all the features of workforce management application and provides additional capabilities. This popular module has detailed records on all employees and stores documents like performance reviews, job descriptions and offer letters. It handles not only hours worked but also paid time off (PTO)/sick days and benefits information.
12. **Ecommerce**: some ERP vendors offer an ecommerce module for businesses that want to sell online. This module helps companies to swiftly promote a business-to-business (B2B) or business-to-consumer (B2C) ecommerce website. Known commerce applications contain user-friendly tools that let employees to easily add new items, update product content (item descriptions, titles, specs, images, etc.) and change the look and feel of the website. If ecommerce application is integrated with other ERP modules, all payments, order and inventory information from ecommerce module is registered into the shared database.
13. **Marketing Automation**: Certain software providers have developed a marketing automation module. A marketing module manages marketing operations across

digital channels like email, web, social media and SMS. It can automate email sends based on promotion rules and has advanced customer segmentation features, so customers only receive relevant messages.

2.1.2 Cloud Computing

The National Institute of Standards and Technology [NIST], (2014) in the USA defined cloud computing as it is a model for allowing convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be quickly provisioned and released with minimal management effort or service provider support.

NIST, (2014) also mentioned four essential characteristics of cloud computing service, three cloud computing models and four types of cloud deployment models:

Essential characteristics of cloud computing service are:

- **Broad network access:** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and personal digital assistants [PDAs]).
- **Resource pooling:** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the subscriber generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or data center). Examples of resources include storage, processing, memory, network bandwidth, and virtual machines.
- **Rapid elasticity:** Capabilities can be rapidly and elastically provisioned, in some cases automatically, to quickly scale out and rapidly released to quickly scale in. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be purchased in any quantity at any time.
- **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 (e.g., storage, processing, bandwidth, and active user

accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the used service.

Cloud computing models are:

Software as a Service (SaaS): The capability provided to the consumer to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a Web browser (e.g., Web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings, **Platform as a Service (PaaS):** The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations, and **Infrastructure as a Service (IaaS):** The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over the operating systems, storage, deployed applications, and possibly limited control of select networking components (e.g., host firewalls).

Figure 2.1 Cloud computing models (Source Raheela et al., 2020)

Cloud computing deployment models are:

Private cloud: The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise, **Community cloud:** The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise, **Public cloud:** The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services, and **Hybrid cloud:** The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

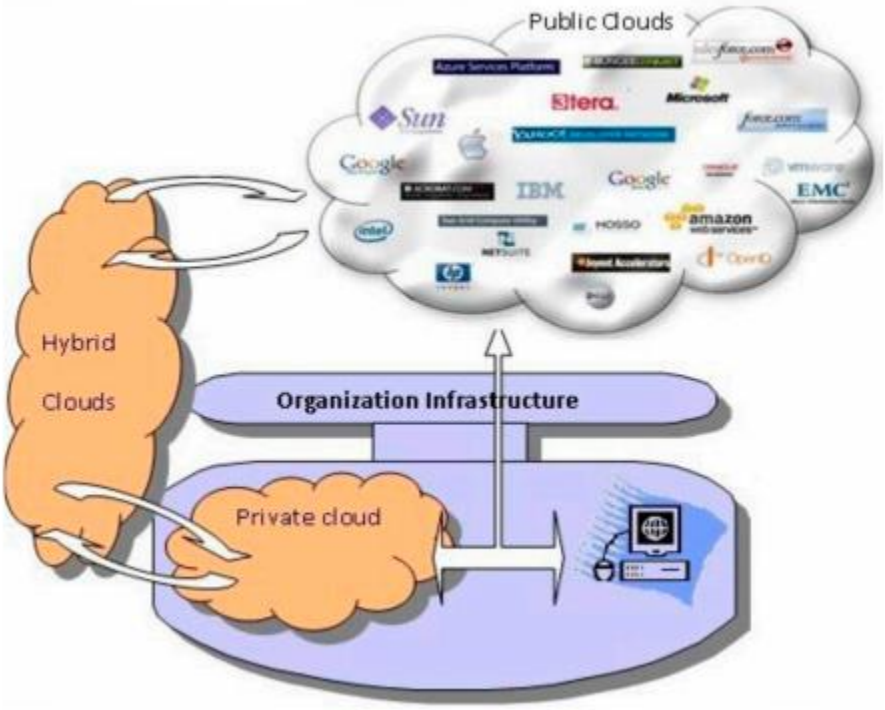

Figure 2.2 Cloud computing deployment models (Source Raheela et al., 2020)

Regarding to cloud computing model, BOA used and licensed for all three models for its cloud computing infrastructure management. Licenses are purchased for oracle fusion service (SaaS) and oracle PaaS and IaaS Universal Credit for Paas and IaaS.

Regarding to cloud computing deployment model BOA used the hybrid cloud type. The ERP is implanted in cloud and integrated with two on-premise systems. The first one is EBS payroll, which is found on premises and helps to process payroll activities. Data from fusion is extracted and automatically inserted into EBS payroll system. The second system is T24 core banking system, which get data from fusion through SFTP server and it is file based integration.

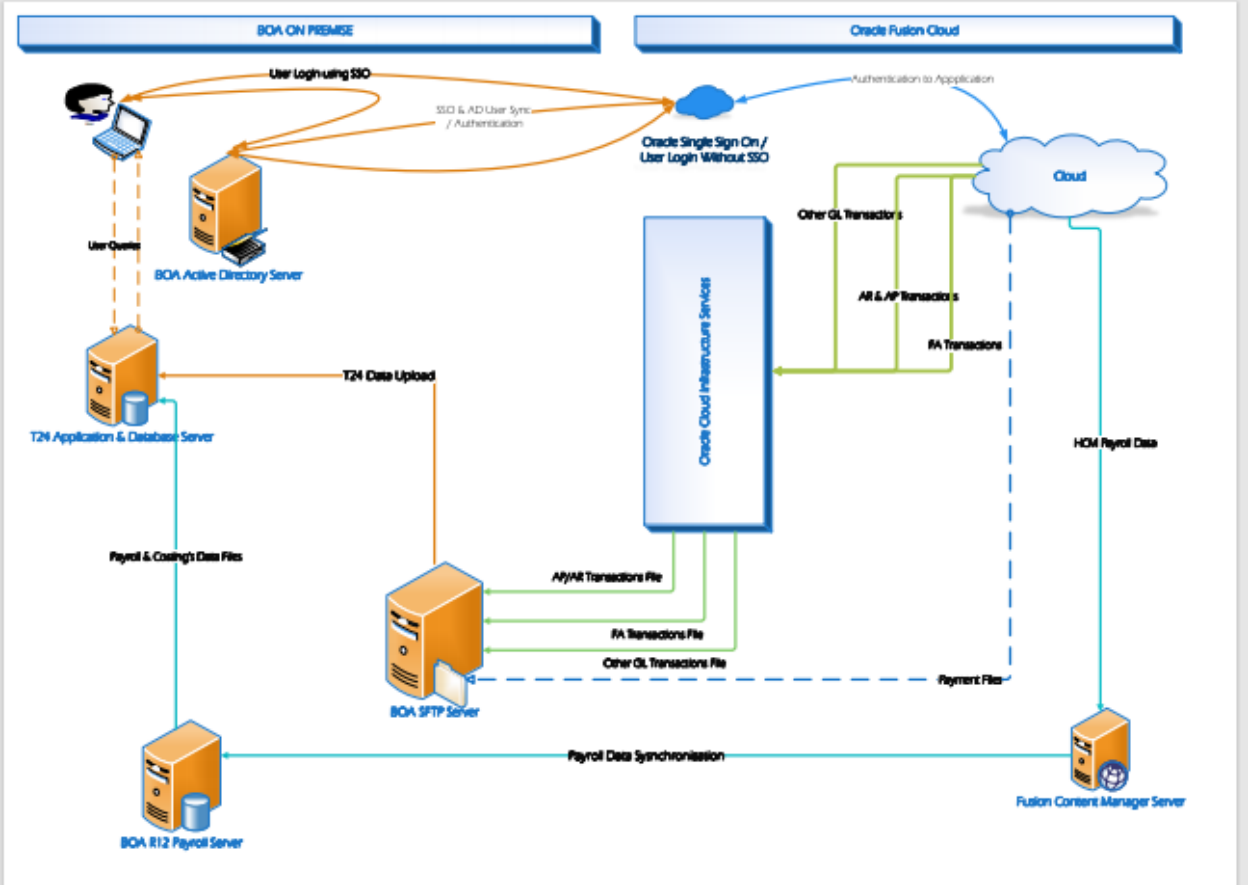

Figure 2.3 BOA ERP High level Architecture (Source BOA bidding document 2019)

2.1.3 Cloud-based ERP

Cloud computing is a computing model which is available over the internet and provides scalability, reliability, availability and low cost of computer resources. Deploying and running ERP systems over the cloud offers great advantages and benefits, in spite of its many difficulties and challenges (Mohamed, Eman, and Mervat, 2017). They added that modern ERP systems are available for use over the internet. It improved with ecommerce capabilities and the ability for integration and collaboration with suppliers, partners, customer portals, and improved tracking of incoming raw material and outgoing final products to extend the visibility and control inside and outside the enterprise.

Currently, cloud computing, software as a service (SaaS), and open architectures are gaining a considerable attention in IS literature. The emergence of cloud computing has enabled many companies with a handy and on-demand network access to share a bundle

of resources. The resources could include networks, servers, data storage devices, applications (e.g. ERP), etc. (Ahmed and Moutaz, 2012).

The cloud is a major player of turning an ERP upgrade into a business opportunity. A move to the cloud can accelerate digital transformation and unlock business benefits like faster time to market for new products and services and moving internal information technology (IT) staff to high-value business advantages (Ben, 2019).

Linthicum (as cited in Ben, 2019, p.2) discussed the causes of ERP to cloud is that "Everybody is in danger of being disrupted today, and executives need to understand how the cloud can help them use digitalization to do business in new ways," and he said that "The cloud can preempt disruption caused by competitors and help companies to become disruptors themselves."

He argued that Open-minded executives are viewing how a modern ERP platform can unlock business value in three important areas for large enterprises.

1. **Real-time insights replace canned reports to optimize ROI:** With older ERP platforms creating custom reports often requires hours or even days, which means the results may be outdated by the time they're presented. However with cloud ERP real-time insight is possible.
2. **Optimized inventories reduce costs and improve efficiency:** Cloud ERP used to achieve the company's demands for better financial management, optimized raw materials purchases, and closer tracking of customer orders.
3. **Faster innovation can gain a competitive edge:** A quickly response is necessary to stay competitive during volatile times for businesses. Everything today is going digital, so if a CIO isn't leading business transformation, the organization is going to be out of market at some point in time.

As stated by ben, (2019) ERP upgrading has conventionally been complex, time-consuming, and resource-hungry. These projects still require broad planning, but IT and business staff find right cloud platform. He explained foundational and advanced cloud capabilities for digital transformation and discussed as **Foundational cloud capabilities are:** Reduced capital expenditures, Optimized resource allocation, and Flexible scalability and on-demand IT service and **Advanced cloud capabilities are:** Table stakes, Actionable insights**,** Ongoing improvements in cyber security**,** Enhanced business

continuity and disaster recovery capabilities**,** Technical expertise**, and** Continues technology innovation.

Ben suggests five steps to boosting business values trough ERP upgrades to cloud

Step 1: Public or Hybrid: choose the right cloud for your ERP, Step 2: Build a solid business case for moving ERP to cloud, Step 3: Asses Implementation risks, and steps to minimize potential problems, Step 4: Evaluate Public cloud providers and their capabilities for digital transformation and ERP support, and 5th step: Create a change management plan that minimize disruption.

2.1.4 Cloud-based ERP major vendors

According to Panorama Consulting Group (2020) potential buyers of ERP software have hundreds of systems to choose from. They have identified top 10 list of ERP software systems in their report.

1. **SAP**: Most of SAP's solutions can take a relatively long time to implement, the vendor does offer out-of-the-box processes built specifically for an organization's needs. Both enterprise-sized and midmarket companies make up a large portion of SAP's customer base. The SAP systems featured in the report include SAP S/4HANA and SAP Business ByDesign.
2. **Oracle:** Oracle provides a set of core applications and industry-specific applications that can be leveraged in basic and advanced ways. In 2016, Oracle acquired NetSuite, an application that was born in the cloud and provides solutions for businesses of all sizes and industries. The featured Oracle systems include Oracle ERP Cloud and Oracle NetSuite.
3. **Microsoft:** Microsoft continually develops new data centers to support its cloud capabilities, including its Dynamics 365 suite. Microsoft's D365 solutions have been gaining market share, which is in part due to the solutions' wide variety of pre-configured processes. The systems featured in the report include Microsoft Dynamics 365 Finance and Microsoft Dynamics 365 Supply Chain Management.
4. **Infor**: Infor's recent focus has been on its industry-specific cloud ERP solutions designed for enterprise and SMB organizations. These solutions are built with pre-configured business processes and setups. The Infor systems featured in the report are Infor's industry CloudSuites.

5. **IFS**: The IFS product is tailored for the aerospace & defense, utilities & resources, construction & infrastructure, manufacturing and service industries. It allows customers to pick and choose the specific functionality they need and add more as needed. IFSs' core modules include everything from customer relationship management to finance to supply chain management.
6. **Epicor:** Epicor was acquired by CD&R, a US-based private equity firm. The firm plans to expand Epicor by building cloud-based products with a SaaS model. This will give Epicor increasingly advanced functionality in the cloud, including embedded EDI and advanced warehouse management. The featured Epicor products include Epicor E10 and Epicor Prophet 21.
7. **Acumatica:** Acumatica was born in the cloud. It is a cloud-based ERP solution for small to mid-sized businesses. Acumatica's pricing model offers flexible licensing and deployment options and is easily expanded for a growing organization. The Acumatica ERP system includes integrated functionality for accounting & financial management, customer relationship management, distribution & manufacturing planning management, retail, eCommerce and field service.
8. **SYSPRO**: SYSPRO is a global, independent provider of industry-built ERP software designed for manufacturers and distributors. The SYSPRO solution can be deployed on-premise, in the cloud or accessed via a mobile device. The SYSPRO ERP system provides advanced functionality for outbound distribution control activities as well as inbound supply chain management.
9. **IQMS**: IQMS provides a single solution for managing and monitoring the entire manufacturing process. It is ideal for discrete and process manufacturers. In addition to ERP, IQMS has an integrated manufacturing execution system that can interface with shop floor programmable logic controllers.
10. **Salesforce**: Salesforce provides cloud-based CRM software and a platform that is the basis for additional solutions, including FinancialForce and Rootstock. FinancialForce is an ERP suite providing professional services automation, while Rootstock is an ERP solution designed for manufacturers, distributors and supply chain organizations.

2.1.5 Cloud Computing and ERP

Petra & Femi, (2011) pointed out that ERP systems support the core processes and have to reveal the organizational structure of a company they come in many different sizes and specializations, go through a significant customization process to fulfill the companies' specific requirement, and often need to be electronically connected with other software systems (e.g. legacy systems or partner systems). The feasibility of such adaptations need to be considered before the decision for cloud computing is taken and it is interesting to examine different forms of operating a complex business software system (such as an ERP system) in a cloud environment.

When looking at cloud computing as an operations model for ERP systems the following parties should be in mind:

1. User company (the company that uses the ERP system for their daily business processes)
2. ERP vendor (the company developing and selling licenses for the software)
3. ERP implementation partner (the company that supports the user company with the implementation), and the
4. Cloud service provider (the company running the cloud environment).

The authors agreed that most books on cloud computing for ERP show an overview of current offering and divide them into three different levels:

1. **IaaS for ERP systems**: using IaaS for the operation of an ERP system the user company "rents" the computing resources from a cloud service provider. In this setting the user company can still freely choose the ERP vendor of the ERP system and buy the licenses for the software. Vertical integration happens when the ERP vendor offers IaaS themselves and become a cloud service provider.
2. **PaaS for ERP systems**: They argue that the second level of the cloud model is not really appropriate for the provision of an ERP system. Platform services provide resources in a pre-defined software environment that are attractive for software development, testing, or the distribution of software but not for the real operation of an ERP system.
3. **SaaS for ERP systems:** In this model the ERP system is provided by the cloud service provider. The roles of cloud service provider and ERP vendor are merged in this setting (vertical integration).

2.1.6 ERP on premise vs ERP in cloud

There are certain elements which drive the adoption of cloud computing services (from traditional to cloud ERP), among which are cost, flexibility and scalability (Petra and Femi, 2011). As stated by Appandairajan, Zafar, and Madiajagan, M. (2017) there are dominant factors which leads ERP from premises to cloud and shown as follows in the table 2.3

Table 2.1 Comparison of Conventional ERP and Cloud-Based ERP

Conventional ERP	Cloud ERP
High capital expenditure	No capital expenditure
Direct & Indirect investment	No investment
Ballooning costs	Low-cost subscription model
Long immplementation time	Implementable in weeks
Rigid	Scalable
Limited Access	Any time. any where acess
Upgrade at extra cost	Free upgrade
Limited licensing	Flexible licensing

In some of articles there is a tendency to discuss only advantages of cloud-Based ERP. However according to Elias, F. and Shahriar, M. (2012) cloud ERP has lots of problems in security and privacy issues by now and because of being a new technology there might be also a lot of problems in the future. In this regard they have discussed the following comparisons between Traditional ERP and Cloud-Based ERP.

Table 2.2 Traditional ERP and Cloud-Based ERP Comparison

Factor	Traditional ERP	Cloud-Based ERP
Deployment	Local Server	Cloud Server
Reduced server costs	Low costs	High costs
Reduction in IT staff	None	High
Defining business flow	Defined by ERP developer and business organization specific.	Define by both, ERP developer and Business organization.
Implementation costs	High	Low
Ongoing costs	Relatively high	Low
Control over ERP	Easily controllable	Relatively tough to control.
Customization	Not open for business organization	Open for business organization
Support costs	Relatively high	Low
Integration	Dependent on vendor	Can be supported centrally
Licensing costs	High	Low
ERP module update	Costly	Low cost
Internet needed	No	Yes
Version controlling	Complex	Easy

2.1.7 ERP in Bank of Abyssinia

BOA was used some legacy systems for its Back office or support processes, for example payroll for HRM and Core banking system for partially for Finance and Accounting process. Except those system, most support processes were done manually. To this effect, BOA was looking for a suitable software solution which is readily deployable with a rare customization and contains all the security features that are needed to protect the

confidentiality, availability, integrity of information and non-denial of the transactions carried out through ERP. Therefore, the bank intended to implement an Enterprise Resource Planning (ERP) system designed for automating its support process; namely Human Resource Management, Finance and Accounting and Procurement (Supply Chain Management); that meets the Bank's technical and non-technical requirements. The scope of those modules in this project was:

1. Finance and Accounting process: The activities under this division were partially supported by the core banking solution. whereas fixed asset administration was handled manually, so the proposed ERP system in general, and the finance module in particular, was expected to handle a wide range of activities including automatic inter-branch as well as head office account settlement, tangible and intangible asset management, and fund management activities.

2. Human Resource Management process: Which is also mainly handled manually except a solution used for payroll processes. Hence the Bank needed the ERP system to automate HR Processes end to end, from recruitment to retire.

3. Procurement (Supply Chain Management): This process is responsible for facilitating the acquisition and distribution of fixed and non-fixed assets, stationary and other items that are useful in running the bank's day to day activities. It also includes the contract administration and project management of different construction and IT projects. Additionally encompasses the management of fleet to be supported by the automated systems as BOA has 250+ vehicles and was managed by manually.

As per the contract between the Bank and the implementer TransSys, all those modules, mentioned above are implanted and go live. The ERP is cloud-based and used SaaS for ERP system level.

2.2 Empirical review

The result of implementing ERP system could be in the form of higher quality, reduced time-to-market, and improved communications, supporting in decision making, shortened lead times, higher productivity and lowered costs. In this regard Lowered costs can help the enterprise to improve customer service and increase sales and market share as well as profits. Through cloud

computing Modern ERP systems are built for use over the internet and it enhanced with ecommerce capabilities and the ability for integration and collaboration with suppliers, partners, and customer portals (Mohamed, Eman, and Mervat, 2017).

To list out the benefits and challenges of cloud-based ERP, we should know the most important factors, which drive the adoption of cloud-based ERP (Appandairajan, Zafar, and Madiajagan, 2017). In this study the researches considers four categories of factors, which are: cost, security, customization and implementation.

2.2.1 Insights of Employees on Cloud-Based ERP Considered are

1. **Cloud computing**: The delivery of computing services including servers, storage, databases, networking, software, analytics, and intelligence over the Internet by cloud service providers.

2. **Security on Cloud-based ERP**: It is critically important having the right level of security for any size of enterprises. In reality especially midsized business and even large organizations typically have a limited IT staff to take care of the infrastructure with a full time IT security staff. However cloud ERP presents a more secure option for 24x7 to make sure all security updates and procedures are maintained than on-premise deployment.

3. **The difference between cloud-based ERP and ERP on premise:** Cloud-Based ERP is the deployment of ERP in cloud infrastructure provided by cloud service provider. Whereas ERP on premise is the deployment of ERP in the organizations own infrastructure and their IT staff.

4. **Cloud-based ERP modules implemented in the bank**: According to the contract signed by BOA and the implementer TransSys all three module: Human Resource Management, Finance and Accounts, and Procurement (Supply Chain Management) are implanted and go live.

5. **How to access ERP modules using your mobile devices and smartphone**: Cloud-Based ERP can be accessed through mobile devices, such as mobile phones and tablets. Users typically access the system over the Internet using a standard browser or dedicated mobile apps.

6. **Which enterprises size (small, medium or large) is most appropriate for cloud-based ERP**: Cloud-based ERP is more suitable for small and medium size enterprises because of high cost and complexities of implementing it on premise. And it is also possible to use by large organizations, but it needs more customization.

7. **Cloud-based ERP Offer On-Demand and Self-Service Flexibility**: Since Cloud-based ERP is deployed in the cloud environment and any one can access the program on-demand from any connected computer through internet. The service is able to dynamically scale to meet the needs and flexibility requirement of the organization.

8. **Complexities of Cloud-based ERP:** Besides its benefits, cloud-based ERP has some complexities like integrating the traditional-ERP system with cloud-based ERP systems.

9. **Cloud-based ERP system implementation for financial institutions for their ERP implementation**: Cloud-Based ERP allows financial organizations to deploy ERP system without substantial startup cost, especially those didn't have complete infrastructure for their ERP.

10. **Cost of Cloud-based ERP:** Before doing any capital investment, enterprises should understand the total cost of ownership by analyzing how much will be paid for a product throughout the product lifetime.

11. **Compliance issue on Cloud-based ERP implementation**: Compliance issues enforcing the rules that implement the policies defined in the regulations. Government and state regulations are mandatory while industry regulations are suggestions. Regulations are different from country to country but in many cases they use almost identical policies customized to their local needs.

2.2.2 Benefits and challenges of ERP on cloud

Different researches have done studies on cloud-based ERP at different times by different authors. And they have discussed some benefits and challenges of Cloud-Based ERP. Mohamed, Eman, and Mervat have stated the benefits and challenges of Cloud-Base ERP as shown by table 2.3:

Table 2.3 Benefits and Challenges of Cloud-Based ERP (a)

Benefits	**Challenges**
Lower upfront cost	Subscription expenses
Lower operating cost	Security risks
Rapid implementation	Performance risks
Scalability	Customization and integration limitations
Focus on core competencies	Strategic risks
Using advanced technology	Compliance risks
Rapid updates and upgrades	Loss of IT competencies
Improved accessibility, mobility and usability	Functionality limitations
Easier integration with cloud services	SLA issues
Improved system availability and disaster recovery	Sensitivity of the information
Cost transparency	Control over cloud ERP
Sales automation	Hidden costs in the contract
Using security standards	Loss of technical knowledge
Free trails	Migration between CSPs
	Need for ERP as service standards
	Knowledge about the cloud
	Startup support
	Organizational challenges
	Choosing between cloud ERP systems

Appandairajan, Zafar, and Madiajagan, (2017) are also identified in their study the benefits and challenges of Cloud-Based ERP as shown by table 2.4.

Table 2.4 Benefits and Challenges of Cloud-Based ERP (b)

Benefits	**Challenges**
Lower cost of ownership	Bandwidth & Traffic management through Internet
Ease of implementation	Guarantee on the Average Network Latency
Lower upfront cost	Resource Scalability on intermittent and or continuous increase in Demand
Shorter time to go live	Risk of Open Access
	Security (Encryption, Access & identity management, Network security, Industry Secrecy)
	Physical location of the ERP system Data
	the Business model for ERP delivery
	lack of industry standards in providing the SaaS
	Compliance

Amir, Anand, and Hamed, (2018) also put benefits and challenges of Cloud-Based ERP as shown by table 2.5.

Table 2.5 Benefits and Challenges of Cloud-Based ERP (c)

Category	Benefits	Challenges
Cost	Known costs over time	High cost of ownership over the system's entire life cycle
	Cheap initial investment	
	limited investments on hardware (e.g., infrastructure, server)	
Security	Data is stored on vendor's servers, security is usually in the hands of the vendor	With data security being in the hands of vendors, its safety cannot be totally guaranteed. Furthermore, the prospect of this may not go down well with some organizations.
	Prospects of continued stability and constant updates from vendor as a result of little customization that is required.	
Customization	Ease of customization due to its flexibility	Little customization options exist.
Implementation	Requires less time for Implementation	Lesser implementation time may be a result of less customization options.

The benefits and challenges in this research consider four categories of factors (cost, security, customization and implementation), according to the three researchers (Amir, Anand, and Hamed, 2018), (Appandairajan, Zafar, and Madiajagan, 2017), (*Mohamed, Eman, and Mervat, 2017),*) it is summarized and showed by the table 2.6.

Table 2.6 Summarized Benefits and Challenges of Cloud-Based ERP

Category	Benefits	Challenges
Cost	• Cheap initial investment • limited investments on hardware (e.g., infrastructure, server) • Lower upfront cost • Lower operating cost	• High cost of ownership over the system's entire life cycle • Subscription expenses • Hidden costs in the contract
Security	• Data is stored on vendor's servers, security is usually in the hands of the vendor • Rapid updates and upgrades • Improved system availability and disaster recovery • Using security standards	• With data security being in the hands of vendors, its safety cannot be totally guaranteed. • Security (Encryption, Access & identity management, Network security, Industry Secrecy) • Control over cloud ERP • Bandwidth & Traffic management through Internet • Guarantee on the Average Network Latency • Physical location of the ERP system Data
Customization	• Ease of customization due to its flexibility	• Customization and integration limitations
Implementation	• Requires less time for Implementation • Scalability • Focus on core	• Loss of technical knowledge • Functionality limitations • SLA issues

	competencies • Using advanced technology • Improved accessibility, mobility and usability • Easier integration with cloud services • Shorter time to go live	• Performance risks • Compliance risks • Migration between CSPs • Knowledge about the cloud • Startup support • Organizational challenges • lack of industry standards in providing the SaaS

2.3 Conceptual Framework

A conceptual framework is an arrangement, which the researcher considers, she/he can best explain the natural progression of the phenomenon to be studied. It is related with the concepts, empirical research and important theories used in promoting and systemizing the knowledge adopted by the researcher. In a statistical view, the conceptual framework describes the relationship between the main concepts of a study (Dickson and Emad, 2018). In this research, the researcher have seen different literatures to identify the major benefits of cloud-based ERP adoption and as well the major challenges faced during the project implementation. Once understanding and identifying those major benefits and challenges, the study has been done on cloud-based ERP project in Bank of Abyssinia.

According to the literatures mentioned in the empirical review (for example (Amir, Anand, and Hamed, 2018), (Appandairajan, Zafar, and Madiajagan, 2017), and (*Mohamed, Eman, and Mervat, 2017)* the attributes of benefits and challenges are considers in this study up on the adoption of cloud-based ERP project. Figure 2.4 indicates the relationship of the main concepts of a study, which determine the adoption of cloud-based ERP project.

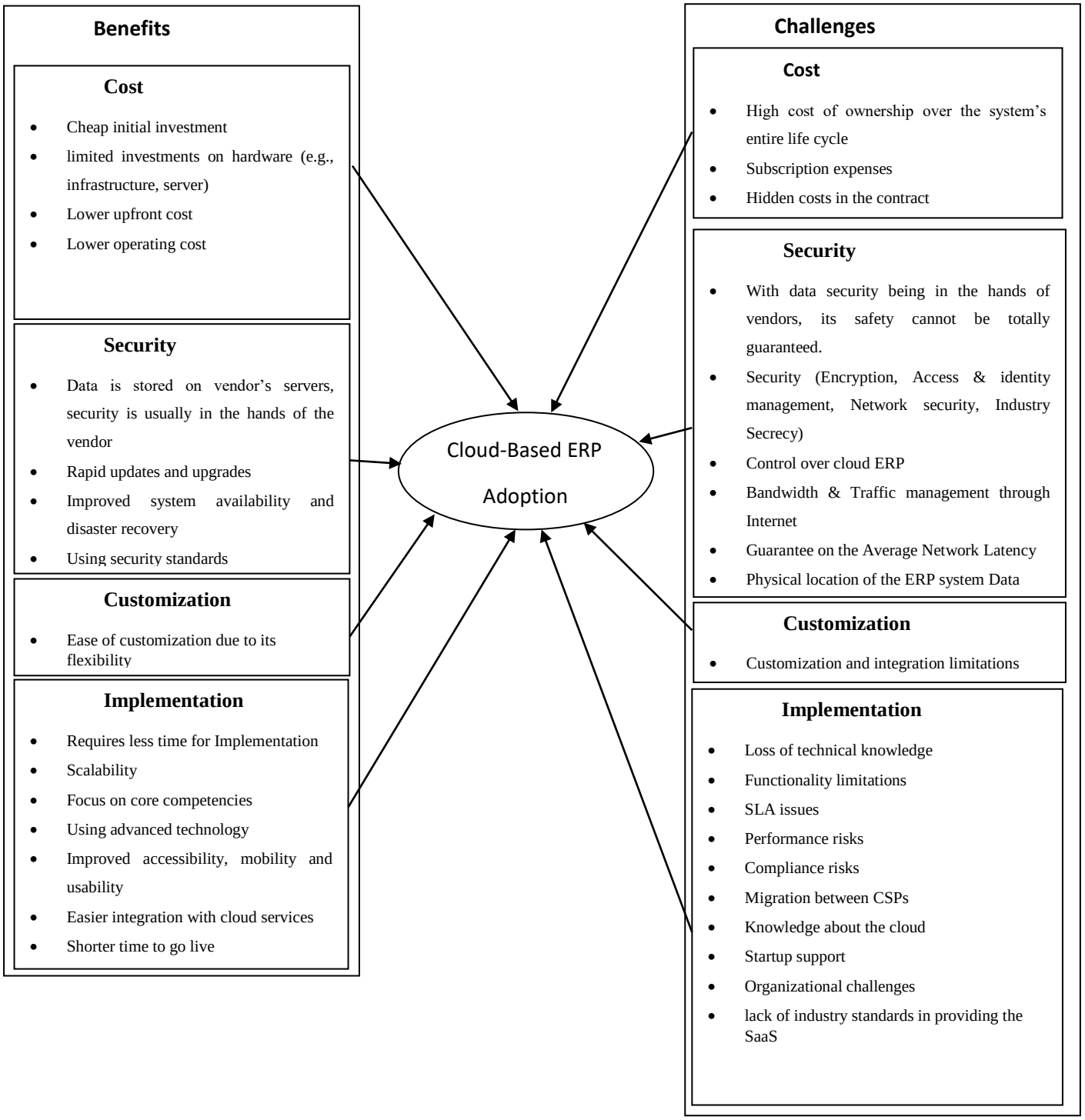

Figure 2.4: Conceptual framework of the study (adapted from Adnan, & Rakibul, 2018)

Many organizations adopt information technology solutions, such as ERP systems, to efficiently achieve their business processes and to simplify the flow of information between units within the enterprise, as well as to collaborate with suppliers, partners, and customers. Therefore, the successful adoption and deployment of ERP systems are vital for the competitiveness and survival of organizations (Amir, Anand, and Hamed, 2018). In this study the researcher considers the benefits acquired and challenges encountered during the adoption of cloud-based ERP in Bank of Abyssinia. The factors for those benefits and challenges are identified and categorized by cost, security, customization and implementation.

The benefits identified related with cost are: cheap initial investment is one of the benefits mentioned by Amir, Anand, and Hamed and it reduces hardware, licenses, and implementation costs compared with traditional ERP models; The other cost benefits is limited investments on hardware infrastructures like servers, storage, network devices, UPS and cooling devices; lower upfront cost which means computing resources are not in the enterprises location, rather it is provided by cloud provider over the internet; the last benefit related with cost is lower operating cost in terms of maintenance, configuration, upgrades costs.

Benefits identified related with security includes: because of the data is stored in vendor's server, security is usually in the hands of the vendor and they have better security than individual enterprises; rapid updates and upgrades are the tasks of the vendor; improved system availability and disaster recovery is granted by cloud provider putting the systems in deferent regions and domains; and using security standards across all cloud infrastructure. Ease of customization is other benefit due to its flexibility and simplicity.

There are some benefits related with implementation on the adoption cloud-based ERP. However ERP implementation is a major and risky endeavor for any organization, large or small, it requires less time required for cloud-based ERP implementation compared with traditional one. Scalability is one of benefits which ease the implementation of cloud-based ERP with extensive level of flexibility and adaptability. Doing the implementation in short period of time, makes the IT staffs to focus on core competencies of the bank. Using advanced technology, improved accessibility, mobility and usability, easier

integration with cloud services and shorter time to go live are some of the major identified befits under implementation category.

Regarding the challenges encountered during cloud-based ERP adoption in BOA are showed in figure 2.4 are also categorized by cost, security, customization and implementation. One of challenges related with cost is higher cost of ownership over the system's entire life cycle; additionally subscription expenses and hidden costs in the contract are the major challenges in this category.

Regarding security related challenges data security is in the hands of vendor and this leads the data is not guaranteed. Security related with encryption, access and identity management, network security and industry secrecy are challenging because of accessing the service using web through internet. Other challenges are control over cloud ERP is under vendor, bandwidth and traffic management through internet, guarantee on the average network latency and physical location of the ERP system data is not in the enterprise's boundaries. The limitation of customization and integration is one of the challenge.

As specified by figure 2.4 there are some challenges identified and categorized under the implementation category. these challenges are: loss of technical knowledge about ERP by IT staffs, there is functionality limitations, SLA issues, performance risks, compliance risks, possibility of migration between CSPs, knowledge about the cloud by IT Staffs, startup support from vendor; organizational challenges like management support, organization structure, project management team and etc.; and lack of industry standards in providing the SaaS.

CHAPTER THREE

RESEARCH METHODOLOGY

3 Research Approach and Design

This chapter discussed the research design and approach which have been used in the study to specify the data collection method, types of research sampling method, and how to use primary and secondary data decision making.

3.1 Research Approach

As mentioned in the research objectives this study tried to assess the benefits and challenges of cloud-based ERP project implementation in BOA. The research approach used qualitative and quantitative or mixed approach. The mixed approach method includes both collecting and analyzing qualitative and quantitative data.

3.2 Research Design

The methodology followed throughout the research was mixed. This is because, the problem identified was to see the benefits and challenges of cloud-based ERP adoption. In addition to this, description of some variables based on patterns found from responses gathered through interview and questionnaire. Concurrent sampling technique, one of the technique to execute mixed method research was used which applies simple random sampling for the quantitative part and purposive sampling for the qualitative part as independent sampling procedures.

3.3 Data Type and sources

To make the study complete and meaningful both primary and secondary data collection method was used to collect insight of employee, benefits earned and challenges encounters during the process of Cloud-Based ERP project implementation.

3.3.1 Primary data type and sources

The primary data was collected through questionnaires and interview. The questionnaires were distributed for eight departments' staffs who were participated in ERP project. Whereas interview were conducted only staffs who were working in project management department for director and managers. And additionally observation of the system was done.

3.3.2 Secondary data type and sources

The required information for the research data was not be fully available from primary data source, in this regard secondary data type and sources, such as other related researches done before, the bank's procedures and policies, contract documents of the project, company website, and RFP for the project.

3.4 Sampling size and sampling design

3.4.1 Sampling design

The study sampling design in this study, used Purposive sampling, which was the sampling technique employed to collect qualitative data thorough interview and Simple random sampling was the technique used to select respondents for Likert based questionnaires. The respondents were from each department who was participated in the ERP project, which are namely, project management, accounting and finance, procurement, facility management, Human resource management, Human resource development, infrastructure and application management. This specific area employees were taken as target group. The total population of the target group was 160 project employees from which sample was drawn for this study.

3.4.2 Sample size determination

The total population of project target group was 160 project members, which is stratified departmentally participated in the project, in to project management, accounts and finance, procurement, facility, Human resource management, Human resource development, infrastructure management and application management. Sample size was determined by considering the size of population variance, budgetary constraint and time given to conduct the study, so that the researcher was used a proportionate stratified sampling from probability sampling technique to get a representative sampling and the sample size determined was 160. So to adjust it, the researcher was selected the sample members using purposive i.e. judgmental and Quota sampling technique from non-probability sampling technique. The sample size of this study is determined by using the formula developed by Taro Yamane (1967).

$$n = \frac{N}{1 + N(e)^2}$$

Where, n is the sample size,

N is the population size,

e is the level of precision or sampling error = (0.05)

$$n = \frac{160}{1+160(0.05)2} = 114$$

Thus, sample size of 114 employees was selected from the population of 160.

3.5 Data collection methods and tools

In this research paper, the researcher has used both primary and secondary data collection methods. The primary data was collected from the different level of ERP Project team members. Primary data consists of interviews, observations, questionnaires (Arbnor and Bjerke, 1999). The secondary data was also reviewed from various sources including books, annual reports, internet, magazine and ERP Project documents of Bank of Abyssinia.

3.6 Data Analysis and Presentation

Once the data was collected by using qualitative and quantitative measurements, it needs to be clearly presented by using tables, which was expressed in the form of frequency, percentage and mean for quantitative measurements. The qualitative measurements for interview questions was used thematic content analysis by identifying common themes; insights, benefits and challenges. This is for the purpose of data organizing, analyzing, interpreting and presenting of the open-ended interview, questionnaires and direct observations with document review.

Here descriptive analysis technique (percentage, mean and std. deviation) was applied to manipulate the organized data by using SPSS tool to manipulate the data. Accordingly the analysis was done towards the objective of the study and identified the insights of employees, benefits and challenges of cloud-based ERP project implementation in BOA.

3.7 Validity

Validity is often defined as the extent to which an instrument measures what it declares to measure. So that it requires research instrument (questionnaire) or interviews to correctly measure the concepts under the study. Qualitative research is based on the fact that validity is a matter of trustworthiness, utility, and dependability and in quantitative research validity is the extent to which any measuring instrument measures what it is intended to measure (Haradhan, 2017). Hence the items in the questionnaires and interviews were carefully refined during the validity test of questionnaires and interview question distributed for four staffs to meet the intended objective of the study.

3.8 Reliability

The reliability refers to a measurement that provides consistent results with equal values and it measures consistency, precision, repeatability, and trustworthiness of a research. In quantitative research, reliability refers to the consistency, stability and repeatability of results. But, in qualitative research it is referred to as when a researcher's approach is consistent across different researchers and different projects (Haradhan, 2017). According to (Roberta, and Alison, 2015) there are three types of attributes of reliability: Homogeneity (or internal consistency), Stability and Equivalence. Haradhan explained that the most common internal consistency measure is Cronbach's alpha (α), which is widely used in social sciences, business, nursing, and other disciplines. He added Alpha values above 0.7 are generally considered acceptable and satisfactory, above 0.8 are usually considered quite well, and above 0.9 are considered to reflect exceptional internal consistency. In the social sciences, acceptable range of alpha value estimates from 0.7 to 0.8. In this study the 53 questions were entered in SPSS and the reliability result are showed in tables 3.1, 3.2 and 3.3 and it has been found beyond the acceptable value.

Table 3.1: Reliability Statistics of insight of employees

Cronbach's Alpha	N of Items
.818	11

Source own survey, March 2021

Table 3.2: Reliability Statistics of Benefits of cloud-based ERP

Cronbach's Alpha	N of Items
.863	16

Source own survey, March 2021

Table 3.3: Reliability Statistics of Challenges of cloud-based ERP

Cronbach's Alpha	N of Items
.823	20

Source own survey, March 2021

3.9 Ethical Standards and Procedures

The research was based on one of the company's project, which was part of the strategic initiative and the research is for academic purpose. In this regard the data collected from documents, interview, observation, and questionnaire should be ethical and confidential. The researcher used a formal authenticated cover letter, a participant consent, together with an ethics application form. The interviewees was also be informed of their rights to withdraw from the study or not to answer any uncomfortable questions.

Accordingly, the researcher assured confidentiality, namelessness and facelessness just by withholding names and ensuring that no individual or company details may not published in the final report.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter discussed the results, which are collected from respondents by using data collection instruments like questionnaires and interviews. The first part of the discussion deals with demographic information of respondents, which are gender, age, educational status, year of service, department and position in the company. The second part deals with presentation of sample data, which were collected from respondents by distributing questionnaires using survey design tool called SmartSurvey and manual distribution of print out questionnaires for those who were not allowed to open SmartSurvey link and also by doing interview for selected managers and director of PMO. Then the data was analyzed using Microsoft excel and SPSS statistical application software version 20. Finally the data from respondent's questionnaire and analyzed by SPSS and semi structured interviews were used for analysis and interpretation.

4.2 Participation Rate

The study targeted a sample size of 160 respondents, in order to get the primary data and for qualitative data analysis and questionnaires were distributed to respondents which are working under project management office and other departments, they were participated in the project and using the system. The distributed questionnaires were contained 53 questions and sent to 114 respondents. The researcher tried to use online survey design tool (SmartSurvey) to avoid COVID-19 transmission and 69 questionnaires were distributed to the respondents using SmartSurvey. However some departments were not allowed to open unknown (like SmartSurvey link) and they can't fill the questionnaire online. So because of that 45 hard copy questionnaires was sent to the respondents. Among the 69 questionnaires, which were sent by online, 65 respondents were correctly filled and returned. From 45 hard copy questionnaire all of them were filled correctly and returned. In general 110 questionnaires were returned. Which means 96% response rate could properly be completed and returned. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a rate of 70% and over is excellent. Based on this statement, the response rate was excellent. In addition to make the study more reliable, semi structure interview questions that consisted five

(5) have been interviewed the higher position employees of the ERP project such as Director of the PMO and Four managers under the project office. The responses from the interviews and questionnaires were used to analyze the data and write the report for this study.

4.3 Respondent's Demographic information

The respondent's demographic information contains gender, age, and educational status, year of service, department and position in the company

4.3.1 Gender Information of Respondent's

The first respondent's demographic information was gender data and it is shown in table 4.1

Table 4.1: Gender information of Respondent's

		Frequency	Percent	Valid Percent
Valid	Male	85	77.3	77.3
	Female	25	22.7	22.7
	Total	110	100.0	100.0

Source own survey, March 2021

According to the data collected and shown in the table 4.1 the overall composition of staffs, which are directly and indirectly working in the project and using the ERP system are dominated by male employees and they are 77.3% of the target group and the rest 22.7% are female employees. According to the data collected, it showed that there are more male employees and they are highly dominated in this project.

4.3.2 Age Information of Respondent's

The researcher was also needed to have the respondent's age information and it is shown in table 4.2

Table 4.2: Age information of Respondent's

		Frequency	Percent	Valid Percent
Valid	18-25	23	20.9	20.9
	26-33	51	46.4	46.4
	34-41	31	28.2	28.2
	42-49	5	4.5	4.5
	Total	110	100.0	100.0

Source own survey, March 2021

Regarding to age information the majority (46.4%) of respondents were in the age category of 26-33, followed by the next highest percentage was 28.2% of employees which were under the age category of 34-41. 20.9% of the employees were under the category 18-25. The least percent (4.5%) were under the category 18-25. the data collected showed that most employees worked in this project were belonging in the productive age group which is from 26 to 33 and from 34-41.

4.3.3 Educational Status of Respondent's

This demographic information was used to understand the educational background of employees assigned for this project and the data is showed in the table 4.3

Table 4.3: Educational Status information of Respondent's

		Frequency	Percent	Valid Percent
Valid	BA/BSC	66	60.0	60.0
	Masters	44	40.0	40.0
	Total	110	100.0	100.0

Source own survey, March 2021

Table 4.3 shows that 60% of employees had degree in BA/BSC and the reset 40% had Master Degrees and there was no diploma holders assigned in this project. According to the findings of this information we can conclude that the employees assigned for this project were qualified to effectively implement and use the ERP project.

4.3.4 Year of Service of Respondent's

Table 4.4: Year of Service information of Respondent's

		Frequency	Percent	Valid Percent
Valid	0-3	57	51.8	51.8
	4-9	39	35.5	35.5
	10-15	11	10.0	10.0
	Greater or equal to 21	3	2.7	2.7
	Total	110	100.0	100.0

Source own survey, March 2021

This part of demographic information of respondents is used to know how long the employees were stayed in the bank and the data is analyzed and explained in table 4.4

Based on the result indicated by the table, most of employees, which were 51.8% of employees have stayed from 0 to 3 years in the bank. In fact before two years back BOA had a new strategy and because of that, many new staffs were joined the bank. That is why more than 50% of employees were found from 0 to 3 years of service in the project. While 35.5% of respondents indicated from 4 to 9 years which is the next higher percentage and 10.0% of respondents are grouped from 10 to 15. The remaining 2.7% of respondents were greater than 21 years of service in the bank. Regarding to the result, we can conclude that, the newly hired staffs were assigned in this project.

4.3.5 Department of Respondent's

Table 4.5: Department information of respondents they are working

		Frequency	Percent	Valid Percent
Valid	HRM	17	15.5	15.5
	Finance and Accounting	5	4.5	4.5
	Procurement	19	17.3	17.3
	Project Management	21	19.1	19.1
	Infrastructure Management	16	14.5	14.5
	Application Management	16	14.5	14.5
	Security Management	7	6.4	6.4
	Facilities Management	7	6.4	6.4
	HRD	2	1.8	1.8
	Total	110	100.0	100.0

Source own survey, March 2021

As mentioned in the methodologies part there are departments identified, which are included in this research and respondents are asked to pin their department they are worked.

Out of 110 respondents, who are returned the questionnaire correctly and timely, 19.1% (21) of them were working in project management office and the next higher percentage is procurement and counted as 17.3% of the total respondents. Other departments HRM, Application management, Infrastructure management had a contribution of 15.5%, 14.5% and 14.5% respectively. Security management, Facilities management and Accounting and finance had the percentage of 6.4%, 6.4% and 4.5% respectively. The least and the last department HRD had only 1.8% (2) of the total respondents.

4.3.6 Position of Respondent's

Table 4.6: Position information of respondents in the Company

		Frequency	Percent	Valid Percent
Valid	Clerical	11	10.0	10.0
	Professional	82	74.5	74.5
	Managerial	17	15.5	15.5
	Total	110	100.0	100.0

Source own survey, March 2021

Position of respondents is summarized in table 4.6 and most of respondents in this quantitative analysis 74.5.5% of respondents are in professional position, 15.5% of respondents are managerial and the rest 10.0% of respondents are under clerical position.

4.4 Data Related to Insight of Employee's on Cloud-Based ERP Implementation

The first objective of this study was to assess the insight of employees on Cloud-Based ERP Implementation. To attain this objective the respondents were required to reflect their insight or understanding on each of statements on the five-point Likert scale of 5-1. The rate are: 1 = Very Low (VL), 2 = Low (L); 3 = Moderate (M), 4 = High (H), 5 = Very High (VH) and The mean value from 1 to 1.80 is Very Low, from 1.81 to 2.60 Low, from 2.61 to 3.40 Moderate, from 3.41 to 4.20 is high, and from 4.21 to 5 is Very High. The responses were as presented in table 4.7

Table 4.7: The insight of Respondents on Cloud-Based ERP

Statements	*Very Low In percentage and number	*Low In percentage and number	*Moderate In percentage and number	*High In percentage and number	*Very High In percentage and number	Mean	S.D	N
Your Knowledge about cloud computing is	2.7 (3)	12.7 (14)	50.0 (55)	28.2 (31)	6.4 (7)	3.23	.853	110
Your Knowledge about Security on Cloud-based ERP is	3.6 (4)	26.4 (29)	39.1 (43)	28.2 (31)	2.7 (3)	3.00	.899	110
Your Understanding of the difference between cloud-based ERP and ERP on premise is	2.7 (3)	21.8 (24)	34.5 (38)	33.6 (37)	7.3 (8)	3.21	.959	110
Your Knowledge about all cloud-based ERP modules implemented in the bank is	1.8 (2)	20.0 (22)	47.3 (52)	24.5 (27)	6.4 (7)	3.14	.872	110
Your knowledge about how to access ERP modules using your mobile devices and smartphone is	5.5 (6)	24.5 (27)	20.0 (22)	37.3 (41)	12.7 (14)	3.27	1.133	110
Your knowledge on which enterprises size (small, medium or large) is most appropriate for cloud-based ERP is	1.8 (2)	20.0 (22)	39.1 (43)	30.0 (33)	9.1 (10)	3.25	.940	110
Understanding of Cloud-based ERP Offer On-Demand and Self-Service Flexibility	4.5 (5)	12.7 (14)	30.0 (33)	38.2 (42)	14.5 (16)	3.45	1.037	110
Knowledge about Complexities of Cloud-based ERP	15.5 (17)	30.0 (33)	38.2 (42)	13.6 (15)	2.7 (3)	2.58	.999	110
Knowledge about why Cloud-based ERP system for financial institutions for their ERP implementation.	2.7 (3)	13.6 (15)	31.8 (35)	30.9 (34)	20.9 (23)	3.54	1.055	110
Knowledge about cost of Cloud-based ERP	8.2 (9)	17.3 (19)	35.5 (39)	34.5 (38)	4.5 (5)	3.10	1.013	110
Knowledge about compliance issue on Cloud-based ERP implementation	4.5 (5)	23.6 (26)	42.7 (47)	27.3 (30)	1.8 (2)	2.98	.878	110

Source own survey, March 2021

For this part of the study objective, which is insights of employees on cloud-based ERP there were many fundamental variables related with this subject and here eleven major variables have been identified and they were distributed on survey questionnaires. The researcher needed to know the employees understanding of cloud computing and Cloud-Based ERP project implementation. The respondent's response is summarized in table 4.7 by considering their mean and percentage value.

The majority of employees' insight on Cloud-Based ERP mean value is from 2.61 – 3.41, which means eight of insight responses out of eleven are under this category, this implies that most of the employees have moderate understanding about cloud-based ERP, which is implemented in BOA. Employees had high understanding only on two insight variables which are Cloud-based ERP Offer On-Demand and Self-Service Flexibility and knowledge about why Cloud-based ERP system for financial institutions for their ERP implementation. While on one insight variable (Knowledge about Complexities of Cloud-based ERP) the employees had low understanding.

As we have seen in table 4.7, for all required variable about insight of employees on cloud-based ERP in BOA, respondents had low percentage values. Among them the insight variable, Knowledge about cloud computing asked for respondents 2.7% (3) of respondents have very low understanding or knowledge of cloud computing and 6.4% (7) of respondents have very high knowledge and the rest of respondents have 50.0% (55), 28.2% (31) and 12.7% (14) of Moderate, High and Low understanding about cloud computing respectively. From this point of view we can conclude that most of employees working in this project didn't have enough knowledge/training about cloud computing. Hence knowledge about cloud computing is a spring board for Cloud-based ERP implementation.

Regarding Knowledge about Security on Cloud-Based ERP, among 110 respondents 39.1% (43) of them have moderate understanding, 28.2% (31) of respondents have high understanding and 26.4% (26) have low insight. The rest 3.6% (4) and 2.7% (3) of respondents agreed that they have very low and very high understanding of security on cloud-based ERP respectively. In fact security is the burning issue on cloud computing and on any cloud-based systems. So in this regard the staffs in this project expected to have a good knowledge in order to safe guard the system and the data.

For the question asked about the difference between cloud-based ERP and ERP on premise, the majority 68.1%, which is aggregate of 34.5% and 33.6% of respondents agreed that they have moderate and high understanding of ERP on premise and in cloud. In fact 21.8 % (24) of respondents believed that they have low understanding and 2.7% (3) respondents have very low insight about this question. Only 7.3% (8) of respondents have very high understanding. Based on this data we can say that employees were not highly knowledgeable to differentiate between ERP on premise and in cloud and they had a slight understanding why the ERP is put in cloud.

One of the questions asked about insight of employees was about all cloud-based ERP modules implemented in the bank, surprisingly 47.3% (52) of respondents believed that they have moderate understanding of ERP in cloud modules which are implemented and exercised in the bank. At the time this study was downing the three major streams, Human Resource Management, Finance and Accounting and Supply Chain Management of ERP project implementation was fully implemented and go live. However only 24.5% (27) and 6.4% (7) of respondents replied that they have high and very high insight on the implemented modules. On contrary 20.0% (22) and 1.8% (2) of respondents replied that they have low and very low insight about modules implemented respectively. The result showed that the employees participated in the project are less aware of the ERP modules implemented.

Cloud-Based ERP is a web based system and it is possible to access the system using mobile devices and smartphone. One of the insight variables asked was knowledge about how to access ERP modules using your mobile devices and smartphone and 37.3% (41) and 12.7% (14) of respondents replied that they have highly and very highly aware of using the ERP using smartphone and mobile devices. From the total respondents 20.0% (22) and 24.5% (27) were agreed that they have moderate insight and less aware of using smartphone and mobile devices to access the cloud-based ERP. We can understand that the staffs participated in the project are not actively accessed the system by using their smartphone and other mobile devices.

As mentioned in the background of this study, cloud computing has become a feasible and competitive means for especially Small and Medium-sized Enterprises and also for large organizations. Hence one of the insight questions were focused to investigate the knowledge of employees on which enterprises size (small, medium or large) is most appropriate for cloud-based ERP. From the responses replied by the respondents 39.1% (43) of respondents believed

that they have moderate understanding about which enterprise size appropriate for cloud-based ERP, 30.0% (33) of respondents were agreed they were highly aware of it, 20.0% (22) of them are less aware of and 9.1% (10) of respondents had very high understanding of cloud-based ERP and best fit of enterprise size. From the data collected for this insight we can conclude that the majority of employees were not understood if cloud-based ERP is the best fit for their organization.

Among the eleven insight questions distributed to respondents, one insight question which was Cloud-based ERP Offer On-Demand and Self-Service Flexibility. For this question 38.2% (42) and 14.5% (16) of respondents have high and very high understanding respectively that cloud-based ERP is offered On-Demand and Self-Service Flexibility. Other respondents have 30.0% moderate, 12.7% low and 4.5% very low understanding of this insight are.

As mentioned in the literature part conventional ERP implementation is complex, time-consuming, and resource-hungry. In this study the researcher wanted to know understanding of employees about cloud-based ERP complexities and the following responses were replied by respondents. 38.2% (42), 30.0% (33) and 15.5% (17) of respondents have moderate, low and very low understanding of complexities of cloud-based ERP. This implies that the employees were not aware of it, because the cloud-based ERP system is SaaS model architecture and it is obvious, the system is managed by cloud provider and ERP vendor. In BOA's ERP implementation the cloud provider and the ERP vendor is Oracle Company. So the employees didn't have a chance to see complexities of the cloud-based ERP system. Only 13.6% (15) and 2.7% (3) of respondents were highly and very highly understood the complexities of cloud-based ERP related with conventional ERP implementation.

As previously discussed in this study Bank of Abyssinia is the first bank implemented cloud-based ERP and the researcher wanted to know if the employees were aware of why Cloud-based ERP system is selected for the bank for their ERP implementation. With this question more than 51% which is the aggregate of 30.9% (34) and 20.9% (23) of respondents have high and very high understanding of why the cloud-based ERP is implemented in BOA. 31.8% (35) of respondents have moderate knowledge and the rest 13.6% (15) and 2.7% (3) have low and very low understanding of why cloud-based ERP is selected and implemented in the bank.

Cost is the advantage and as well also disadvantage of cloud-based ERP implementation. So concerning of the insight about cost of Cloud-based ERP 35.5% (39) of respondents agree that they have moderate understanding and 34.5% (38) of respondents have high understanding about cost of cloud-based ERP. 17.3% (19) of the total respondents believed that they have low understanding of the cost needed for cloud-based ERP. And the final insight question distributed to respondents was about compliance issue on Cloud-based ERP implementation. To use cloud computing and to implement systems in cloud in financial institutions, there are compliance issues required by national bank of Ethiopia. The data collected from respondents revealed that 42.7% (47) of respondents believed that have moderate understanding of compliance and 27.3% (30) of the respondents were highly aware of the compliance issues required by National Bank of Ethiopia. Other 23.6% (26) of respondents have low understanding of compliance issues.

The mean analysis in table 4.7 told us the value of the mean as expressed in the table showed us that the respondents have moderate understanding on most of insight questions. The employees couldn't show their confidence of high understanding of cloud-based ERP and cloud computing knowledge areas.

In the interview part of the enquiry, 5 respondents have participated and all of them were from project management office, one director and four managers. The interview process was semi structured, which means some points were raised by the researcher to initiate and guide, whereas major part was left to interviewees.

Most of the interviewees, when asked about their insight/understanding regarding cloud computing and cloud-based ERP, one of the respondent said that he had any knowledge about cloud computing and cloud-based ERP before this project. However including this interviewee and the rest said, they had acquired a good knowledge during the project implementation. They were also asked differentiate between cloud-based ERP and ERP on premise, they replied that they understood a huge difference between them, like licensing method, data storage, backup and recovery management, infrastructure management, regular maintenance, performance tuning, patch update and version upgrade and many others. Some of the interviewees explained that they have a good insight about the implemented modules, which are the most critical modules and agreed to do between the bank and the implementer (TransSys) in their contract document. These modules are: Human Resource Management, Accounting and Finance and Procurement (Supply

chain management). These modules are go live and functioning well in the organization. In fact Strategy Management (Strategy planning and monitoring) were included in the FRP document but it is not include in the contract document and not implemented. Regarding this issue the interviewees are aware of the rest of modules which are not implemented and know they can implement when every wanted by the bank.

From the interview dialogue, they have expressed the cost advantage of cloud-based ERP, they had a knowledge of detail license cost, aware of hidden costs and other cloud related costs. Regarding the question, how was there understanding on compliance issues, two of interviewees said they know there was any compliance issues regarding ERP data putting in cloud. However as they explained only customer data should not be in the cloud.

4.5 Data Related to the Benefits of Cloud-Based ERP Implementation

The findings in this research regarding the benefits of Cloud-Based ERP systems is based on the four categories of factors (cost, security, customization and implementation) and discussed respectively in each category. Even if there might be various benefit factors in connection with Cloud-based ERP project implementation, for this study sixteen benefit factors have been identified and distributed on survey questionnaires for getting information and the respondents were required to reflect their agreement on each of statements on the five-point Likert scale of 5-1. The rate are: 1 = Strongly Disagree, 2 = Disagree, 3 = Uncertain, 4 = Agree, 5 = Strongly Agree and The mean value from 1 to 1.80 is Strongly Disagree, from 1.81 to 2.60 Disagree, from 2.61 to 3.40 Uncertain, from 3.41 to 4.20 is Agree, and from 4.21 to 5 is Strongly Agree. The responses were as presented in tables from 4.8 to 4.11

Table 4.8: Cloud-Based ERP Benefits regarding with Cost

Statements	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Mean	S.D	N
Needs cheap initial investment	9.1% (10)	29.1% (32)	31.8% (35)	27.3% (30)	2.7% (3)	2.85	1.012	110
Needs limited investment on hardware (e.g., infrastructure server)	8.2% (9)	15.5% (17)	21.8% (24)	38.2% (42)	16.4% (18)	3.39	1.174	110
Lower upfront cost	2.7% (3)	20.9% (23)	44.5% (49)	26.4% (29)	5.5% (6)	3.11	.892	110
Lower operating cost	2.7% (3)	17.3% (19)	30.0% (33)	40.9% (45)	9.1% (10)	3.36	.965	110
Aggregate Mean and Standard Deviation						12.71	4.043	
Average Mean and Standard Deviation * *Figures in () represent number of respondents*						3.12	1.010	

Source own survey, March 2021

In this cost category of benefits, four benefits were distributed to respondents. First by considering the mean analysis as shown in table 4.8, 110 respondents were asked on which condition they agree, the bank was benefited. From all four cost related benefits the mean analysis showed that the result is between 2.61 and 3.40 and the Average mean is 3.12 and this showed that the respondents were uncertain on those benefits asked. Therefore, from this the researcher concluded that based on all those benefit factors related with cost, the respondents were not whether agree nor disagree on those conditions, rather they were uncertain about those benefits.

Regarding cheap initial investment, in fact 31.8% (35) of respondents said that they were uncertain whether initial investment is cheap or not to implement Cloud-Based ERP. The other 29.1% (32) of them argued that they were disagreed and 27.3% (30) of them were agreed that initial investment is cheap. Whereas 9.1% (10) of respondents were strongly disagreed and only 2.7% (3) of them were strongly agreed.

Similarly, concerning the question whether cloud-based ERP Needs limited investment on hardware or not, 38.2% (42) of respondents agreed and also 16.4% (18) of them strongly agreed that, the hardware resources needed is provided by the cloud provider and the bank didn't required to avail hardware resources. However 21.8% (24) of respondents were uncertain if hardware investment provided by cloud provider is a benefit for the bank or not. Even 15.5% (17) of respondents were disagreed and also 8.2% (9) of them were strongly disagreed, which implied that it is not a benefit for the bank. According to their response we can conclude that Bank of Abyssinia has implemented its infrastructure by HCI technology and it was possible to implement ERP in its infrastructure.

While this study was done, the researcher recognized that most of respondents were participated in the cloud-based ERP project and assumed they were familiar with cloud computing terms and can understand the questions raised and distributed to them. Said that the next question was *Lower upfront cost* was one of the benefits. Upfront cost includes software licensing, implementation consulting, production servers, test and development servers, backup datacenter, server configuration, availability, network and storage, operating system, database, integration, provisioning, security, system maintenance and performance tuning. Out of 110 respondents 44.5% (49) of them were uncertain if lower upfront cost is a benefit for the bank or not. However 26.4% (29) and 5.5% (6) of respondents were agreed and strongly agreed that lower upfront cost is a benefit for the bank respectively. In other side 20.9% (23) and 2.7% (3) of respondents said that they were disagreed and strongly disagreed respectively and this implied that they didn't believed that lower upfront cost is not a benefit.

Regarding *Lower operating cost*, there are costs included in operating cost like: Maintenance fee, patches, Upgrades, Training, IT Staff overhead, Finance admin overhead, Consulting for changes and Data center. In this question 40.9% (45) of respondents were agreed that the bank is benefited by spending lower operating cost by putting ERP system in cloud and 9.1% (10) of respondents said that they were strong agreed. However some 30.0% (33) of respondents were uncertain whether the bank is benefited by spending lower operating cost by implementing The ERP system in cloud.

Table 4.9: Cloud-Based ERP Benefits regarding with Security

Statements	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Mean	S.D	N
Data is stored on vendor's servers and security is usually in the hands of the vendor	6.4% (7)	9.1% (10)	20.0% (22)	47.3% (52)	17.3% (19)	3.6	1.077	110
Rapid updates and upgrades	0.9% (1)	8.2% (9)	20.0% (22)	42.7% (47)	28.2% (31)	3.89	.942	110
Improved system availability and disaster recovery	0.9% (1)	4.5% (5)	20.9% (23)	46.4% (51)	27.3% (30)	3.95	.866	110
Using security standards	0% (0)	3.6% (4)	23.6% (26)	40.0% (44)	32.7% (36)	4.02	.846	110
Aggregate Mean and Standard Deviation						15.46	3.731	
Average Mean and Standard Deviation * *Figures in () represent number of respondents*						3.865	.933	

Source own survey, March 2021

The next benefits factor are categorized under security concern and the data is analyzed in table 4.9. In contrary to cost factors, in security factors, based on mean values respondents were agreed that all conditions are benefits of the cloud-based ERP project implementation in BOA. The average mean of all those factors is 3.865 and it implied that those security factors are benefits for BOA by implementing ERP in cloud. And even the average standard deviation of them is .933 which is very near to each factor standard deviation. It told us no variation among them regarding the nature of security benefits.

According to collected data from respondents with regard to cloud-based ERP security benefits, almost most of respondents said that all the four mentioned security factors are benefits of cloud-based ERP implementation in Bank of Abyssinia. However some number of respondents were uncertain whether they are benefits of the bank or not.

Regarding to *Data is stored on vendor's servers and security is usually in the hands of the vendor*, some of respondents 9.1% (10) and 6.4% (7) were disagreed and strongly disagreed respectively, this implied that they were not consider this factor as a benefit at all. And yet,

almost 20.0% (22) of respondents were uncertain if it is a benefit for the bank storing the data on vendor's server and security is in the hands of vendor. This benefit factor is one of the benefits agreed by respondents and it counted as 47.3% (52) and 17.3% (19) of the total respondents agreed and strongly agreed respectively.

Similarly, concerning the question whether *Rapid updates and upgrades* is a benefit or not, almost most respondents said that it is one of the benefit for the bank. It counted the aggregate 70.9% (78) of 42.7% (47) agreed and 28.2% (31) strongly agreed. It is obvious that one of the services given by the cloud provider is system updates and upgrades are handled by the vendor. The rest 20.0% (22) of respondents were uncertain on this benefit factor, 8.2% (9) of them were disagreed and they believed that it is not a benefit for the bank. Finally only 0.9% (1) respondent is strongly disagreed that it is not a benefit at all.

Regarding the question *improved system availability and disaster recovery* only 0.9% (1) respondent is strongly disagreed that it is not a benefit at all and also 4.5% (5) of respondents disagreed with this factor and they considered it is not a benefit. Whereas almost 20.9% (23) of respondents said that they are uncertain whether *improved system availability and disaster recovery* is a befit for the bank or not. However most of the respondents were argued that by implementing the ERP system in cloud the bank would be benefited by improved system availability and disaster recovery. In this regard we can conclude that cloud-based ERP system availability is sustainable and having good disaster recovery plan.

According to the question *Using security standards* and the data collected showed that, none of the respondents strongly disagreed on this factor. And also only 3.6% (4) of respondents were disagreed and believed that, using security standard is not a benefit for the bank. Some of respondents counted as 23.6% (26) were uncertain to decide if this factor a benefit for the bank or not. In contrary to those respondents, the rest of respondents 72.7% (80) out of the total 110 respondents were argued that *using security standards* is a major benefit for bank of Abyssinia by implementing their ERP in cloud.

Table 4.10: Cloud-Based ERP Benefits regarding with Customization

Statements	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Mean	S.D	N
Ease of customization due to its flexibility	2.7% (3)	17.3% (19)	22.7% (25)	40.0% (44)	17.3% (19)	3.52	1.056	110

Source own survey, March 2021

Among the 16 benefit factors, which were distributed to respondents, one factor *ease of customization due to its flexibility* was related with customization category. As it is shown by table 4.10 the mean value of this benefit factor is 3.52 which means the majority of respondents were agreed that it is a benefit factor for bank of Abyssinia. From the total 110 respondents 40.0% (44) and 17.3% (19) of them agreed and strongly agreed respectively. However 22.7% (25) of respondents were uncertain if customization is easy because of flexibility of cloud-based ERP implementation. The rest of respondents 17.3% (19) and only 2.7% (3) were disagreed and strongly disagreed and this implied that those respondents believed that it is not a benefit for the bank. Regarding the mean value showed we can conclude that due to flexibility of cloud-based ERP customization is easy and it is possible to add functionalities easily any time required by the bank.

Table 4.11: Cloud-Based ERP Benefits regarding with Implementation

Statements	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree	Mean	S.D	N
Requires less time for Implementation	5.5% (6)	21.8% (24)	25.5% (28)	32.7% (36)	14.5% (16)	3.29	1.128	110
Scalability	0% (0)	8.2% (9)	27.3% (30)	46.4% (51)	18.2% (20)	3.75	.851	110
Focus on core competencies	0% (0)	4.5% (5)	29.1% (32)	51.8% (57)	14.5% (16)	3.76	.753	110
Using advanced technology	0.9% (1)	6.4% (7)	14.5% (16)	43.6% (48)	34.5% (38)	4.05	.913	110
Improved accessibility, mobility and usability	0.9% (1)	10.0% (11)	13.6% (15)	43.6% (48)	31.8% (35)	3.95	.971	110
Easy integration with cloud services	0.9% (1)	4.5% (5)	26.4% (29)	46.4% (51)	21.8% (24)	3.84	.852	110
Shorter time to go live	8.2% (9)	14.5% (16)	28.2% (31)	30.0% (33)	19.1% (21)	3.37	1.188	110
Aggregate Mean and Standard Deviation						26.01	6.651	
Average Mean and Standard Deviation * Figures in () represent number of respondents						3.72	0.950	

Source own survey, March 2021

When we see the cloud-based ERP benefit factors, which are related with implementation, seven questions were distributed to respondents. To evaluate the benefits of cloud-based ERP project implementation with mean values 3.75, 3.76, 4.05, 3.95 and 3.84 are the major benefit highly stated by the respondents respectively are Scalability, Focus on competencies, Using advanced technologies, Improved accessibility mobility and usability and Easy integration with cloud services whose total mean value is 19.35 which is 74.39% of the aggregate mean of 26.01. Finally, when we see the mean of mean or weighted average mean which is 26.01 relative to the total summation mean of highly critical benefits 19.35 that is almost similar. And also the average standard deviation of all the five highest benefits is 0.868 which is nearest to average aggregate standard deviation of 0.95. So they are highest benefits agreed by respondents.

Among those seven benefit factors, on two factors: Requires less time for implementation and Shorter time to go live, respondents were not agreed to consider them as a benefit. Regarding the

question Requires less time for implementation, 25.5% (28) of respondents were uncertain whether it is a benefit or not and this implied that those respondents didn't know the project schedule and the time the implementation took. And also 21.8% (24) and 5.5% (6) of respondents where disagreed and strongly disagreed respectively. Those respondents believed that the bank is not benefited and not implemented the project within a short period of time. However 32.7% (36) of respondents were agreed and 14.5% (16) of them strongly agreed, which means less time is required for implementation and accordingly they argue it is a benefit factor. The other factor: shorter time to go live, which the majority of respondents were nor agreed and considering it is not a benefit factor for the bank. Based on the data 28.2% (31) of respondents were uncertain whether go live time is shorter or not by implementing ERP in cloud. From the total respondents 22.7 % (25) were disagreed that go live time is shorter by implementing ERP in cloud. Whereas 30.0% (33) and 19.1% (21) of respondents were agreed and strongly agreed respectively, that go live time is shorter at the implementation ERP in cloud.

Regarding the question *Scalability* none of the respondents were strongly disagreed and only 8.2% (9) of respondents argued that they are not considered scalability as a benefit for BOA. In contrary to those respondents 46.4% (51) of respondents were agreed and additionally the other 18.2% (20) of respondents even strongly agreed that scalability is one of the major benefit factors which is under the implementation category. Depending on their response we can conclude that it is possible to implement the most critical and important modules first and then expand and scale indefinitely as needed by the business.

Within the implementation category, other factor which the researcher wanted to know about *Focus on core competencies*, if it was a benefit or not. As we have seen in scalability, the same scenario was happened here, which means none of the respondents were strongly disagreed and only 4.5% (5) of respondents argued that they are not considered *Focus on core competencies* as a benefit for the bank. Among 110 respondents 29.1% (32) of them were uncertain and believed that they are not sure to say if it a benefit or not. Hence the majority of respondents 66.3% (73) were agreed it is a major benefit are for the bank. According to this data the researcher believed that, the bank is benefited by avoiding routine operation of ERP system and enable the IT staff to focus more on their competencies and service the client.

On the question *Using advanced technology* is a benefit on cloud-based ERP project implementation, only 0.9% (1) of respondents said strongly disagree and 6.4% (7) of them were

disagree on this issue, 14.5% (16) of participants were uncertain but the remaining 78.1 % (86) of the respondents said that using advanced technology is the benefit for BOA by implementing their ERP in cloud.

Based on the response of 75.4% (83) of respondents, we ensured that *improved accessibility, mobility and usability* is one of cloud-based ERP implementation area of benefit except 13.6% (15) of uncertain and 10.9% (12) disagreed of participants. So we can conclude that participants understood the system had improved accessibility, mobility and usability than the legacy system they used previously.

The last question of benefit factors in the implementation category was *Easy integration with cloud services,* and regarding this factor in fact 38.2% (75) of the respondents were agreed that easy integration with cloud services is one of the benefits and the rest participants which are counted 28.2% (31) uncertain and 22.7% (25) were didn't agree on this factor to take as a benefit for the bank.

From the point view of cloud-based ERP implementation in BOA, we have seen different benefit factors, which are categorized by Cost, Security, Customization and Implementation. Hence the major five benefits from the data are: *using advanced technology; using security standards; improved system availability and disaster recovery; improved accessibility, mobility and usability; and rapid updates and upgrades respectively.* The study done by Mohamed, Eman, and Mervat, (2017) showed us the five major benefits, which are: *lower upfront costs; lower operating costs; improved accessibility, mobility and usability; rapid implementation and scalability.* In this regard improved accessibility, mobility and usability benefit factor is common for this study and the study done Mohamed, Eman, and Mervat.

According to the questions distributed to respondents and the data collected from them, we can conclude that the major benefit areas are security related factors which have the average mean value of 3.865. The next most benefit factors are implementation factors and the average mean value is 3.72 and the third benefit factor are related with customization factor and its average mean value is 3.52 and the last and least average mean value 3.12 collected from cost related benefit factors.

During interview, the question, the benefit of cloud-based ERP was raised. The interviewees were mentioned few benefits of implementing the banks ERP system in cloud. These mentioned

benefits are: 1. no need of managing the infrastructure on which the ERP is run; 2. it helps to automate back office activities and integrate it with front office activities; e.g. accounts and finance or HRM activities with core banking system. 3. It helps to improve the banks HR process end to end automation starting from recruitment to retires, accounts and finance and supplies chain and to enhance overall internal capacity; 4. It is easy to use, improve processes, easy communication and flow and then it increases productivity; 5. Its flexibility and handling employees data centrally, which operations has done at different district offices and HR Department, efficiencies in faster financial close, improved and managed inventory planning and accurate forecasting; 6. It is easy to adopt with minimum customization and helps to prioritize the appropriate module; 7. Finally it creates departments' collaboration and integration with up to date information and reliable data.

4.6 Data Related to the Challenges of Cloud-Based ERP Implementation

As it has previously described in this study in the statement of the problem of this study paper, there might be various major challenges when cloud-based ERP project implementation. Which is in fact IT project and it is a new practice in our county as a whole and specifically BOA is a first implementer from financial institutions. So it could have challenges related with Cost, Security, Customization and Implementation. Hence in this research paper 110 respondents were asked only 20 major specific challenges and the respondents were required to reflect their agreement on each of statements on the five-point Likert scale of 5-1. The rate are: 1 = Very Low, 2 = Low, 3 = Uncertain, 4 = High, 5 = Very High The mean value from 1 to 1.80 is Very Low, from 1.81 to 2.60 Low, from 2.61 to 3.40 Uncertain, from 3.41 to 4.20 is High, and from 4.21 to 5 is Very High . The responses were as presented in tables from 4.12 to 4.15

Table 4.12: Cloud-Based ERP Challenges related to cost

Statements	Very Low	Low	Uncertain	High	Very High	Mean	S.D	N
High cost of ownership over the system's entire life cycle	4.5% (5)	8.2% (9)	48.2% (53)	33.6% (37)	5.5% (6)	3.27	.866	110
Subscription expenses	0.9% (1)	2.7% (3)	43.6% (48)	45.5% (50)	7.3% (8)	3.55	.711	110
Hidden costs in the contract	0.9% (1)	5.5% (6)	57.3% (63)	31.8% (35)	4.5% (5)	3.34	.694	110
Aggregate Mean and Standard Deviation						10.16	2.271	
Average Mean and Standard Deviation * Figures in () represent number of respondents						3.39	.757	

Source own survey, March 2021

Accordingly, regarding cost related challenges named: *High cost of ownership over the system's entire life cycle,* subscription expenses and hidden costs in the contract and respondents data is described in table 4.12, we have seen the average mean values 3.39, which is fallen under the value from 2.61 to 3.40 and it means most of respondents were uncertain of those factors related with cost are challenges for cloud-based ERP project implementation or not. However most of respondents argued that subscription expenses are challenging areas under security factors.

Regarding *High cost of ownership over the system's entire life cycle* under cost category most of respondents counted 48.2% (53) were uncertain whether it is a challenge for cloud-based ERP project implementation or not. However 39.1% (43) of respondents were argued that *High cost of ownership over the system's entire life cycle* was a high challenge while cloud-based ERP project implementation was done. The rest 12.7% (14) of respondents were believed that this factor was a lower challenge in cloud-based ERP project implementation.

Concerning to subscription expenses, only 3.6% (4) of respondents were believed that the challenge of subscription expenses is low. Meaning, it is not taken by those respondents as a challenge, whereas 48 respondents that account 43.6% were about it's being a challenge or not. On contrary, 52.8% of respondents said subscription expenses is highly challenging factor.

When respondents asked about whether hidden costs in the contract were a challenge or not, only 7 participants, about 6.4% of 110 respondents were believed that hidden cost in the contract was not a challenge and the majority of respondents 57.3% (63) were uncertain to say hidden costs in

the contract are challenge for ERP in cloud Project implementation. The rest 36.3% (40) of participants were argued that hidden costs in the contract are a challenging element in cloud-based ERP project.

Table 4.13: Cloud-Based ERP Challenges regarding with Security

Statements	Very Low	Low	Uncertain	High	Very High	Mean	S.D	N
With data security being in the hands of vendors, its safety cannot be totally guaranteed	4.5% (5)	17.3% (19)	34.5% (38)	30.9% (34)	12.7% (14)	3.30	1.045	110
Security problem (Encryption, Access & identity management, Network security, Industry Secrecy)	4.5% (5)	22.7% (25)	31.8% (35)	32.7% (36)	8.2% (9)	3.17	1.021	110
Control over cloud-based ERP	1.8% (2)	12.7% (14)	38.2% (42)	36.4% (40)	10.9% (12)	3.42	.913	110
Challenges related to Bandwidth & Traffic management through Internet	3.6% (4)	12.7% (14)	29.1% (32)	40.0% (44)	14.5% (16)	3.49	1.011	110
Guarantee on the Average Network Latency	2.7% (3)	13.6% (15)	40.9% (45)	38.2% (42)	4.5% (5)	3.28	.858	110
Physical location of the ERP system Data is in cloud	1.8% (2)	10.0% (11)	35.5% (39)	36.4% (40)	16.4% (18)	3.55	.944	110
Aggregate Mean and Standard Deviation						20.21	5.792	
Average Mean and Standard Deviation * Figures in () represent number of respondents						3.36	.965	

Source own survey, March 2021

Other group of challenges were categorized under security category and questions were distributed to respondents to reflect how much they are agreed and identify the challenges in cloud-based ERP project implementation. Here in table 4.13 also the average mean value 3.36 is under the uncertain range. There are six factors in this security category and their average mean 3.36 showed that the majority of respondents were didn't know if those factors were challenging

for the project. Whereas three of security factors: Control over cloud-based ERP, Challenges related to Bandwidth & Traffic management through Internet and Physical location of the ERP system Data is in cloud, mean values showed majority of respondents believed that, they are high challenging factors under security category.

The first question in this section was *with data security being in the hands of vendors, its safety cannot be totally guaranteed* and 34.5% (38) of respondents were uncertain, really whether this factor is a challenge or not. On the other hand 43.6% of participants said that it is a challenge for cloud-based ERP implementation. According to those respondents it is not advisable to put the data in the hands of vendor. On contrary 21.8% of participants argued that data security being in the hands of vendors, its safety cannot be totally guaranteed is not a challenging factor for ERP in cloud project.

Concerning to *Security problem (Encryption, Access & identity management, Network security, Industry Secrecy)* out of 110 respondents 40.9% (45) of them were replied that it is a challenge for implementing ERP in cloud. *Whereas 31.8% (35) of respondents were uncertain to say it is a challenge for implementing ERP in cloud. The rest 27.2% of participants said that this security factor is low challenging one.*

When the respondents asked about whether *Control over cloud-based ERP* was a challenge or not, 36.4% (40) and 38.2% (42) of participants were considered *Control over cloud-based ERP* was highly challenging and uncertain about it respectively. Only 10.9% (12) of participants believed that *Control over cloud-based ERP* was a very high challenging factor. On contrary 12.7% (14) and 1.8% (2) of respondents argued that this security factor was low and very low challenging for ERP implementation in cloud respectively.

Except 29.1% of respondents who replied they are uncertain whether *Bandwidth & Traffic management through Internet* was a challenge or not, 12.7% and 3.6% of the total respondents who believed that *Bandwidth & Traffic management through Internet* has low and very low challenging. Nevertheless 54.5% of the participants said that this security factor has challenges with cloud-based ERP project implementation.

For one of the security factor *Guarantee on the Average Network Latency*, which were asked respondents whether it was a challenge for cloud-based ERP project implementation or not, from the total 110 respondents 45 said they were uncertain and 42 of them believed that it was a

challenging factor in the project implementation. However the rest of respondents 5 of them argued that it has very high challenge and in contrary 15 respondents said this security factor has low challenge and even 3 of them believed that *Guarantee on the Average Network Latency* has a very low challenge.

Regarding Physical location of the ERP system Data in cloud was one of the major challenge under security category. Out of 110 participants 52.8% (58) of them were argued that Physical location of the ERP system Data is in cloud was a challenging factor. From this we can understood that putting ERP system data in cloud is a highly challenging factor for the bank. In fact some 35.5% (39) of respondents said that they were uncertain about it and the rest 11.8% (13) of participants believed that Physical location of the ERP system Data is in cloud was a low challenging factor for the implementation of ERP in cloud.

Table 4.14: Cloud-Based ERP Challenges regarding with Customization

Statements	Very Low	Low	Uncertain	High	Very High	Mean	S.D	N
Customization and integration limitations	0.9% (1)	19.1% (21)	31.8% (35)	36.4% (40)	11.8% (13)	3.39	.959	110

Source own survey, March 2021

One challenge regarding customization: Customization and integration limitations was identified and asked respondents what was their response. The response from participants was explained in table 1.14. From the table we have seen that the mean value is 3.39, which is under the uncertain category. In fact 36.4% (40) and 11.8% (13) of participants replied that Customization and integration limitations was a highly and a very high challenge in cloud-based ERP project implementation in BOA. Other large number of participants, 31.8% (35) were uncertain to judge whether it was a challenge or not. The last 20% (22) of respondents replied it was less challenging factor under customization.

Table 4.15: Cloud-Based ERP Challenges regarding with Implementation

Statements	Very Low	Low	Uncertain	High	Very High	Mean	S.D	N
Loss of technical knowledge of staffs	4.5% (5)	18.2% (20)	31.8% (35)	35.5% (39)	10.0% (11)	3.28	1.024	110
Functionality limitations	2.7% (3)	32.7% (36)	35.5% (39)	21.8% (24)	7.3% (8)	2.98	.977	110
SLA issues	0.9% (1)	20.9% (23)	51.8% (57)	21.8% (24)	4.5% (5)	3.08	.803	110
Performance risks	3.6% (4)	39.1% (43)	33.6% (37)	20.9% (23)	2.7% (3)	2.80	.907	110
Compliance risks	0.9% (1)	31.8% (35)	40.9% (45)	22.7% (25)	3.6% (4)	2.96	.856	110
Migration between Cloud service providers (CSPs)	3.6% (4)	5.5% (6)	57.3% (63)	27.3% (30)	6.4% (7)	3.27	.812	110
Knowledge about the cloud	0.9% (1)	18.2% (20)	30.0% (33)	40.0% (44)	10.9% (12)	3.42	.942	110
Startup support	0.9% (1)	12.7% (14)	30.0% (33)	45.5% (50)	10.9% (12)	3.53	.885	110
Organizational challenges	1.8% (2)	21.8% (24)	32.7% (36)	38.2% (42)	5.5% (6)	3.24	.918	110
lack of industry standards in providing the Software as a Service (SaaS)	2.7% (3)	12.7% (14)	46.4% (51)	30.9% (34)	7.3% (8)	3.27	.877	110
Aggregate Mean and Standard Deviation						31.83	9.001	
Average Mean and Standard Deviation * Figures in () represent number of respondents						3.183	.900	

Source own survey, March 2021

The last challenges related with implementation was ten in number, identified and distributed to respondents. The average mean value for those challenge factors was 3.183 and it implied that the most of participants were uncertain whether those specified implementation factors were challenging or not in ERP in cloud project implementation. Among those factors only two questions: Knowledge about the cloud and Startup support have the high challenging mean value 3.42 and 3.53 respectively.

According to 45.0% (50) of participants reply, from 110 of respondents, *Loss of technical knowledge of staffs* was a challenge for cloud-based ERP project implementation. In this regard

we can conclude that BOA IT staff members don't have technical knowledge of ERP system. Some 31.8% (35) of participants were uncertain to say, if it was a challenge for the ERP project. 22.7% (25) of respondents didn't say *Loss of technical knowledge of staffs* is a challenge for cloud-based ERP project implementation.

Regarding the question *Functionality limitations*, 35.5% of participants were uncertain to put this issue as a challenge under implementation category of ERP in cloud project. Additionally 35.4% (39) of respondents replied *Functionality limitations* was low challenge for this project. With those results we can say that, there is no functional limitation of ERP in cloud implementation. Whereas only 32 participants believed that *Functionality limitations* was a challenge for cloud-based ERP implementation.

On the question on SLA issues during cloud-based ERP project implementation, the majority 51.8% (57) of respondents were uncertain to reply SLA issues were a challenge during the ERP project implementation. The analysis showed us that most of participants didn't have active SLA issues with vendor. On the other side 21.8% (24) of respondents said SLA issues were low challenging and on the contrary 26.3% (29) of respondents believed SLA issues were challenging for cloud-based ERP project implementation.

To know the performance challenge of the ERP project, respondents were asked the question Performance risks of cloud-based ERP implementation and 23.6% (26) of participants said performance risk was a challenge. However 42.7% (47) of respondents replied that performance risk was not a challenge and even 33.6% (37) of participants were uncertain about a challenge of performance risk. So we can say that there was not a performance problem regarding ERP system in cloud.

Like performance risk, compliance risk was not also considered as a challenge by respondents, from the total 110 respondents, 29 of them said compliance risk was a challenge, 45 of them were uncertain about its being a challenge or not and 36 of them argued that compliance risk was not a challenge at all in cloud-based ERP implementation.

If in the future BOA wants to change cloud provider and needs to migrate its ERP in some other cloud provider environment, cloud it be a challenge for the bank? And the question: Migration between Cloud service providers (CSPs) was asked to participants. The reply from table 4.15 showed that 57.3% of respondents were uncertain, 33.7% of participants argued that it was a challenge and only the rest 9.1% of respondents said that migration between cloud service providers is not a challenge.

To implement cloud-based ERP project successfully Knowledge about the cloud is mandatory and a spring board. So that 50.9% (56) of respondents replied that Knowledge about the cloud is a highly challenging factor for cloud-based project implementation. But 19.1% (21) of participants said Knowledge about the cloud was not a challenging factor and 30.0% (33) of 110 respondents replied that they were uncertain to identify Knowledge about the cloud is a challenge or not.

In the same way as we have seen in Knowledge about the cloud, startup support was also a highly challenging factor for the successful implementation of cloud-based ERP project, this is because of the responses replied by participants and showed by table 4.15. From the total 110 respondents 56.4% of them replied that startup support is a highly challenging factor, 30.0% of them said they were uncertain and 13.6% of them argued that startup support is not a challenging factor cloud-based ERP project implementation.

Concerning Organizational challenges, only 26 respondents that account 23.6% have believed that the challenge of Organizational challenges is low, 32.7% (36) of respondents were uncertain about its challenge. On contrary, 43.7% (48) of respondents said Organizational challenges was highly challenging. This is, therefore, Organizational challenges was a challenge for ERP project to some extent.

At last in this implementation category, the question: lack of industry standards in providing the Software as a Service (SaaS) was raised and distributed respondents. 38.2% (42) of the total respondents answered the question and said there were lack of industry standards in providing the Software as a Service (SaaS) and it was highly challenging. While 15.4% (17) of respondents replied it was low challenging and the remaining 46.4% (51) of participants were uncertain about its being challenging or not.

AS shown in table from 4.12 to 4.15 respondents in all category, the highest challenges the respondents said are: *Subscription expenses* in cost category with mean value of 3.55; *Control over cloud-based ERP, Challenges related to Bandwidth & Traffic management through Internet* and *Physical location of the ERP system Data is in cloud* in security category with mean values 3.42, 3.49 and 3.55 respectively; *Knowledge about the cloud* and *startup support* in implementation category with mean values 3.42 and 3.53 respectively. As we have seen the study done by Mohamed, Eman, & Mervat, (2017) there were five major challenges specified: *security risks; customization and integration; performance risk; SLA issues and data ownership*.

Data ownership is showed both in this study and the study done by Mohamed, Eman, and Mervat as one of the top five challenges of cloud-based ERP project implementation.

The interviewees of the ERP project higher position employees have also mentioned some challenges during interview. Concerning the challenges raised by them in this study are: 1. Once the system and the data control is out of the bank, it is risky to put the ERP data in cloud; 2. its limited functionality and forced to use the system standards; 3. Offsite implementation due to COVID-19; 4. Communication problem with vendor because of lack of clarification; 5. Vendor was working with third party integrator and the bank was working with both of them; 6. Data availability problem; 7. Lack of awareness for system requirement definition; 8. Consultant limited knowledge; 9. Gathering of data from different work units and data quality; 10. Change management problems.

Summary of employees' insights, benefits and Challenges identified from Interview and observation

1. **Employee insight include:**
    - Having good insights regarding cloud computing and cloud-based ERP during project implementation, but most of them didn't have a good understanding on cloud computing and cloud-based ERP before the project.
    - Once they have participated in the project they could understood the difference between cloud-based ERP and ERP on premise, for example licensing issue is totally different.
    - They could identify modules in cloud-based ERP system, they can explain which modules are functional by now and which will be most appropriate and will be added in the future because of its flexibility and it's on demand offer.
    - They could understood the costs advantage of cloud-based ERP
    - They said compliance issues will be raised, however they couldn't find any specific rule regarding putting ERP data in cloud.
2. **Benefits:**
    - No need to manage the infrastructure
    - It helps to automate back office activities by integrating with front office activities.

- It helps to improve the banks' HR, accounts and finance and procurement processes to enhance overall internal capacity
- Easy to use
- Facilitate communication and flows
- Increase productivity
- Cost benefits, flexibility, handling employee's data centrally, which operations has done at different district offices and HR Department, efficiencies in faster financial close, improved and managed inventory planning and accurate forecasting.
- Minimize customization
- Easy to adopt new deployments
- Help to prioritize the appropriate module
- Creates department collaboration, integrate up-to-date information and data reliability

3. Challenges:

- Putting the banks ERP data in cloud is risky and data availability problem
- Limited functionality and forced to use the system standards
- Off sit implementation due to COVID-19
- Communication problem with vendor lack of clarification
- Vendor working with third party implementer
- Lack of system requirement awareness,
- Consultant limited knowledge
- Lack of requirement definition
- data gathering from different work units
- Data quality
- Change management

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of Findings

The purpose of this study was to identify the benefits and challenges of Cloud-based ERP project implementation in Bank of Abyssinia. Therefore, the Self-administered questionnaires designed for 114 respondents, direct observation of the system and one director and four project managers were interviewed to collect the primary data. Regarding the participants profile, six demographic factors were among the questions forwarded to respondents, these were regarding: gender, age, educational status, year of service in BOA, department you are working and position in the company. According to the data, general sex composition of Bank of Abyssinia ERP project's human resource is highly dominated by male employee who are 77.3% in gender & near to 95.5% of them at large are belonging in the productive age group. They had enough education background and with good experience to make the project successful and can understand the project objectives. More than 50% of employees were among the newly joined staffs.

Concerning the insight of employees' on cloud-based ERP implementation, 51.8% of the respondents were understood why Cloud-based ERP system for financial institutions for their ERP implementation and 52.7% of respondents had Understanding of Cloud-based ERP Offer On-Demand and Self-Service Flexibility. The majority of participants, regarding insight about cloud computing, cloud-based ERP, difference between ERP in cloud and on premises and ERP modules implemented in the bank, had a moderate and low understanding on those factors.

The benefits and challenges are categorized by under cost, security, customization and implementation. From all benefits, using advanced technology, improved accessibility, mobility and usability, easy integration with cloud services, using security standards, improved system availability and disaster recovery, scalabilities, focus on core competencies and rapid updates and upgrades which accounts 54.09% of the aggregated mean value benefits of cloud-based ERP in BOA. Same time among the four categories, benefits related with security have a better benefit for the implementation ERP in cloud.

According to the collected data form respondents with Regard to challenges; Subscription expenses, Control over cloud-based ERP, Challenges related to Bandwidth & Traffic

management through Internet, Physical location of the ERP system Data is in cloud, Knowledge about the cloud and Startup support were considered more challenging factors for implementation of ERP in cloud. The rest of factors in all categories of challenges the majority of participants were uncertain whether they are challenging or not and others considering those factors are low challenging for the project.

5.2 Conclusion

At the end, this chapter concluded that this research paper titled "Benefits and Challenges of Cloud-Based ERP project implementation in Bank of Abyssinia" answers the case study questions based on the findings of the research. To collect the data the research questions were designed and from which questionnaires and interviews have been derived. The research findings are analyzed and briefly summarized to confirm the relevance of this study. Accordingly the study has conducted with interview discussions, survey questionnaire, observations and documents review and finally identified eleven insight factors important for the success of Cloud-Based ERP project implementation. From those eleven factors, only on two factors, most of participants said they are aware of cloud computing and cloud-based ERP. From the interviews conducted most of interviewees which are director and managers had a good knowledge about cloud computing, Cloud-Based ERP and other issues related to them, whereas from questionnaires distributed the majority of respondents, which were professionals assigned in the project and users of the system, replied they had moderate knowledge and even less aware of those factors.

The bank is using those three modules and can improve the processes, which were separately managed by using the previous legacy systems. But now all those ERP modules can process activities from end to end and integrated each other and also integrated with other on premises system. The major benefits identified from interviews and questionnaires are: rapid updates and upgrades this is in fact handled by the vendor itself, improved system availability and disaster recovery, using security standards in cloud environments, scalability, focus on core competencies, using advanced technologies, improved accessibility, mobility and usability and easy integration with cloud services.

Finally this thesis paper remarkably conclude that the challenges of cloud-based ERP project implementation are: subscription expenses, control over cloud-based ERP, challenges related to

bandwidth & traffic management through internet, physical location of the ERP system data is in cloud, knowledge about the cloud, startup support, lack of system requirement definition, data gathering from different work units and it quality, change management and offsite implementation due to COVID-19.

5.3 Recommendation

Based on the findings of the research, three modules are implemented and functioning in the bank. However there are some issues, which needs attention and the researcher draw some recommendations in order to minimize the gap for the next similar projects in the bank or for others who needs to implement cloud-based ERP project.

From this research paper findings identified by either from primary data like interview and questionnaire or secondary data like reviewing the document and observing the system, one of the fact that insight of employees on cloud computing and cloud-based ERP is not enough, since the ERP is go live. So every member of staffs assigned for the ERP project should have adequate knowledge before the implementation of the project. The researcher observed that the cloud infrastructure needs comprehensive knowledge to use the system, to manage the cloud infrastructure environment, to manage cost consumption and to understand cloud security related issues. So it is recommended to prepare the training parallel with the implementation or even before the implementation.

Even if the cloud-based ERP is SaaS model and mostly prepared for and pretty fit with Small and medium size enterprise, large enterprise also can implement their ERP in cloud. However large organizations may need more customization or change their processes according to cloud standards. So it is recommended for large enterprises first to identify their functional requirement and map with cloud-based ERP available functionalities.

Once the implemented modules are tested and running successfully, the bank should implement other modules, which may improves the banks functional areas and also integrated on premise systems like data warehouse. One challenging area, which were mentioned by respondents were Physical location of the ERP system Data is in cloud and it is a big risk for the bank, if there is no internet connection for extended time. So every transaction passed by the ERP system should be extracted and available in the bank’s data warehouse on premise.

Cloud computing has a compliance issues specific to each country's rule and regulation. Regarding to ERP data, there is not compliance issues to put the data in cloud as far as the data is not customer related data. However for integrated systems which are on premise, there should be due care before integration is done if the data contain any customer related information.

Finally, the researcher also recommended that it is very much necessary to conduct more research case studies of cloud-based ERP in Ethiopian context. Especially research area may cover cloud-based ERP risk factors, cyber security issues, cloud-based ERP adoption factors related with technology, organization and environment factors. More studies will show the gap and will give enterprises confidence to adopt the system. When during this research was done, the researcher found only two companies implementing cloud-based ERP, which are Ethiopian shipping lines and Bank of Abyssinia.

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APPENDIX

SAINT MARY UNIVERSITY

MBA POST GRADUATE PROGRAM

QUESTIONNAIRE

Dear Respondent,

This is a survey questionnaire which is aimed at identifying and collecting data for a study about "Benefits and challenges of Cloud-based Enterprise Resource Planning (ERP) implementation Project: a case of Bank of Abyssinia". This study is being conducted for a partial fulfillment of the requirements of MA in Project management. Your response will be used for academic purposes only and the findings can help financial institutions to implement such a project in systematic way. Your participation in this survey is completely voluntary and all of your responses will be kept confidential. Writing your name on this questionnaire is not required.

Thank you in advance for your unreserved co-operation

PART I: DEMOGRAPHIC INFORMATION

Instruction:

Please put (X) mark in the box provided for the information that describes you.

1.1 Gender

☐Male ☐Female

1.2 Age

☐18-25 ☐26-33 ☐34-41 ☐42-49 ☐50-60

☐Above 61

1.3 Educational status

☐Diploma ☐BA/BSC ☐Masters ☐Above Masters

1.4 Year of service in BOA

☐0-3 ☐4-9 ☐10-15 ☐16-20 ☐≥21

1.5 Department you are working

☐HRM ☐Finance and Accounting ☐Procurement

☐Project management ☐Infrastructure Management ☐Application Management

☐Security Department ☐ Facilities Management ☐ HRD

1.6 Position in the company

☐Clerical ☐Professional ☐Managerial

PART II: QUESTIONS RELATED TO INSIGHT OF EMPLYEE'S ON CLOUD-BASED ERP IMPLEMENTATION

The following are insights on cloud-based ERP implementation. How do you rate your insight on cloud-based ERP? From the scales given, indicate your insight with (X) mark for the statements listed below. The rate are: 1 = Very Low (VL), 2 = Low (L); 3 = Moderate (M), 4 = High (H), 5 = Very High (VH)

S.No	Items	VL	L	M	H	VH
1	Your Knowledge about cloud computing is	☐	☐	☐	☐	☐
2	Your Knowledge about Security on Cloud-based ERP is	☐	☐	☐	☐	☐
3	Your Understanding of the difference between cloud-based ERP and ERP on premise is	☐	☐	☐	☐	☐
4	Your Knowledge about all cloud-based ERP modules implemented in the bank is	☐	☐	☐	☐	☐
5	Your knowledge about how to access ERP modules using your mobile devices and smartphone is	☐	☐	☐	☐	☐
6	Your knowledge on which enterprises size (small, medium or large) is most appropriate for cloud-based ERP is	☐	☐	☐	☐	☐
7	Understanding of Cloud-based ERP Offer On-Demand and Self-Service Flexibility	☐	☐	☐	☐	☐
8	Knowledge about Complexities of Cloud-based ERP	☐	☐	☐	☐	☐

9	Knowledge about why Cloud-based ERP system implementation for financial institutions for their ERP implementation	☐	☐	☐	☐	☐
10	Knowledge about cost of Cloud-based ERP	☐	☐	☐	☐	☐
11	Knowledge about compliance issue on Cloud-based ERP implementation	☐	☐	☐	☐	☐

PARTIII: QUESTIONS RELATED TO THE BENEFITS OF CLOUD-BASED ERP IMPLEMENTATION

Please read each item carefully and show the extent of your agreement on the statements by putting (X) in the next columns using the following rating scale (Likert Scale). The rate are: 1 = Strongly Disagree (SDA), 2 = Disagree (DA); 3 = Uncertain (U), 4 = Agree (A), 5 = Strongly Agree (SA)

S.No	Items	SDA	DA	U	A	SA
1	Needs cheap initial investment	☐	☐	☐	☐	☐
2	Needs limited investment on hardware (e.g., infrastructure server)	☐	☐	☐	☐	☐
3	Lower upfront cost	☐	☐	☐	☐	☐
4	Lower operating cost	☐	☐	☐	☐	☐
5	Data is stored on vendor's servers and security is usually in the hands of the vendor.	☐	☐	☐	☐	☐
6	Rapid updates and upgrades	☐	☐	☐	☐	☐
7	Improved system availability and disaster recovery	☐	☐	☐	☐	☐
8	Using security standards	☐	☐	☐	☐	☐
9	Ease of customization due to its flexibility	☐	☐	☐	☐	☐

10	Requires less time for Implementation	☐	☐	☐	☐	☐
11	Scalability	☐	☐	☐	☐	☐
12	Focus on core competencies	☐	☐	☐	☐	☐
13	Using advanced technology	☐	☐	☐	☐	☐
14	Improved accessibility, mobility and usability	☐	☐	☐	☐	☐
15	Easy integration with cloud services	☐	☐	☐	☐	☐
16	Shorter time to go live	☐	☐	☐	☐	☐

PART III: QUESTIONS RELATED TO THE CHALLENGES OF CLOUD-BASED ERP IMPLEMENTATION

Please read each items carefully and show the extent of your agreement on the statements by putting (X) in the next column using the following rating scale (Likert Scale). Here the scaling rate are, 1 = Very Low (VL), 2 = Low (L); 3 = Uncertain (U), 4 = High (H), 5 = Very High (VH)

S.No.	Items	VL	L	U	H	VH
1	High cost of ownership over the system's entire life cycle	☐	☐	☐	☐	☐
2	Subscription expenses	☐	☐	☐	☐	☐
3	Hidden costs in the contract	☐	☐	☐	☐	☐
4	With data security being in the hands of vendors, its safety cannot be totally guaranteed	☐	☐	☐	☐	☐
5	Security problem (Encryption, Access & identity management, Network security, Industry Secrecy)	☐	☐	☐	☐	☐

6	Control over cloud-based ERP	☐	☐	☐	☐	☐
7	Challenges related to Bandwidth & Traffic management through Internet	☐	☐	☐	☐	☐
8	Guarantee on the Average Network Latency	☐	☐	☐	☐	☐
9	Physical location of the ERP system Data is in cloud	☐	☐	☐	☐	☐
10	Customization and integration limitations	☐	☐	☐	☐	☐
11	Loss of technical knowledge of staffs	☐	☐	☐	☐	☐
12	Functionality limitations	☐	☐	☐	☐	☐
13	SLA issues	☐	☐	☐	☐	☐
14	Performance risks	☐	☐	☐	☐	☐
15	Compliance risks	☐	☐	☐	☐	☐
16	Migration between Cloud service providers (CSPs)	☐	☐	☐	☐	☐
17	Knowledge about the cloud	☐	☐	☐	☐	☐
18	Startup support	☐	☐	☐	☐	☐
19	Organizational challenges	☐	☐	☐	☐	☐
20	lack of industry standards in providing the Software as a Service (SaaS)	☐	☐	☐	☐	☐

Finally, I'd like to thank you very much for your unreserved co-operation and time spend for this questionnaire.

If you have any questions related to this questionnaire, don't hesitate to contact me,

deselun@gmail.com

Tel: 0911632557

Open ended Questions (**Interview)**

1. What factors push the bank to implement Cloud-based ERP?

2. What the bank wants to improve by implementing Cloud-based ERP?

3. What was your insight/understanding on cloud computing and cloud-based ERP before and after implementation?

4. What are the major benefits the bank has accomplished by implementing Cloud-based ERP?

5. What were the major challenges faced during the implementation of the project?

6. In which areas does the cloud-based ERP project gives you a better insight?