ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

SCHOOL OF INFORMATION SCIENCES

Assessment of Enterprise Resource Planning Post-Implementation Success: The Case of Ethio telecom

A thesis submitted to the school of Information Science In partial fulfillment of the requirements for the degree of master's in information sciences

By

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APPROVED BY BOARD OF EXAMINERS

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Chair of Department Graduate Program Coordinator

DECLARATION

I declare that the thesis is my original work and has not been presented for a degree in any other university.

Signature: _____

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

Advisor's Signature: _____

DEDICATION

This paper is dedicated to my beloved wife konjit Bekele, our kids Kenean and Nahom who always love me unconditionally.

ACKNOWLEDGEMENTS

Above all, thanks to the Almighty God for enabling me to complete this study.

I would like to express my deepest gratitude to Dr. Melakamu Bayene, the advisor of my thesis for his valuable guidance, support and dedication throughout the period of the study**.**

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LIST OF ACRONYMS

BOMP -Bills of Material Processor

BSS –Business support system

CCB-Customer care and billing

CRM – Customer relationship management

CS- Customer satisfaction

CSF-Critical success Factors

ERP- Enterprise resource planning

ES- Enterprise system

ESS- Enterprise system success

ET -Ethio telecom

EVA -Economic Value Added,

II- individual Impact

IS- Information System

IQ-Information quality

IRR- Internal Rate of Return

MRP -Material Requirement Planning

MRP-II Manufacturing Resources Planning

NPV -Net Present Value

OI-Organizational Impact

PCA- Principal component Analysis

ROCE -Return on Capital Employed

ROI -Return on Investment

SQ-System quality

SPSS-Statistical package for social science

ABSTRACT

The main objective of this study is to assess the success of ERP post-implementation at Ethio telecom. The general approach of this research was a case study in which a combination of quantitative and qualitative methods has been used to collect and analyze data. The quantitative data was collected using questionnaires from sample population of 320 users from HR, Finance and sourcing & facility departments with different job positions, roles, and work experience. The collected data was analyzed using SPSS. In the qualitative study, direct interviews were used to collect data from three executive management members of Ethio telecom. A theoretical ERP success model was used to assess the success of ERP Post- implementation at Ethio telecom. The results of this study show the deployed ERP system has brought significant impact on individual performance by enhancing employee awareness and recall of job- related information, increased employee productivity and decision-making activities during post-implementation phase. Similarly, the study report shows there is positive impact in organizational business process managements by integrating and improving internal communication, providing accurate & real-time information, increasing efficiency and productivity, reduces administrative and operations costs, and resulted better positioning for e-government and online business transactions. Even though ET has gained many benefits from deployed ERP system, some challenges were encountered during post implementation phase. Among those challenges ERP system response time delay (slow response), ERP system data integration with other ET soft-wares, ERP system is not always up and running as necessary, lack of training & IT-helpdesk support to solve the problem were the main challenges during post implementation phase. Hence, the researcher has recommended that Ethio telecom is expected to resolved challenges of ERP system interruptions, ERP data integration, ERP system slow performance, ERP system flexibility, lack of adequate training and IT-help desk support as top priority to get the full-fledged benefits from deployed ERP System.

Keywords: ERP, ERP Post-implementation, Individual impact, organizational impact, information quality, system quality and satisfaction.

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CHAPTER ONE

INTRODUCTION

1.1 Overview of the Chapter

This chapter briefly introduces the research that is undertaken in this thesis. The chapter is organized in to seven subsections. The first section gives some background information about the study area followed by a discussion on the main problems and research questions of the study, Statement of the problem, Research questions, Objectives of the study, Significance of study, Scope of study, Limitations of the study, and Organization of the study.

1.2 Background of the Study

An ERP system is technology infrastructures that assist a company to integrate information from all internal departments with suppliers and customers. ERP system is an integrated, configurable and customizable information system, which plans and manages all the resources in the enterprise, streamlines and incorporates the business processes within and across the functional or technical departments in the organization (She and Thuraisingham, 2007). ERP supports a process-oriented view of the enterprise and provides standardized business processes and real-time financial and production information for the management (Nah and Delgado 2006; May 2003).

There are many reasons why businesses are adopting ERP (Davenport, 1998; Hallikainen et al.2004). Some reasons include replacing existing legacy systems, reducing cost and faster information transactions. ERP system provides consistency and visibility or transparent information flow across the entire enterprise, which helps to improve the business process efficiency and enhance the competitive advantage of organization. It is imperative for organizations to have this tool to facilitate the coordination of several activities within the organizations.

Enterprise resource planning (ERP) systems have become very important in modern business operations; it has played a major role in changing organizational computing for the better. One study found that more than 60% of Fortune 500 companies had adopted an ERP system (Stewart, Milford, Jewels, Hunter, & Hunter 2000). These systems have been credited with reducing

inventories, shortening cycle times, lowering costs, and improving supply chain management practices. ERP has been credited within creating the Speed with which information flows through a company (Davenport, 1998). ERP has also been credited with creating value through integrating activities across a firm, implementing best practices for each business process, standardizing processes within organizations, creating one-source data that results in less confusion and error, and providing online access to information (O'Leary, 2000). All these features facilitate better organizational planning, communication, and collaboration (Olson, 2004).

There are not only benefits that can be achieved from an ERP system implementation; there is already evidence of failure in projects related to ERP implementations, which are found in the literature (Davenport, 1998). Competitively and technically, implementing ERP is a must do, but economically there are costs which are difficult to justify, and it is difficult to implement a long-lasting business advantage (Willcocks and Sykes, 2006). An investment in ERP represents a significant commitment of resources and it has a dramatic effect on operational aspects of a business (Nicolau, 2004). Business needs are changing rapidly, and new requirements are often influencing business processes. Because of the new business needs which are coming up the company which wants to hold up or achieve competitive advantage must react immediately and the quality of the adopted or implemented solution is often poor (Kronbichler et al., 2009).

According to different studies, many ERP projects neither bring the expected results or lead to the failure of the project. Cooke et al. (2001) studied 117 companies that has implemented ERP where: 25 percent of all the projects were out of budget, 20 percent of the projects were abruptly discontinued for various reasons, and the remaining 55 percent did not achieve the intended goals within one year after the official project ended. Some problems arise from technical aspects, while majority caused by management, social and organizational issue within the companies. This shows the extent to which ERP Post-implementation achievement needs further study.

1.3 **Statements of the problem**

ERP Post implementation phase in organizations have become a serious issue, as there are significant efforts and costs associated with it. Most of the issues with post ERP implementation were related to project management issues, organizational structure and behavior, human factors. In this phase, the system put into the working environment and the actual end users were given

exposure to the system. End users learn to use the system, systems go through dynamic workloads and their performance limits were crosschecked in real life scenarios.

ERP post-implementation has emerged as research topic that requires attention from IS researchers (Pan, Nunes, & Peng, 2010, p. 108). The major problems of ERP post-implementation failure are not only technologically related issues such as technological complexity, compatibility, standardization, etc., but mostly organization and human related issues such as resistance to change, organizational culture, incompatible business processes, project mismanagement, top management commitment, etc. These risk factors illustrate various organizational considerations: organization fit, skill mix, project management and control, software system design, user involvement and training.

ERP failure can occur at different stages of an ERP's life cycle including the post-implementation phase (Peng & Nunes, 2009). It has been argued that many organizations have trouble in achieving the projected business results during the post-implementation phase when the deployed ERP system is underutilized (Davenport et al., 2004; Esteves, 2009). Moreover, some of the issues that firms face during post-implementation phase are the effect of unrecognized or unresolved problems from pre-implementation and implementation phases. However, the firm needs post-implementation management since it has no control over these past errors and deficiencies (pan et al., 2009).In other words, organizations need a long-term view that ERP implementation is not the end of the journey; but rather the starting point of a long excursion towards innovation, continuous improvement, and flexibility (Willis and IS, 2002).This indicates that ERP post- implementation is one of the critical stage that needs to analyze the success of the ERP system in organization (Koouki et al., 2007).Therefore, ERP post-implementation emerges to be an interesting research topic and it is being considered by IS researchers (Yu, 2005; Peng & Nunes, 2010; Pan et al., 2009)

Only limited studies are conducted regarding ERP system implementation in Ethiopian context. Abiot & Jorge (2012). tried to assess Successful ERP Implementation in an Ethiopian Company: A case Study of ERP Implementation in Mesfin Industrial Engineering Pvt. Ltd. Tewodros G.rufael (2007), has also tried to review Design of Enterprise Resource Planning (ERP) Frame work and its implementation, Gafat Engineering, Derese Agonafir(2013) has conducted a study on "Ensuring

Successful Implementation of Enterprise Resource Planning (ERP): The Case of Ethio-Telecom", 2013.

Elsa Tadele (2015) has conducted study on "ERP Post-Implementation Management Framework": The case of Ethiopian Airlines. This research was conducted by considering Ethiopian airlines as a single case organization. Since Ethiopian airlines is in a service sector, the researcher recommended future research in other sectors that are Ethiopian based manufacturing firms. Moreover, instead of single case, multiple case studies can give a holistic picture of ERP post-implementation success issues. In addition to this, conducting ERP post-implementation related research on organizations with other ERP system package can also help to get all-rounded solutions of ERP system utilization issues. Most of the organizations in Ethiopia have started to Implement ERP.Ethiotelecom also Implemented ERP since 2011 to improve its business management qualities. But the success of ERP post-implementation study was not conducted. Therefore, it is important to conduct this research to understand success and challenges encountered during ERP post-Implementation phase at Ethiotelecom.

In this regard, this study explores and answers the following research questions.

1. What is the Impacts of ERP at individual level during post-implementation in Ethio telecom?
2. What is the Impacts of ERP at organizational level during post-implementation in Ethio telecom?
3. What are affecting factors of ERP system during ERP post-implementation phase in Ethio telecom?

1.4 Objectives of the study

1.4.1 General objectives

The general objective of this research is to assess the ERP post-implementation success in Ethio telecom and give valuable recommendation for further improvement.

1.4.2 Specific objectives

The specific objectives of this research are

1. To identify the Impacts of ERP system at individual level during post-implementation phase.

2. To identify the Impacts of ERP system at organizational level during post-implementation in Ethio telecom.
3. To Identify the factors that affect the ERP post-implementation success in Ethiotelecom

1.5 Significance of the study

Recently most of the organizations in Ethiopia have started to Implement ERP technologies to improve their organization business management. Ethio telecom also Implemented ERP since 2011 to improve its organizational business qualities. However, the success of ERP post-implementation study was not conducted. Therefore, it is very important to conduct this research to understand the status of ERP post implementation success at individual and organizational level. This is supported by successful implementation of an ERP system is not only a first step accomplishment towards achieving ERP success in terms of realization of business results. In other words, ERP implementation is not the end of the journey, but rather, the beginning of the long road way towards innovation, improvement, and flexibility (Smyth, 2001; Willis & Willis, 2002; Yu, 2005; Koouki et al., 2007; Peng & Nunes, 2009; Peng & Nunes, 2010; Ononiwu, 2013).

The study helps to take corrective actions for further ERP Post-implementation success in Ethio telecom.

The researcher believes this study may fill the literature gap on ERP post-implementation in Ethiopian context and can be used as a reference for future research.

1.6 Scope and limitation of the study

The study has been limited to the assessment of ERP post-implementation success in Ethio telecom, right after the ERP system is running stable and users have familiarized themselves with the basic functions of ERP system. Therefore, the assessments cannot address the project implementation phase.

This research was limited to only Ethio telecom ERP post implementation phase and cannot address other organizations.

The study considers limited ERP post-implementation success measures.

Very limited availability of documents related to ERP post implementation in Ethiopian context.

1.7 Organization of the thesis

The thesis was organized in to five chapters. The first chapter deals with introductory part, which consists of background of the study, Statement of the problem, Objectives of the study, Significance of the Study, Scope and Limitations of the study. The second chapter deals with review of Related Literature. It deals the concepts of ERP evolution and life cycle, ERP system implementation, ERP Critical success Factors, ERP post implementations challenges, ERP/ IS success measurement models. In chapter three, methodology and Research design, the research model is discussed in detail. The fourth chapter presents Discussion and analysis based on the collected data on assessments of ERP post implementation in Ethio telecom. After collecting the data, the results of the study were analyzed and interpreted. The fifth chapter declares summary, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Over View of the chapter

This chapter describes the literature reviews, which is undertaken in this thesis. The chapter is organized in to six subsections. The first section describes definitions and evolutions of ERP system followed by ERP system benefits, ERP implementation and post implementations, Critical success Factors, IS/ERP measurement models and Related literature review in Ethiopian context.

2.2 What is ERP?

An ERP system is a technology infrastructure that can assist a company in integrating information from all internal departments with suppliers and customers. It links all areas of a company's internal functions and processes with the external ones to create a close relationship between customers and suppliers. ERP also allows information to be shared between different partners, supports the effectiveness of the supply chain management, and improves the flow of information. These should enable managers to make better decisions based on more accurate and up-to-date information (Al-Mashari & Zairi, 2000).

Enterprise resource planning (ERP) systems have become very important in modern business operations, as ERP has played a major role in changing organizational computing for the better. One study found that more than 60% of Fortune 500 companies had adopted an ERP system (Stewart, Milford, Jewels, Hunter, & Hunter 2000). These systems have been credited with reducing inventories, shortening cycle times, lowering costs, and improving supply chain management practices. ERP has been credited with increasing the speed with which information flows through a company (Davenport, 1998). ERP has also been credited with creating value through integrating activities across a firm, implementing best practices for each business process, standardizing processes within organizations, creating one-source data that results in less confusion and error, and providing online access to information (O'Leary, 2000). All these features facilitate better organizational planning, communication, and collaboration (Olson, 2004). Al-Mashari (2003) noted that, since the 1990s ERP system have been considered by many researchers and

practitioners as one of the most innovative developments in Information Technology and one of the most well-known IT solutions for this decade, and this is in fact because ERP system has become one of the main prerequisites and the backbone of e-business era. There are many reasons why businesses are adopting ERP. Some reasons include replacing existing legacy systems, reducing cost and faster information transactions. ERP system provides consistency and visibility or transparent information flow across the entire enterprise, which helps to improve the business process efficiency and enhance the competitive advantage of organization. (Davenport, 1998; Hallikainen et al., 2004)

2.2.1 The evolution of ERP

The evolution of ERP systems started in the 1960s when the main manufacturing systems in companies are inventory control. At that time, the software main aim was to manage inventory whereby the main emphasizes were placed on the activities of Bills of Material Processor (BOMP)

In the 1970, most organizations shifted their focus to Material Requirement Planning (MRP) systems. MRP make use of software applications for preparation production processes. With MRP systems, a master schedule which is built for the product is translated into time-phased net requirements for the production activities such as subassemblies, components and raw materials planning and procurement.

In the 1980s, MRP moved to its second stage whereby Manufacturing Resources Planning (MRP-II) was developed and was an extension of MRP to utilize software applications for coordinating manufacturing processes and distribution management activities.

In the early 1990's, MRP-II started to cover a larger area in businesses and included areas such as Engineering, Finance, Human Resources, Projects Management etc. i.e. the complete of whole activities within any business enterprises. These MRP II extensions are what are now known as ERP.

During the 1990s, Internet technologies start to grow. The growths of Internet technologies have also improved ERP systems. ERP vendors looked at their system as an e-business suite, which allows companies to add additional modules, and functions into their ERP systems as their needs increased or business expanded. Such ERP system for example, might help integrate e-commerce

front store of companies and link it to the companies' CRM and Supply Chain Management Systems. As Internet technologies is low cost, and has a universal standard, the Internet enabled ERP systems were able to allow customers to gain unmediated access into their supplier's ERP system anytime, anywhere. There are many ERP systems vendors in the market today, but only a handful of them share the ERP market, which dominates about 60 percent of it. Evolution of ERP systems

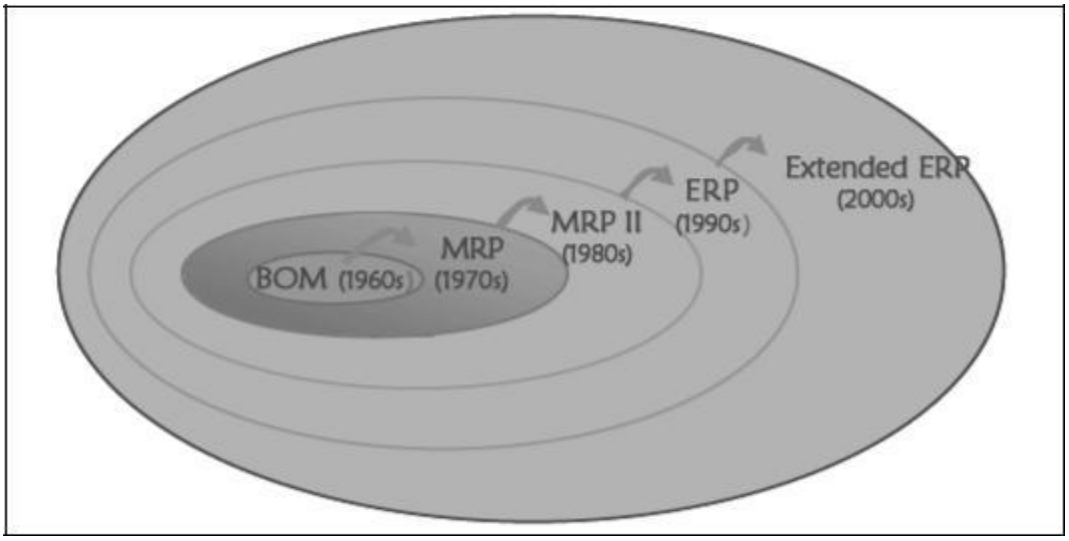

Figure2.1 Evolution of ERP (Rashid, M. A., Hossain, L., & Patrick, J. D. 2002)

2.2.2 ERP lifecycle

ERP systems are complex systems and require proper planning and total support (support from management, employees and end-users) for its successful implementation. A successful ERP implementation raises the productivity of the enterprise and results in increased customer satisfaction. A company is likely to benefit more if it is fully integrating ERP into its day-to-day business operations of the company. An effective ERP system will be able to accommodate rapidly changing business conditions.

ERP Lifecycle Framework by Esteves and Pastor

The ERP Lifecycle Framework given by Esteves and Pastor (Esteves, J., & Pastor, J. (1999, November). include the following phases as shown in figure 2.2

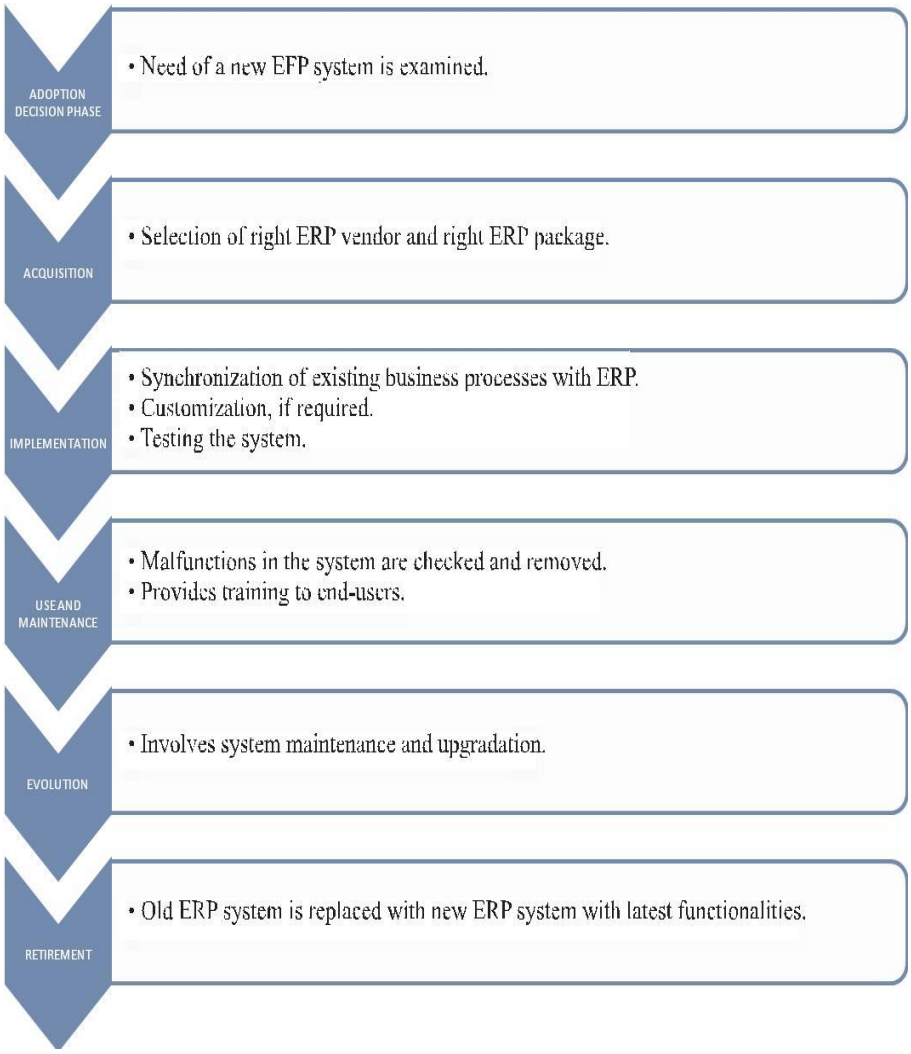

Figure 2.2 ERP life Cycle by Esteves and pastor (Esteves, J., & Pastor, J. (1999, November)

The ERP Lifecycle Framework given by Esteves and Pastor include the following phases

Adoption Decision Phase

In this phase, the need of a new ERP system is examined for the organization. The business requirements, the nature of the operations and the goals and objectives of the company are carefully studied. What impact the ERP system will have on the company is also determined before deciding to go for ERP adoption. It is necessary to assess the organization's readiness, management's support and IT skills required before the ERP adoption decision is taken.

Acquisition Phase

This phase involves selecting the vendor and the ERP software that best addresses the needs of the business. The pricing models offered by different vendors, the functionality of different ERP products, training required are some of the factors that are considered for selecting an ERP package from a vendor. The selection of a right ERP package for the organization will minimize the risk often associated with ERP implementation and increase the likelihood of success.

Implementation Phase

In this phase, efforts are made to synchronize existing business process with the ERP software package. Customization of the acquired ERP software may be required to meet the specific needs of the business. This phase also involves testing the ERP system and providing training on the new system. It is necessary to test data, procedures and processes before launch of ERP system to minimize errors after deployment.

Use and Maintenance Phase

In this phase, the ERP system is up and running. The system needs to be corrected in case of any malfunctions in the system. End-users are trained to use ERP system efficiently so that benefits from the system are obtained.

Evolution Phase

Upgradation and changes in ERP system is important and essential to improve the performance of business. Here, additional capabilities are integrated into the company's ERP system to obtain additional advantages. In "upwards" evolution, functionality in the ERP system is provided in such a way that it enables decision making with applications such as advanced planning and schedule, data warehouses and business intelligence systems. In "outward" evolution, ERP system is integrated with web and E-Commerce. It delivers added value to the traditional business ERP system.

Retirement Phase

An ERP system may become vulnerable to legacy system problems in the long run as technologies and the business state of art change with time. It is advisable to retire the ERP system when the ERP system begins to provide difficulty in modifying and evolving itself to meet new and

constantly changing business requirements. The company may decide to replace ERP system with another newer ERP system with latest functionalities required.

2.2.3 The ERP system benefits

ERP systems are being worked out for the organizations who exceedingly wish their business expanded quickly and with no trouble and want to remain on top, keep up with revolutionary technologies, and maintain good relationships with clients. Here you can find several benefits you can get while using ERP system.

- Real time integration throughout the whole company
- Deep performance and financial visibility
- Careful management of regulatory compliance risk
- Deployment of new operational and technological models
- Increase in revenues from products and service
- More effective management of existing asset base and careful planning of new asset investments.

Zeng, Lu, and Skibniewski (2012) summarized the benefits that can be gained from the ERP system, which they classified into five different dimensions:

1. Operational benefits: ERP systems can provide benefits in terms of cost, cycle time, performance, and quality.

2. Managerial benefits: ERP systems can improve decision-making and planning.

3. Strategic benefits: ERP systems can support business growth and innovations.

4. IT infrastructure benefits: ERP systems provide flexibility for current and future changes.

5. Organizational benefits: ERP systems are expected to empower workers and build a common vision.

2.3 ERP system implementation

Many companies around the world began implementing ERP system in 1990s. The main reason behind the implementation of ERP system is to re-engineer business processes through a uniform information system (Rajagopal, 2002). During the mid to late 1990s, around 30,000 companies worldwide implemented ERP system (Mabert et al., 2003). Companies worldwide have spent $10 billion per annum on ERP systems (Yusuf et al., 2004). Between 1996 and 2003, there was a tremendous upward growth in the number of ERP systems. Many leading international companies have successfully implemented ERP systems. These companies have experienced the expected benefits of ERP system. An order with Autodesk Software Company that used to take two weeks was completed within four hours. Cisco's ERP system enabled it to cut costs and substantially increase its revenue. ChevronTexaco improved its supply chain management through the implementation of an ERP system. It achieves an annual net profit of $100 million. IBM's R/3 implementation was one of the most successful implementations (Chen, 2001; Davenport, 1998; Turban et al., 2008; Sheikh, 2003). However, there have been some significant failures. Dell felt that ERP system would fail to cope with their sales volume. Thus, it cancelled the ERP project and lost $115 million. Another case in point was FoxMeyer. The pharmaceutical giant suffered a loss of $100 million and made bankrupt after unsuccessful implementation (Chen, 2001; Davenport, 1998).

Implementation of ERP system is very costly and takes a long time to implement. This reason prevents many companies from implementing ERP system and limits the market share of ERP systems. However, to solve this problem, top ERP vendors need to develop special ERP packages to meet the need of small size companies to increase the market share of ERP systems. With this solution, small and medium sized companies can also benefit from ERP system. This solution also enables the global proliferation of ERP systems (Zheng et al., 2000; Rashid et al., 2002). Implementing technological solutions and techniques such as ERP system could improve and integrate the internal and external flow of information within an organization. Such innovations would also improve performance, enhance decision-making based on accurate information and improve the relationship, collaboration, and exchange of information. It would improve the movement of goods and services to outsource suppliers, customers, and other partners in the supply

chain and finally achieve a competitive advantage and increase profitability (Wieder et al., 2006; Kremzar & Wallace, 2001).

2.3.1 Challenges of ERP system implementation

Despite ERP's significant growth from the late 1990's to the present day, there are a number of challenges that companies may encounter when implementing ERP. Dillard and Yuthas (2006) stated that most multinational firms are using ERP and that more small and midsize companies have begun to adopt ERP. Despite ERP's promises to benefit companies and a substantial capital investment, not all ERP implementations have successful out comes. ERP implementations commonly have delayed an estimated schedule and overrun an initial budget (Ehie & Madsen, 2005; Helo,Anussornnitisarn &b Phusavat, 2008).Furthermore, the literature indicates that ERP implementations have sometimes failed to achieve the organization's targets and desired outcomes. Much of the research reported that the failure of ERP implementations was not caused by the ERP software itself, but rather by a high degree of complexity from the massive changes ERP causes in organizations (Scott & Vessey, 2000; Helo et al., 2008; Maditinos, Chatzoudes & Tsairidis, 2012).These failures can be explained by the fact that ERP implementation forced companies to follow the principle of 'best practices' in most successful organizations and form appropriate reference models. (Zornada & Velkavrh, 2005) According to Helo et al., (2008), "Unlike other information systems, the major problems of ERP implementation are not technologically related issues such as technological complexity, compatibility, standardization, etc. but mostly organization and human related issues like resistance to change, organizational culture, incompatible business processes, project mismanagement, top management commitment, etc.".

2.3.2 Critical success factors for ERP implementation

Rabaa'i (2009), Presented the top 12 most frequently cited Critical success factors (CSFs) for ERP implementation are: Top management commitment and support, change management, project management, business process re- engineering and system customization, training, ERP team composition, visioning and planning, consultant selection and relationship, communication plan, ERP system selection, ERP systems integration, and post-implementation evaluation measures.

Top management commitment and support: Successful ERP implementation depends on management to prepare for challenges that might be faced (Motwani, Mirchandani, Madan & Gunasekaran, 2002), as well as senior management who are involved in overall strategy of the company and are not familiar with technical aspects (Yusuf, Gunasekaran & Abthorpe, 2004). Also, top management commitment and support leads to overall organizational commitment across an organization.

Change management: Ehie and Madsen (2005) stated that ERP implementation involves more than changing software or hardware systems. Ideally, by reengineering business processes, ERP implementation can help an organization to benefit from higher levels of efficiency and improved performance. Therefore, ERP implementation may cause changes that lead to resistance among employees (Glover, Prawitt & Romney, 1999). Consequently, balancing conflicts between staff and technology and effectively managing employees in the change process are key elements for the successful ERP implementation (Ash & Burn 2003).

Project management: Effective project management is critical for the successful ERP implementation (Umble, Haft & Umble, 2003; Nah & Delgado, 2006). Bingi, Sharma, and Godla (1999) found that "a lack of proper understanding of the project needs and the inability to provide leadership and guidance to the project" are the main factors when ERP implementation fails. Thus, effective project management should define clear project objectives, develop a work and resource plan, and carefully track the project's progress.

Business Process Re-engineering and system's customization: There are two approaches to implementing ERP systems in an organization: reengineering business processes and ERP customization (Shehab, Sharp, Supramaniam & Spedding, 2004). Business process reengineering creates deep changes in organizational processes in order to fit them to ERP functions. On the other hand, when an organization wishes to maintain its existing processes using an ERP system, it can customize ERP functions. However, many researches indicate that ERP customization should be avoided or minimized to achieve the full benefits offered by ERP systems (Shanks, Parr, Hu, Corbitt, Thanasankit & Seddon, 2000; Light, 2001; Bajwa, Garcia & Mooney, 2004).

Training: End user training has been recognized a critical factor for ERP implementation (Bajwaet al., 2004). Due to the complexity of the integrated ERP system, end user training is essential for a

robust understanding of how the system works and how to use it. Consequently, appropriate end user education and training will maximize ERP benefits and increase user satisfaction.

ERP team composition: Since ERP covers diverse functional areas across an organization, ERP team composition is also important for the successful ERP implementation; an ERP project team should consist of representatives from all functional units related to ERP.

Consultant selection and relationship: ERP consultants play a critical role in ERP implementation. Consultants can be essential knowledge resources for ERP's hardware, software, and personnel. They also can help staff, have responsibility for project management, and audit the project. On the other hand, to be successful system maintenance after post-implementation, knowledge transfer from consultants is crucial for the organization.

Communication plan: Strong communication within the entire organization during the implementation process increases success for ERP implementation. It allows the organization's stakeholders to understand the goal and the expected benefits of the project as well as to share the progress of the project. An "open information policy" protects the various communication failures for the project. (Al-Mashari, Al-Mudimigh, and Zairi, 2003) While the critical success factors can lead to success of ERP implementation, they do not guarantee it. Al- Mashari, Al-Mudimigh, and Zairi (2003) state that the delivery of the critical success factors is one major condition to lead to benefits from ERP implementation, and they suggests that IT projects can be considered successful as according to the following terms: Correspondence success which occurs when there is a match between IT systems and the specific planned objectives. Process success: - which occurs when IT project is completed within time and budget. Interaction success: - which occurs when users' attitudes towards IT are positive. Expectation success: -which occurs when IT systems match users' expectations.

In addition, the taxonomy represented in below (Al-Mashari et al., 2003) illustrates the interplay between core business strategy aspects in the ERP implementation and explains how the role of IT and associated systems can play in supporting the effective deployment.

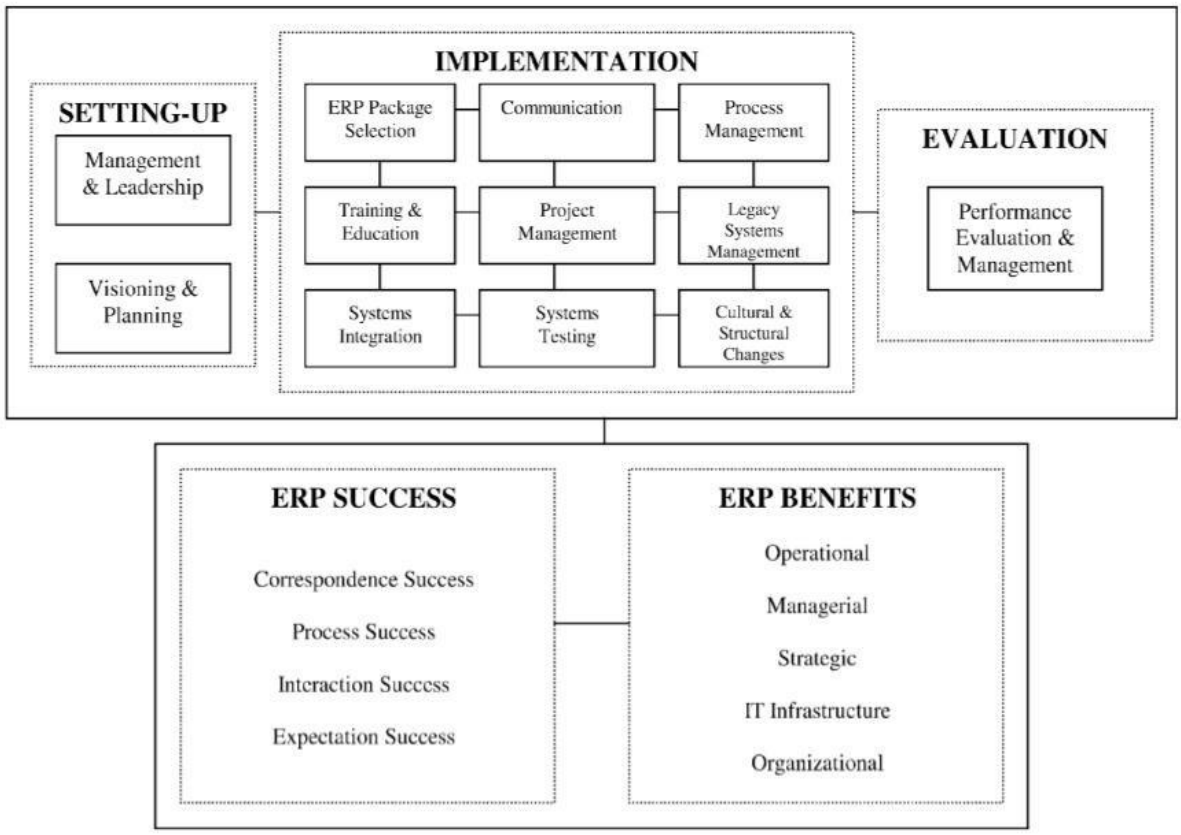

Figure 2.3 Taxonomy for ERP critical factors (Al-Mashari et al., 2003)

2.3.3 ERP post-implementation

The post implementation period for ERP systems begins after the implementation phase of an ERP system. The post implementation phase provides on-going support such as maintenance, training, and upgrades to help organizations sustain and prevent any disruptions to the system. To avoid an IS failure, the system requires continuous support from top management (McGinnis & Huang, 2007; Salmeron & Lopez, 2010). Nicolaou and Bhattachanya (2008) reported that maintaining the post implementation phase of an ERP system could support the long-term performance gain and efficiencies of the system. Many organizations upgrade and maintain their ERP systems in the post implementation phase to prevent any disruptions to the daily operations of the business (Ng, Gable, & Chan, 2002). According to Willis and Willis-Brown (2002), the post implementation stage has many challenges because the go-live phase signals a new beginning, the performance of the system continues to be challenging but necessary because the system must be extended to satisfy the current and all future business requirements (Muscatello & Chen, 2008;

Wei, Liou, & Lee, 2008). Other studies have also noted that one of the main challenges in ERP systems is the high cost of maintenance and support (Law, Chen, & Wu, 2010; Salmeron & Lopez, 2009). Previous studies have indicated that training and education should be provided to end users during the implementation process. It is suggested that organizations apply training to end users during the implementation life cycle of an ERP system (Amoako-Gyampah & Salam, 2004; Woo, 2007).

According to Peng and Nunes, (2009), organizations often encounters a wide range of risks during an ERP system post-implementation phase which incorporates using, maintaining, and enhancing ERP systems after the go-live stage. These issues are not only the technical aspects, but are also, and more importantly can be found in diverse operational, strategic, and organizational areas (Peng and Nunes, 2010). Some organizations that have implemented ERP have failed to achieve the expected business values due to underutilization; while others have abandoned using the system even though the initial implementation was successful (Smyth, 2001; Willis & Willis, 2002, Peng & Nunes, 2009).

The successful implementation of an ERP system is not only a first step accomplishment towards achieving ERP success in terms of realization of business results. In other words, ERP implementation is not the end of the journey, but rather, the beginning of the long road way towards innovation, improvement, and flexibility (Smyth, 2001; Willis & Willis, 2002; Yu, 2005; Koouki et al., 2007; Peng & Nunes, 2009; Peng & Nunes, 2010; Ononiwu, 2013). As with any IS, an ERP system should be exploited to realize the expected business values (Jasperson, et al., 2005).

ERP System initiatives lower the performance of the organizations immediately after their implementations and take at least 2-3 years to produce sustainable benefits (Baer 1999; Davis 1999; Levingston 1999; Mabert et al. 2000; Radding 1999; Ross and Vitale 2000). These challenges have generated new interests and research on approaches to performance measurement, performance evaluation and business value creation from Enterprise Systems, with emphasis on a balance between financial (quantitative and historic) measures and non-financial (qualitative and futuristic) measures (Bruggeman 1999; Eicklemann 1999; Thorp 1998; Van der Zee 1999a; Van der Zee 1999b).

2.4 Information system (IS) / ERP success measurement models

Although success is complex and difficult to measure, researchers are making efforts in doing so. Most of the practical measurements focus on delivering a functional IS product within certain economic and temporal constraints. ERP system must first accept to be used and that should increase the probability of system success (Behrens et al., 2005). The impacts resulting from Enterprise Systems are arguably difficult to measure (Baer 1999; Davis 1989; Deloitte Consulting 2000; Knowles et al. 2000; Sedera et al. 2001): An ERP System entails many users ranging from top executives to data entry operators; many applications that span the organization; and a diversity of capabilities and functionality. There are several advantages of applying a performance measurement system in ERP Systems implementation, especially for top management. These reasons include:

Enterprise Systems expenses are significant - as Enterprise Systems expenditure grows and becomes a significant portion of business costs, top management and stakeholders become increasingly interested in being able to compare the value of these expenditure with the obtained benefits and compare those benefits with how other organizations benefit from a similar Enterprise Systems;

To find out the benefit generating areas - top management wants to find the benefit generating points (if any) so that they can further exploit these and apply corrective measures where the benefits are small;

Enterprise Systems performance measures aid in a competitive thrust - performance measures help top management to obtain and maintain Key Performance Indicators (KPI);

As an aid for innovation – As consequence of the above, top managers can identify and exploit areas for deploying innovative business strategies (Parker, Benson and Trainor 1988; Sedera, Rosemann and Gable 2001; Sethi, Hwang and Pegels 1993).

Recent studies indicate that issues pertaining to IS / ES evaluation and management are of great importance to managers all over the world (Brancheau, Janz and Wetherbe 1996; Burn, Saxena, Ma and Cheung 1993; Galliers, Merali and Spearing 1994). The increased role of and dependency on Enterprise Systems, and the 'uncertainty' of benefits, have in combination magnified the need to

monitor and measure Enterprise Systems performance.

According to (Vickers 2000), organizations should analyze Enterprise Systems by justifying the initial purchase with return on investment and trying to find the Return on Investment post-implementation. However, Vickers further (2000) states that cost justification in some sectors, such as manufacturing, are straight forward, where the tangible benefits are much larger than the intangible benefits, but states that the cost justifications is harder in services-oriented organizations. In measuring ES-Success, many traditional measurement and evaluation methods (e.g. Return on Investment [ROI], Economic Value Added [EVA], Net Present Value [NPV], Internal Rate of Return [IRR], Return on Capital Employed [ROCE]), have failed to yield an appropriate estimate of the 'pay back' of these complex systems (Barua, Kriebel and Mukhopadhyay 1995; Martinsons 1991; Mukhopadhyay, Javier Lerch and Mangal 1997; Sharda, Barr and McDonnell 1988). It is believed that the financial perspectives only portray one face of the organization, thus inadequate to measure ES-Success (Deloitte Consulting 2000; Mabert et al. 2000; Martinsons, Davison and Tse 1999). Therefore, the ES-Success measurement needs to encapsulate both tangible and intangible benefits of ES-Success (Cameron 2000; Thorp 1998). Cameron (2000) illustrates the importance of measuring the intangible benefits of Enterprise Systems, stating that evaluating a complex system by just looking at the tangible benefits is a huge mistake. Calculating the gain from an Enterprise Systems investment in general requires a deeper understanding of the organizational goals, strategies and expectations. The 'time of measurement' is also an important aspect of ES-Success measurement.

2.4.1 Information system success models

Enterprise Resource Planning (ERP) system is a system for the seamless integration of all the information flowing through the company such as accounting, finances, supply chain, human resources and customer information (Yang Jyh-Bin, Wu Chih-Tes, and Tsai Chiang-Huai, 2007). In this global competition, enterprises must make the best business resources on the configuration, which can help them to continue to survive and develop. However, limited literature has concentrated on measuring success of an ERP system. Although it is very important to measure the success of ERP post implementation since a lot of financial and human resources are invested. Some of IS success models available in the literature are also used for measurement of ERP system

success on the ground that ERP system is a kind of information system (IS). A Priori Model and The Revised Gable Model proposed by Gable Guy G., etc. are claimed as IS and ERP success model. Model

2.4.2 DeLeon-McLean model (1992)

The most quoted model for success measurement in the field of information systems is the DeLeon and McLean (D and M) model, which moved to a user, centered approach when trying to judge overall IS success. The D and M consists of six mutually dependent dimensions of Success viz. System quality, information quality; use, user satisfaction, organizational impact and individual impact as the main dimensions. The D and M model is useful for the success measurement when the casual/ processual dependencies are important for the company, which is doing the measurement (Kronbichler et al., 2010). Important social performers of this stage are end users, technical administration and IT executive personnel.

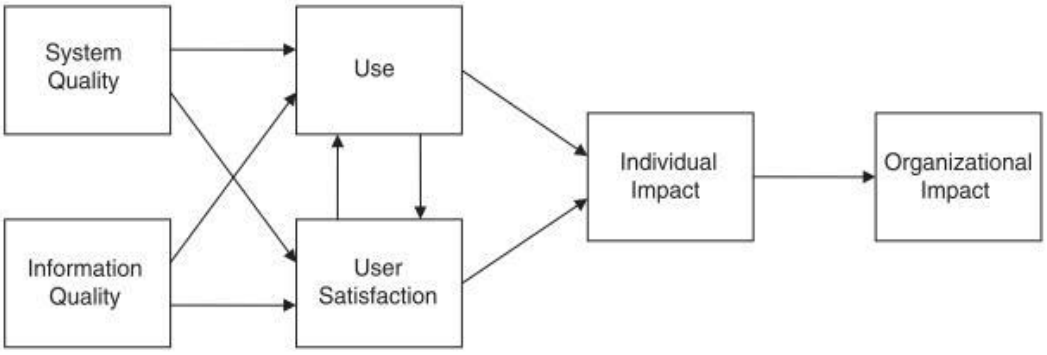

Figure 2.4 D and M Model by DeLeon and McLean (1992)

2.4.3 Updated DeLeon McLean Model (2003)

DeLeon and McLean presented a reconstructed IS success model which presented the addition of service quality and the merging of individual impact and organizational impact on net benefits (DeLeon and McLean, 2002,) in 2002. The ‘use ‘was substituted by ‘Intention to use’, which imitates an attitude whereas ‘use’ imitates behavior; this novel part of the model may determine some of the process versus causal concerns that Seddon (1997) has pointed out. The new model reveals that ‘use’ must precede ‘user satisfaction’ in a process sense, but positive experience with ‘use’ will guide to greater ‘user satisfaction’ in a causal sense. As a result, ‘net benefits’ will arise. The new construct ‘Net benefits’ is the merging of individual and organizational impact which was

mentioned in the original D and M (1992) model (Kronbichler Stephan A., et al. 2010; DeLone, W.H. and McLean, E.R., 1992).

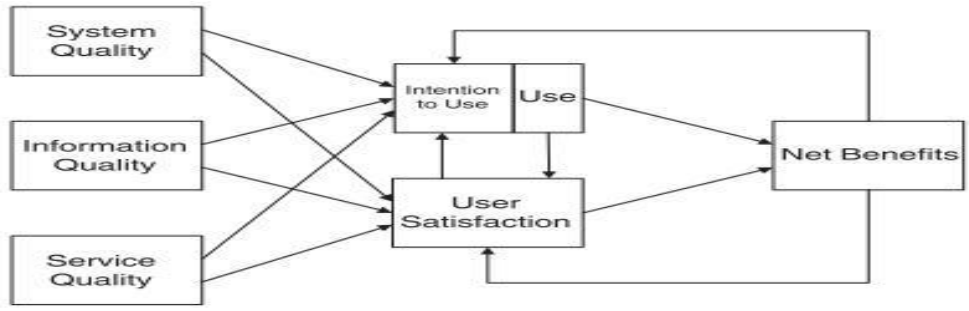

Figure 2.5 Updated D and M model by DeLone McLean (2003

2.5 ERP success measurement models

2.5.1 ERP success a priori model by Sedera, Gable and Chan (2003)

Guy G. Gable et al. (2003) completed an investigative inventory review which was used for model. They constructed a model which was used for IS and ERP system success measurement - the "A Priori Model". The "A Priori Model" was using 5 constructs and 41 sub-constructs. The aim of the test of the "A Priori model" demonstrated that the ERP success depends on the size of the organization (Myers et al., 1997).The D&M variables were used as the basis of the preliminary ERP success model and were amalgamated with the associated measures from Sedera et al. (2003).This model is applicable to measure IS and ERP system success (Gable Guy G., et.al., 2003) .When estimating an ERP , this model demonstrates picture of the organization's experience at a point in time. The impact dimensions are an assessment of profits that have pursued (positively or negatively) from the ERP system. A-priori ERP-Success model depicted below consists of the 41 measures arranged under five dimensions of success: Information quality, System quality, Individual Impact, Organizational Impact and Satisfaction. (Darshana Sedera, Guy Gable, Taizan Chan, 2000)

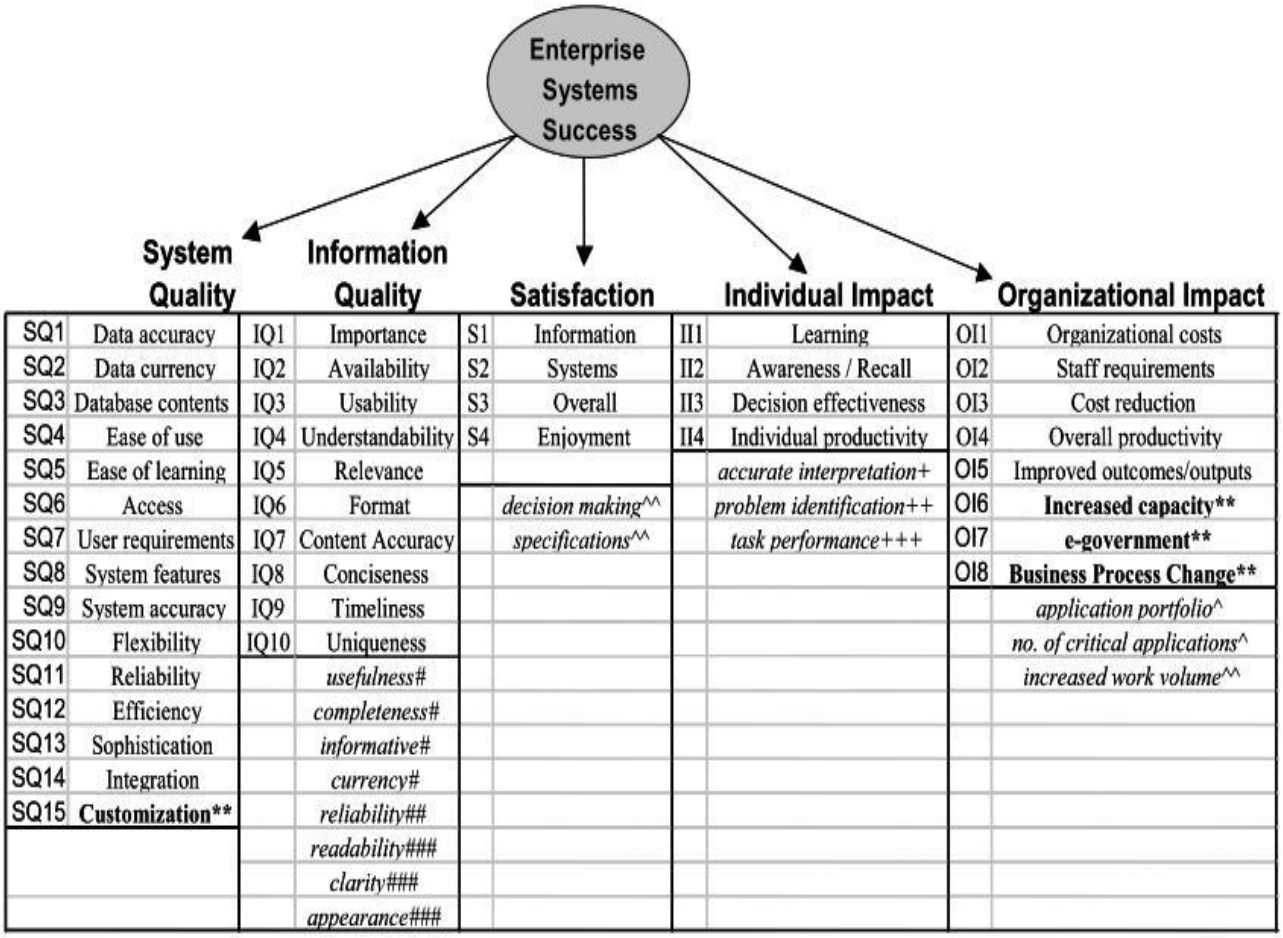

Figure 2.6 The Gable/A Priori model by Gable, Sedera and Chan (2003

The a-priori model depicts five ERP -Success dimensions: 1) Information quality 2) System quality, 3) Individual Impacts, 4) Organizational Impacts and 5) Satisfaction. In total, the a-priori ERP -Success model includes forty-one (41) measures of success: include fifteen (15) measures of system quality, ten (10) measures of information quality, eight (8) measures of organizational impact and four (4) measures for satisfaction and four (4) measures for individual impact (Gable Guy G., et.al., 2003). The following section discusses the five dimensions of the ERP -Success a-priori model.

Information quality:

Measures pertaining to Information quality address on the output produced by a system and the value, usefulness or relative importance attributed to it by the user. Results from review of the literature and expert workshops, emphasized the importance of the quality of information produced

by the ERP System. It is however, one of the more contentious aspects of a system evaluation, where respondents are divided on the quality of information. In one of the early studies on User Satisfaction, (Bailey and Pearson 1983) identified nine characteristics of information quality including accuracy, precision, currency, output timeliness, reliability, completeness, conciseness, format and relevance. (Fredenberger, Lipp and Watson 1997) empirically demonstrated the discriminant validity of information availability and information importance. In his work on system effectiveness, (Sirinivasan 1985) alluded to the importance of information understandability, while Information usefulness and reliability were also addressed by (Mahmood et al., 1985). However, the ten measures of Information quality included into the ERP-Success a-priori model are Importance, Availability, Understandability, Timeliness, Relevance, Format, Conciseness, Uniqueness, Content, and Accuracy.

Table 2:1 Information quality Items (Gable, Sedera, & Chan, 2003; Petter et al., 2008)

1.Importance	Information available from the ERP system is important.
2.Availability	Information from the ERP system is always available
3.Understandability	Information from the ERP system is easy to understand
4. Timeliness	Information from the ERP system is always timely.
5. Relevance	The information provided by the ERP system is relevant.
6. Format	Information from the ERP system appears readable, clear, and well formatted.
7. Conciseness	Information from the ERP system is concise.
8.Uniqueness	Information from the ERP system is unavailable elsewhere
9.Content	Information from the ERP system is in a form that is readily usable
10. Accuracy	Though data from the ERP system may be accurate, outputs sometimes are not

System quality

Measures of System quality typically focus on performance characteristics of the system under investigation. The role of the ERP System is to integrate all departments and functions across a company onto a single enterprise-wide information system that can serve different departments' particular needs. Major benefits of ERP Systems are improved coordination and standardization

across functional departments and increased efficiencies of business processes. The implementation of an ERP System helps to establish the backbone of data warehousing, and the advent of an Enterprise System allows better accessibility to data so that management can have better access to information for effective decision-making. The fifteen (15) measures of ERP-Success a-priori model include Data Accuracy, Data Currency, Database Contents, Ease of Use, Ease of Learning, Convenience of Access, User requirements, System Features and Functions, System Accuracy, Flexibility, Reliability, Efficiency, Sophistication, Integration, and Customization.

Table 2:2 System quality Items (Gable, Sedera, & Chan, 2003; Petter et al., 2008).

1.Data accuracy	Data from the ERP often needs correction
2.Data currency	Data from the ERP is current enough
3.Ease of use	The ERP is easy to use
4.Ease of learning	The ERP is easy to learn
5.Access	It is often difficult to get access to information that is in the ERP
6.User requirements	The ERP meets my requirements
7.System features	The ERP includes necessary features and functions
8.Flexibility	The ERP user interface can be easily adapted to one's personal approach
9.System accuracy	The ERP always does what it should
10. Reliability	The ERP system is always up and running as necessary
11.Efficiency	The ERP system responds quickly enough
12.Sophistication	The ERP requires only the minimum number of fields and screens to achieve a task
13.Integration	All data within the ERP are fully integrated and consistent
14. Customization	The ERP can be easily modified, corrected, or improved
15.Database Contents	The ERP database content is important

Individual Impact

The Individual Impact dimension attempts to capture the individual diverse experiences of the ERP System. Impacts resulting from an Enterprise System are arguably difficult to measure. An Enterprise System entails many employment cohorts ranging from top executives to data entry operators; many applications that span the organization; and a diversity of capabilities and functionality. Therefore, the Individual Impact dimension warranted measures that are broad to accommodate multiple levels of system usage and all employment cohorts. Measures of Individual

Impact include performance measures, such as productivity (Rivard and Huff 1988), decision making effectiveness (Burton, Leitch and Tuttle 2001) and individual learning (i.e. recall) (Vandenbosch and Higgins 1995).Apriori model of four measures of Individual Impact are: Learning, Information Awareness / Recall, Decision making effectiveness, Individual productivity .

Table 2:3 Individual Impact Items (Gable, Sedera, & Chan, 2003; Petter et al., 2008).

1.Learning	I have learned much through the presence of the ERP system.
2.awareness/Recall	The ERP system enhances my awareness and recall of job- related information
3.Decision Effectiveness	ERP system enhances my decision-making effectiveness at the job
4. Individual productivity	The ERP system increases my productivity at the job

Organizational Impact

Information system investments are in many ways comparable to traditional investments such as production equipment; they entail a strong organizational element as well. It is a common tendency to measure ERP Systems (and IS generally) only in terms of financial criteria. However, it is widely acknowledged that Enterprise Systems result in considerable intangible impacts in addition to more tangible impacts. Thus, use of traditional financial measures alone may not account for evidence of IS 'payoffs' (Ballantine et al. 1996; Brynjofsson 1993; Kaplan and Norton 1992). Furthermore, economic evaluations and quantitative measures of ERP- Success tend to be difficult to obtain, easy to manipulate and difficult to combine with the each other. One of the biggest issues with measuring organizational impact is the difficulty of isolating the organizational impact of the ERP System (from other factors, both internal and external to the firm). Using myopic financial measures some researchers have attempted to look at the value of technology investments through quantifiable financial measures such as investment, market share, cost, productivity analysis, productivity paradox, and profitability. These studies aim to assess the value of IT investments, rather than evaluating the goodness of the system. In a similar manner, some researchers have attempted to measure organizational impact by analyzing the IS function using measure such as quality of customer service and the competitive advantage.

In evaluating the goodness of the system from an Organizational point-of-view, studies have investigated perceptual measures, such as, organizational cost reductions, staff requirements, overall productivity measures and business process changes. To achieve the aims of the study – to assess the success of ERP System – these perceptual measures deemed more appropriate than financial indicators. The eight measures of organizational impact A-prior model are listed below: Organizational costs, Staff requirements, Administrative cost reduction, Overall productivity, Service quality improvements, Meeting future business needs, Positioning for e-Government and Improved Business Process Change.

Table 3:4 Organizational Impact (Gable, Sedera, & Chan, 2003; Petter et al., 2008)

1.Organizational costs,	ERP is cost effective
2.Staff requirements	ERP has resulted in reduced staff costs
3.Administrative cost reduction	ERP has resulted in cost reductions (e.g. inventory
4.Overall productivity	ERP has resulted in overall productivity improvement
5.Service quality improvements	ERP has resulted in improved outcomes or outputs
6.Meeting future business needs	ERP has resulted in an increased capacity to manage a Growing volume of activity (e.g. transactions, population growth, etc.
7. Positioning for e-Government.	ERP has resulted in better positioning for e-Government.
8.Improved Business Process Change	ERP Has resulted in improved business processes.

Satisfaction

User Satisfaction is possibly the most extensively used single measure for IS evaluation (e.g. Delone and McLean, 1992; Doll and Torkzadeh, 1988; Etezadi-Amili and Farhoomand, 1996; Igbaria and Nachman, 1990; Igbaria and Tan, 1997; Gatian, 1994). There exist several widely cited studies and standard instruments that measure satisfaction (e.g. Bailey and Pearson, 1983; Baroudi and Orlikowski, 1988; Doll and Torkzadeh, 1988). Early Satisfaction instruments (e.g. User Information Satisfaction - Bailey and Pearson 1983) have been found to mix measures of multiple dimensions of success (e.g. quality and Impact) rather than measuring 'satisfaction'. The four measures of Satisfaction A-prior model are listed below Information Satisfaction, System Satisfaction, Enjoyment, and Overall Satisfaction.

Table 2:4 Satisfaction (Gable, Sedera, & Chan, 2003; Petter et al., 2008)

1.Information Satisfaction	Overall, the ERP Information quality is satisfactory
2.System Satisfaction	Overall, the ERP System quality is satisfactory
3.Enjoyment	ERP is enjoyable to use
4. Overall Satisfaction.	Overall, ERP system related knowledge has been managed satisfactorily

2.5.2 Balanced Scorecard (BSC) approaches by Rosemann and Wiese (1999)

Rosemann Michael and Jens Wiese (1999) proposed the Balanced Scorecard (BSC) and it is the supplementation of traditional financial measures with three additional perspectives; the customer perspective, the internal business process perspective and the learning and growth perspective. The BSC used for evaluation of these tasks and afterwards for the strategic planning of the future expansion of the system based on the assessment results. For using the Balanced Scorecard to control running of ERP system, the four standard perspectives of the novel model have to be adjusted to the specific object of an ERP system. Because of the bottom-up, approach measures should be considered to permit simple recognition of blockages linked with the system.

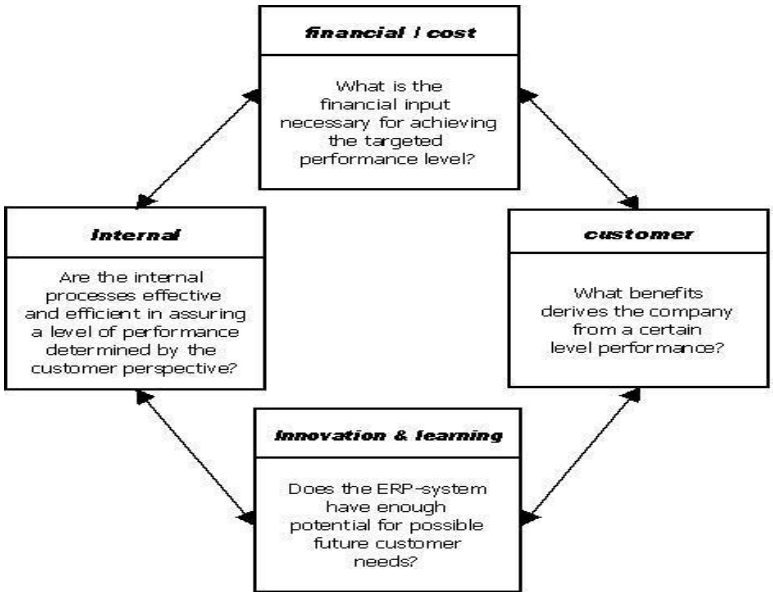

Figure 2.7 The ERP operation Balanced Scorecard(Rosemann

2.6 Related work on ERP implementation

Regarding research conducted on ERP system implementation in Ethiopian context, only limited studies were conducted.

Elsa Taddele(2015) has conducted study on "ERP Post-Implementation Management Framework": The case of Ethiopian Airlines. The main objective of the study is to investigate technical, organizational, and operational issues of ERP post-implementation management in the context of Ethiopian airlines and design a solution framework to address those issues. The general approach of the research was a case study in which a combination of quantitative and qualitative methods has been used to collect and analyze data. A research model was established which constitutes three main themes: technical, organizational and operational concerns that influence ERP post-implementation success.

Derese (2013) has conducted his MSc. thesis on ensuring successful implementation of ERP at Ethio-Telecom, a government company. The main objective of the study was to present experiences that are obtained from a successful ERP implementation project while the case study organization implemented Oracle ERP system. As a research methodology, the researcher used a case study approach with qualitative and quantitative methods. The researcher developed a framework that identified CSFs that needs to be addressed during pre-implementation, implementation and post-implementation phases. However, the study mainly focused on the implementation phase of ERP adoption even if the framework tried to address the three major phases. This is also supported by the researcher's recommendation which says "during testing CSFs for pre-implementation and post-implementation could not justify which could be attributed for lack of clarity by the respondents. Thus, these CSFs should be further studied". Besides, the researcher also recommended conducting a comprehensive empirical study to further understand the direct and indirect relationships among the critical success factors and the actual benefits of ERP adoption.

Boltena and Gomez (2012) presented experiences of a successful implementation by conducting a case study at private company called Mesfin Engineering found in Ethiopia. The main objective of the study was to examine the implementation of ERP system considering the key technical, business and cultural dimensions. The research was carried out within the selected organization by having an in-depth look at the issues behind the process. However, the success of the ERP adoption only considered with respect to the implementation activities that covers up to the go-live stage of the system. In this regard,

the researchers also recommended further study on the issues of post-implementation period by taking into consideration the strategic needs and requirements for sustaining the effectiveness of ERP systems after the go-live stage.

Related literature on the context of other countries

John k. wanjohi (2016) assessing ERP systems post implementation success in Kenyan corporates. This study was carried out on the ERP post implementation phase of a local corporate in Kenya and it sought to investigate factors that affect post implementation success of ERP systems, investigate what management should put in place to achieve post implementation success for ERP Systems and investigate the relationship between factors in the organization's contextual environment and post implementation success of ERP Systems. The research approach used were quantitative and qualitative. The study made use of questionnaires, targeted interviews, focused group discussions and data from ERP project. From the findings of the study, organizational, technological and environmental factors indirectly or directly influence post implementation success. The researcher recommends on probable ways to overcome existing ERP post implementation challenges and to improve on ERP post implementation success. In conclusion, the study recommends increased investments towards hardware and software upgrades, developing internal skilled expertise, firm policy on ERP usage, change management and proper human resource management as necessary drivers towards achieving ERP post implementation success.

Peng & Nunes (2009) researched ERP post-implementation risks in China. The objective of the study was to identify, assess and explore potential risks that Chinese companies may encounter during the post-implementation phase. The post-implementation phase was comprised of using, maintaining and enhancing the ERP system. The researchers adopted a deductive research design based on a cross-sectional case study on the State-Owned Enterprises (SOEs). In line with this, questionnaire was used as primary source of data collection. Based on critical literature review, the researchers proposed ERP post-implementation risk ontology. The ontology consists of a set of 40 ERP utilization risks that were categorized as operational, analytical, organization-wide and technical issues. Accordingly, the researchers established a questioner survey instrument based on the risk ontology and also conducted a survey on the selected Chinese organizations. As a result, the study confirmed that successful ERP implementation was not the end of the journey, but it was a beginning

that requires a strategic approach to exploit the system and bring business results. In

Kiriwandeniya et al. (2013) conducted a research on eight selected large-scale manufacturing organizations with special reference to Sri Lanka. The main objective of the study was to develop a framework for successful ERP post-implementation by analyzing best practices, procedures, and success factors. The researchers defined the post-implementation stage as the time on which a company initiates a major upgrade to its core modules. This limits the scope of the study on upgrading, which is only one of the activities of the post- implementation phase of an ERP system.

The researchers were motivated to focus on the post implementation phase of ERP since many Sri Lankan companies are investing a huge amount of resources to implement SAP. However, majority of the companies failed to reap the expected benefits of the system. Based on literature review the researchers developed a conceptual framework to show the independent variables that affect ERP post implementation success. The variables were: pre-implementation success, change management, top management Support, post implementation training, initial post-implementation benchmarking, maintenance of ERP, minimal customization and introduction of additional features in the post implementation phase. The researchers used primary data through in-depth interviews, questionnaires and on- site observations.

CHAPTER THREE

METHODOLOGY

3.1 Over view of the chapter

This chapter briefly describes the research methodology used in this thesis. The chapter is organized in to three subsections. The first section deals Research design and research model, Research population and Sampling Techniques. The second section deals about data collection methods, data source, data analysis, pilot study, Reliability and Validity followed by Ethical considerations to address research questions during assessment of ERP post implementation success in Ethio telecom.

3.2 Research Methodology

3.2.1 Research Design

This research followed a mixed approach (i.e. combination of quantitative and qualitative) methods. This study adopted a descriptive type to meet the research objectives and address the research questions. Descriptive research can use both quantitative and qualitative sources of data to answer research questions (Yin, 2003; Lack, et al., 2006; Creswell, 2007). Quantitative approach is convenient to reach more people with optimized time than qualitative approach. Qualitative approach is also used to explore attitudes, behavior and experiences through interviews to get an in-depth opinion.

3.2.2 The Research Model

This research paper uses ERP success - a priori model by Sedera, Gable and Chan (2003) as a guidance for assessing the multi-dimensional phenomenon of ERP post-implementation success in Ethio telecom. The "A Priori Model" uses 5 constructs and 41 sub-constructs. The aim of the test of the "A Priori model" is to demonstrate that the ERP success depends on the size of the organization (Myers et al., 1997).The D&M variables were used as the basis of the preliminary ERP success model and were amalgamated with the associated measures from Sedera et al. (2003).This model is applicable to measure IS and ERP system success (Gable Guy G., et.al., 2003).When estimating ERP, this model demonstrates picture of the organization's experience at a point in time. The impact dimensions are an

assessment of profits that have pursued (positively or negatively) from the ERP system.

A-priori ERP-Success model consists of the 41 measures arranged under five dimensions of success: Information quality, System quality, Individual Impact, Organizational Impact and Satisfaction (Darshana Sedera, Guy Gable, Taizan Chan, 2000).

3.2.3 Research Population

The target population comprises Ethio telecom operational employees, operational supervisors, managers and officers who directly use Oracle ERP system for their day -to-day activities.

In January 2017, Ehiotelecom ERP system Employee Head count report shows there are 14,272 Permanent employees out of which 9,034(63%) are working in Addis Ababa and the rest 5238(37%) are out of Addis Ababa. Not all Ethio telecom Employees are using ERP system as Major IT solution for their day today activities. Customer service, Marketing, Enterprise, Residential Sales, Network divisions and some other sections are using other software for their day today activities as major IT solution. On the other hand, Employees of Human resource (191), Finance and budgeting (321), sourcing and Facilities divisions (1076) employees use Oracle ERP system for their main day-to-day business activities. Therefore, HR, Finance, Sourcing and Facilities division employees are considered as valid target population for this study since they use Oracle ERP system as their major IT solution for their core business functionalities. Therefore, the target population size of these three sections is 1588

3.2.4 Sample and Sampling techniques

In this study, proportional stratified sampling technique is used for the quantitative analysis to get proportional representative sample from the users of the three oracle ERP user divisions. The main purpose of using stratified sampling is to reduce bias and ultimately improve the precision level of the output of the study. The target population is stratified according to the core user population of main oracle ERP system are Finance, HR and SFD.

Based on the sampling formula (Yamane Taro,1992) to calculate sample sizes

Where **n** is the sample size, **N** is the population size, and **e** is the level of precision

1588

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

1+ 1588(0.05)2

n =320

95% of confidence level, the level of precision 5%. The sample size of respondents selected based on the Yamane Taro sampling procedure are 320.

Accordingly, the proportional sample size for SFD users is determined to be 217, Finance is 65, and HR employees are 34. The percentage of the strata from the total target population can be seen in table 3;1.

Table 3:1 **Sample size**

No	Main Oracle ERP user Division	Number of Users	Proportional sample size of the strata	Percentage of the strata from the total sample size
1	SFD	1076	217	68%
2	Finance	321	65	20%
3	HR	191	34	12%
	Total	1588	320	100%

3.3 Method of data collection

To achieve its objectives, the researcher used both primary and secondary data collection.

3.3.1 Sources of data

To achieve the objective of the study, the researcher design to use two appropriate data sources. These are the Primary and Secondary sources.

Primary sources: This study focus much on the primary sources of data to be collected by questionnaires and interviews. The survey instrument was developed from questionnaires widely used in the previous literature (Gable, Sedera, & Chan, 2003; Petter et al., 2008). A 5-point Likert scale (Norman, G. (2010).) questionnaire was used to obtain data from ERP system users of Ethio telecom.

Accordingly, the scales were ranging from 1= strongly disagree to 5=strongly agree. Therefore, Employees require answers to these questions, are normally very precise without any vagueness and ambiguity (Shajahan, 2004).

Secondary sources: The study uses the secondary data to complement the primary data. This include documents and manuals used for the implementation of ERP, plans and reports relate to ERP, Different books, internet source, and journals pertinent to the study have been use as a source of secondary data.

Interviews: -Conducted with Ethio telecom Chief Information officer, IT Rollout officer, and IT application manager to get in-depth analysis of survey questions.

Open-ended questions: were distributed for respondents to get more information not addressed by the questionnaires.

3.3.2 Methods of Data Analysis

The researcher analyzed the data gathered through questionnaires and interview by using Frequency, percent, means to interpret, and analyzes data quantitatively. SPSS software version 23 was used to analyze the collected data and descriptive analysis was presented. Factor Analysis is used to verify the descriptive findings. Moreover, data gathered through interview was analyzed qualitatively to strengthen the study.

3.3.3 Pilot Study

A pilot survey has the purpose of examining the integrity of the survey items being developed for a research. A pilot study improves data collection, helps to develop relevant survey questions, and provides some conceptual clarification of the research. Pilot surveys ensure that the proposed methods will work before being used in the actual survey. Pilot studies provide an opportunity to adjust and revision prior to use in a large study (Yin, 2009). The survey items were carefully developed by the researcher based on the construct definitions available in the literature developed from questionnaires of (Gable, Sedera, & Chan, 2003; Petter eal., 2008).

According to (Baker, 1994), a sample size of 10% of the actual study sample size is sufficient for the pilot study. For this study, 15 to 25 participants were sufficient to examine the integrity and reliability of the survey items. Therefore, pilot study was conducted with a sample of 20 purposively selected ERP

users to test the validity and reliability of the questionnaire. The pilot survey participants were selected from HR, Finance, and Sourcing & Facility. Further, to measure the internal consistency of the questionnaire, reliability test was conducted. The Cronbach's alpha test is an indication that the survey questionnaire's reliability and internal consistency to use for the study. The reliability of the measures was assessed using the inter-item consistency measures of Cronbach alpha. As described by Rovai et al. (2013) indicated that a Cronbach's alpha coefficient of .70 to less than .90 indicates high reliability, and .50 to less than .70 indicates sufficient reliability. Thus, as per the analysis made through using SPSS software and presented in table 3:6, the reliability statistics test for all variables (sub domain) alpha range from 0.79 to 0.89 and total alpha values for all variables 0.94. This indicates that the measurements have high reliability and are very dependable.

Table 3:2 Reliability Statistics based on the Pilot study test data

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.936	.940	41

Source: Own Survey, 2018

3.3.4 Reliability and Validity Test

Reliability analysis refers trustworthiness, consistency and dependability of a measuring instrument to improve the reliability of the data. Cronbach Alpha is the most commonly applied estimate of multiple item scales reliability. Test reliability of data is checked by calculating Cronbach alpha value for all corresponding variable.

Table 3:3 Reliability Statistics

Item	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Individual Impact	.839	.843	4
Organizational Impact	.886	.889	8
Information quality	.819	.832	10
System quality	.857	.861	15
Satisfaction	.784	.790	4

According to Kothari, (2004), Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. Validity can also be thought of as utility. In other words, validity is the extent to which differences found with a measuring instrument reflect true differences among those being tested. The questionnaire used to collect the primary data is developed by (Gable, Sedera, & Chan, 2003; Petter et al., 2008). It is a scientific Standardize questionnaire and many empirical works have already used the instrument, to assure validity of the instrument on the Ethiopian context, the researcher has given a chance for professionals on the area to review the questionnaire and their rating was good.

3.4 **Ethical Considerations**

All participants were informed about the nature of the study following the ethical considerations for a thesis study, Purpose of research, no request for sensitive or confidential information; Participation in this survey is voluntary. The researcher is responsible to respect and keep the confidentiality of all information, which is gathered, from respondents. All the references, materials and sources are properly cited.

CHAPTER FOUR

DATA PRESENTATION, RESULTS AND DISCUSSION

4.1 Overview of the chapter

This chapter is organized into seven sub sections. The first section gives information about respondent's profile, Followed by Missing Data value interpretation, employee's response to assessments, Factor analysis, and qualitative data analysis. Finally, Finding and discussion of the results were presented.

4.1 Missing data Values

The Research has very few missing values due to some respondents skipped some of the questions. Missing values are common in real world data. "For any large data set, it is unlikely that complete information will be present in all cases" (Kim and Curry, 1977:215). If the number of cases of missing values is extremely small; then, an expert researcher may drop or omit those values from the analysis. In statistical language, if the number of the cases is less than 5% of the sample, then the researcher can drop them. (Graham, J. W. 2009). Schafer (1999) asserted that a missing rate of 5% or less is inconsequential. Therefore, the researcher has taken real data of respondents for analysis ignoring the missing value that has less than 5% contribution and presented as follows

4.2 General Information about Respondents

As already explained in chapter three, respondents for this research are mainly selected from only three divisions/departments based on the level of ERP usage. Therefore, HR, Finance, Sourcing, and Facilities division employees are considered as valid target population for this research study since they use Oracle ERP system as their major IT solution for their core business functionalities. Thus, 320 questionnaires were distributed to employees that are selected from Ethio telecom head Quarter and different branches of Addis Ababa. From 320 questionnaires, 290 were returned and the remaining 30 were uncollected. This shows that the response rate was 91%. Out of the 290 employees who returned the questionnaire; 217 (68%), 65(20 %), and 34 (12%) of the respondents belong to Sourcing and Facilities division, Finance Division and Human resources division respectively.

4.2.1 Demographic Characteristics of Respondents

Demographic characteristics of respondents were summarized on the bases of gender, age, level of education, job position, and work experiences. Table 4:1 contains the demographic statistics. It is summarized by using cross-tabulation with simple descriptive statistics like frequency & percentage.

Table 4:1 Demographic Characteristics of Respondents

Profile	Description	Frequency	Percentage
Gender	Male	191	65.9
	Female	97	33.4
	Total	288	99.3
Age	18 to 25	11	3.8
	26 to 30	95	32.8
	31 to 40	126	43.4
	41 to 55	56	19.3
	Total	288	99.3
Level of Education	Certificate	1	.3
	Diploma	12	4.1
	Bachelor's Degree	232	80.0
	Master's Degree	41	14.1
	Other	1	.3
	Total	287	99.0
Job Position	Staff	219	75.5
	Supervisor	55	19.0
	Manager	13	4.5
	Officer	1	.3
	Total	288	99.3
Work Experience	1 to 5	79	27.2
	6 to 10	63	21.7
	11 to 15	67	23.1
	16 to 15	62	21.4
	> 20	18	6.2
	Total	289	99.7

Source: own Survey, 2018

As shown in table 4:1, 191 (66%) of respondents are male while the remaining 97 (34%) of them are females. Regarding their age distribution; 126 (43%) of the respondents are within the age interval of 31-40, 95 (33%) of them lie in the age interval of 26-30, 56(10%) lie in the range of 41-50 and the

remaining 11 (4%) lie in the range of 18-25. This statistic shows the majority (80%) employees are between the ages of 18-40.

According to the analysis result, 232(80%) of employees have undergraduate degrees, 41(14%) of them have M.A\MSc degrees, whereas the remaining 12(4%) are diploma holders. Therefore, majority of the employees (94%) have at least first degree and above. Here, we can say that human resource profile of the company in terms of educational background is in a good status.

Respondents that participate in the survey come also from different job positions, for instance, 219 (76%) of the respondents were ordinary employee while the remaining 69 (24%) of them have administrative positions at different levels. Finally, 79 (27%) of respondents serve the company from one to five while 63 (22%) of the respondents have served from six to ten years. Besides, 67 (23%), 62 (21%) and 18 (6%) of the respondents respectively have service year between eleven to fifteen years, sixteen to twenty years and above Twenty years. The result also farther revealed the fact that 72% (209) of employees have more than 6 years' experience in Ethio telecom while 79(27%) of the respondents serve in the company less than five years. This number indicates that large numbers respondents have knowledge about the internal process and operation of Ethio telecom.

4.3 ERP Post-Implementation Assessments

This researcher has conducted assessments of ERP post-implementation success at Ethio telecom about the impacts of ERP system at individual level, organizational level, information quality, system quality, overall satisfaction during post implementations as follows.

4.3.1 The impacts of ERP at Individual level

Individual Impact assessment has been done on how ERP system has influenced (positively or negatively) on individual performance, ability to interpret information accurately, understanding of information and work-related activities in organization, decision-making effectiveness, and overall productivity during post-implementation success at Ethio telecom. Accordingly, questions that are adopted from Apriori model to assess ERP impact at individual level are shown in table 4.2

Table 4:2 The Impacts of ERP system at individual level at Ethio telecom

ERP system influence on your individual performance	Ratings							
		Strongly Agree	Agree	neutral	Disagree	Strongly Disagree	Total	Mean
I have learned much through the presence of ERP system (How to use the system)	F	76	146	43	11	4	280	4.0
	%	26.2	50.3	14.8	3.8	1.4	96.6	
ERP system enhances my awareness and recall of job- related information	F	74	160	34	11	1	280	4.05
	%	25.5	55.2	11.7	3.8	.3	96.6	
ERP system enhances my decision-making effectiveness at the job (Helps me to give Fast decision)	F	60	132	68	16	4	280	3.81
	%	20.7	45.5	23.4	5.5	1.4	96.6	
ERP system increases my productivity at the job	F	105	118	38	14	4	280	4.09
	%	36.2	40.7	13.4	4.8	1.4	96.6	

Source; Own Survey 2018

Respondents were asked the extent to which the ERP system enhances their awareness and recall of job-related information. The analysis result from this question has revealed that (81%) respondents believe, the system helped them to enhance their awareness and recall of job related information, (12%) were neutral while (4%) of the respondents disagreed on the benefit of ERP system to enhanced Employee awareness and recall of job- related information. This shows that most of the Employees agreed on ERP system enhanced their awareness and recall of job related information.

Regarding contribution of ERP system for decision-making, (66%) of the respondents agreed on ERP system enhances decision-making effectiveness at the job. (23%) remain neutral and (7%) of respondents disagreed on ERP system enhances decision-making effectiveness at the job. From this one can also conclude majority of employees' decision-making is improved by using ERP.

Respondents were also asked to evaluate weather ERP system increases productivity at the job. Thus, (77%) of respondents agreed on ERP system has increased their productivity at the job, (13%) remain neutral and (6%) disagreed on ERP system increases productivity at the job. Based on the presented fact we can infer that most of the Employees agreed on ERP system have increased their productivity. When Employees response is summarized, the majority of respondent agreed on ERP

system has resulted positive Impacts on individual level performance enhancement.

Table 4:3 Impacts of ERP at individual level

No	Individual impact	**Percentage**
1	ERP system enhances Employee awareness and recall of job- related information	81
2	Employees are learned much through the presence of ERP system	79
3	ERP system increases productivity at the job	77
4	ERP system enhances Employee decision-making effectiveness at the	66

Generally, results from findings shows, ERP system enhanced employee awareness and recall of job- related information at ERP post-implementation phase. Thus, ERP system optimizes process management, increases the productivity of employees. Regarding the support of ERP system for decision-making effectiveness, most employees believes ERP systems has supported them in decision making. Hence, ERP system created shared database with more and higher quality of information and improve the process of decision-making. Generally, from the statistics we can conclude that ERP system has brought significant impact on individual level performance by enhancing their awareness on job related information, productivity and decision-making activities.

4.3.2 The impacts of ERP at Organizational level

Assessment was conducted in evaluating the appropriateness of the system from an Organizational point-of-view; these are seen for organizational cost reductions, staff requirements, overall productivity measures and business process changes. Accordingly, questions that are adopted from Apriori model to assess ERP impact at organizational level are shown in table 4.4

Table 4:4 the impacts of ERP system at Organizational level

The impacts of ERP system at Ethio telecom Organizational level		Ratings						
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	total	Mean
ERP system is cost effective (work can be done minimum cost)	F	101	136	41	12	0	290	4.12
	%	34.8	46.9	14.1	4.1	0	100	
ERP system at has resulted in reduced staff costs (it helps to work with minimum man power)	F	57	128	79	21	4	289	3.74
	%	19.7	44.1	27.2	7.2	1.4	99.7	
ERP system has resulted in cost reductions (e.g. Inventory& Material Management	F	85	141	52	9	1	288	4.04
	%	29.3	48.6	17.9	3.1	.3	99.3	

ERP system has resulted in overall productivity improvement	F	90	153	37	7	1	288	4.13
	%	31.0	52.8	12.8	2.4	.3	99.3	
ERP system has resulted in improved outcomes or outputs	F	88	161	33	3	3	288	4.14
	%	30.3	55.5	11.4	1	1	99.3	
ERP system has resulted in an increased capacity to manage a growing volume of activity (e.g. transactions, business & staff growth)	F	91	156	35	4	2	288	4.15
	%	31.5	53.8	12.1	1.4	.7	99.3	
ERP system has resulted in better positioning for e-government (e-commerce or online business transaction)	F	58	138	75	13	4	288	3.81
	%	20	47.6	25.9	4.5	1.4	99.3	
ERP system Has resulted in improved business processes	F	94	152	30	10	2	288	4.13
	%	32.4	52.4	10.3	3.4	.7	99.3	

Source: Own Survey, 201

As shown on table 4: 4, respondents were asked to assess whether ERP system is cost effective or not, (82%) of respondents agreed on ERP system is cost effective. (14 %) of the respondents were neutral and (4%) disagree on ERP system is cost effective. From this fact the majority of Employees believe that that ERP system is cost effective during ERP post-Implementation phase.

Respondents were asked to assess weather ERP has result cost reductions in material and Inventory management, (78%) of the respondents agreed on ERP system has resulted in cost reductions (e.g. Inventory& Material Management. (18%) remain neutral and (7%) of respondents disagreed on ERP system has resulted in cost reductions (e.g. Inventory& Material Management. From the above point of view, we can say that ERP system has resulted in cost reduction of inventory and material management during ERP post-Implementation phase.

Concerning ERP overall productivity increment assessment, (84%) of respondents agreed on ERP system has resulted in overall productivity improvement. (13%) remain neutral and (3%) disagreed on ERP system has resulted in overall productivity improvement. From this assessment we can conclude that majority of respondents assumes ERP system has resulted overall productivity increment in Ethio telecom during ERP post-Implementation phase.

Respondents were asked whether ERP system has resulted in improved outcomes or outputs, (86%) of the respondents agreed on ERP system has resulted in improved outcomes or outputs. (11%) remain

neutral and (2%) of respondents disagreed on ERP system has resulted in improved outcomes or outputs during ERP post-Implementation phase. This shows the majority of the respondents agree on ERP improved work out puts.

Employees observation about ERP system improved e-government, (68%) of the respondents agreed on ERP system has resulted in better positioning for e-Government (e-commerce). (26%) remain neutral and (6%) of respondents disagreed on ERP system has resulted in better positioning for e-Government. As result, it is possible to say that ERP system has resulted better positioning for e-government during ERP post-Implementation phase.

The contribution of ERP for improved business process, (85%) of the respondents agreed on ERP system has resulted in improved business processes. (10%) remain neutral and (4%) of respondents disagreed on ERP system has resulted in improved business processes. Based on the presented fact most of population believes that ERP has improved business process.

Table 4:5 has summarized respondents opinion on the impact of the ERP at organizational level

Table 4:5 Impact of ERP at organizational level

No	Organizational Impacts	Percentage
1	ERP system has resulted in improved outcomes or outputs	86
2	ERP system has resulted in improved business processes	85
3	ERP system has resulted in an increased capacity to manage a growing volume of activity (e.g. transactions, business & staff growth)	85
4	ERP system has resulted in overall productivity improvement	84
5	ERP system is cost effective (work can be done with minimum cost)	82
6	ERP system has resulted in cost reductions (e.g. Inventory& Material Management)	78
7	ERP system has resulted in better positioning for e-Government (e-commerce & online transaction)	68
8	ERP system at has resulted in reduced staff costs (work can be done with minimum man power)	64

The findings of the survey presented in table 4;5, demonstrated that most of the respondents believe ERP has positive influence on the organizational business process managements; hence, ERP system suppresses information barriers between departments by integrating and improving internal communication, because as business grows operations become more and more complex. Thus, ERP

system automates business operations cross-departmentally, providing accurate & real-time information during post implementation phase. Regarding productivity improvement, ERP system increases efficiency and productivity by helping users navigate complex processes, preventing data error, and improving functions such as production, order completion and delivery. In similar ways, the majority agreed ERP resulted in cost reduction with one source of accurate, real-time information, ERP system reduces administrative and operations costs. Thus, it allows telecom to proactively manage operations, prevents disruptions and helps users make decisions more quickly. This leads the company to higher efficiency achievement, decrease business costs.

The other positive influence ERP has resulted better positioning for e-government, this is possible because the technology infrastructure of ERP systems supports processes online, which is essential for electronic commerce, and on the other hand, the adoption of ERP systems develops a culture of online businesses transaction during ERP post-implementation phase.

4.3.3 Information quality

An assessment was done pertaining to Information quality on the output produced by a system and the value, usefulness or relative importance attributed to it by the user. Such as information importance, Availability, Understandability, Timeliness, Relevance, Format, Conciseness, Uniqueness, Content, and the accuracy of information generated by Oracle ERP system during post-implementation. Accordingly, questions that are adopted from Apriori model to assess ERP information quality shown in table 4.6

Table 4:6 Information quality generated by ERP system

The accuracy/Relevance of Information quality generated by Oracle ERP system	Ratings							
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	total	Mean
Information available from ERP system is important.	F	141	130	13	4	1	289	4.4
	%	48.6	44.8	4.5	1.4	.3	99.7	
Information from ERP system is always available	F	67	112	70	34	6	289	3.69
	%	23.1	38.6	24.1	11.7	2.1	99.7	
Information from ERP system is easy to understand	F	53	157	52	22	5	289	3.8
	%	18.3	54.1	17.9	7.6	1.7	99.7	
Information from ERP system is always timely (easily available).	F	49	116	80	38	6	289	3.57
	%	16.9	40	27.6	13.1	2.1	99.7	

The information provided by ERP system is relevant (with required data).	F	95	150	32	6	1	284	4.17
	%	32.8	51.7	11.0	2.1	.3	97.9	
Information from ERP system appears readable, clear, and well formatted.	F	65	140	56	21	1	283	3.87
	%	22.4	48.3	19.3	7.2	.3	97.6	
Information from ERP system is concise (clear & brief).	F	47	161	47	24	0	279	3.83
	%	16.2	55.5	16.2	8.2	0	96.2	
Information from ERP system is unavailable elsewhere (easily not available)	F	34	79	100	49	16	278	3.24
	%	11.7	27.2	34.5	16.9	5.5	95.9	
Information from the ERP system is in a form that is readily usable	F	49	154	52	17	6	278	3.8
	%	16.9	53.1	17.9	5.9	2.1	95.5	
Though data from the ERP system may be accurate, outputs sometimes are not (sometimes data mismatch is found)	F	30	116	88	32	13	279	3.42
	%	10.3	40.0	30.3	11.0	4.5	96.2	

As Shown in table 4; 6, questions were raised to respondent about Information available from ERP system is important, (93%) of the respondents agreed on Information available from ERP system is important. (5%) remain neutral and (2%) of respondents disagreed Information available from ERP system is important. From the above statistics majority believe Information available from ERP system is important.

Concerning assessments done on ERP system is easy to understand, (72 %) of the respondents agreed on Information from ERP system is easy to understand. (18%) remain neutral and (9%) of respondents disagreed on Information from ERP system is easy to understand. This shows that most of the respondents agreed on ERP system is easy to understand.

Respondents were asked to know weather Information from ERP system is always timely available). (57%) respondents assume Information from ERP system is always timely available. (28%) remain neutral and (15%) of respondents disagreed on Information from ERP system is always timely available. This shows that more than 50% employees assume Information from ERP system is always timely available.

Employees were asked weather information provided by ERP system is relevant, (85 %) of the respondents agreed on the information provided by ERP system is relevant. (11%) remain neutral and (2

%) of respondents disagreed on information provided by ERP system is relevant. As result we can conclude most respondents agreed information provided by ERP system is relevant.

Regarding respondent's observation about Information from ERP system is concise (clear & brief), (72 %) of the respondents agreed on Information from ERP system is concise (clear & brief). (16%) remain neutral and (8 %) of respondents disagreed on Information from ERP system is concise (clear & brief). This shows that most of the employee believe Information from ERP system is concise (clear & brief).

Respondents were asked about Information from ERP system is unavailable elsewhere, (40 %) of the respondents agreed on Information from ERP is unavailable elsewhere. (35%) remain neutral and (22%) of respondents disagreed on Information from ERP system is unavailable elsewhere. This shows that only (40%) or less than 50% of the staffs believe that Information from ERP system not available elsewhere.

Finally, Employees response to questionaries' were summarized as follows

Table 4:7 ERP Information Qualities

No	ERP Information Quality	Percentage
1	Information available from ERP system is important	93
2	Information provided by ERP system is relevant (with required data)	85
3	Information from ERP system is easy to understand &concise (clear & brief)	72
4	ERP system may be accurate, outputs sometimes are not (sometimes data mismatch is found)	50
5	Information from ERP system is unavailable elsewhere	40

Based on table 4;7 statistics it can be assumed that most of the respondents positively agreed on Information generated from ERP system is important, easy to understand, clear & brief. this helps employees to make effective decision-making. This is supported by ERP systems seamlessly integrate data from different functional areas to provide information for decision-making (Davenport, 1998; Sadagopan, 1999). Different decision-makers directly tap into the ERP database to access information for carrying out different organizational tasks. The use of the same information by different decision-makers has increased the need to ensure that high quality ERP information is available for effective decision-making (Shankaranarayan et al., 2003; Bendoly, 2003; Holsapple and Sena, 2005).

4.3.4 System quality

The assessments of ERP System quality typically focus on performance characteristics of the ERP system such as data Accuracy, Data Currency, Database Contents, Ease of Use, Ease of Learning, Convenience of Access, User requirements, System Features and Functions, System Accuracy, Flexibility, Reliability, Efficiency, Sophistication, Integration, and Customization of ERP post-implementation phase. Accordingly, questions that are adopted from Apriori model to assess ERP system quality are shown in table 4.8

Table 4:8 The Impacts of ERP system performance

The Oracle ERP system performance		Ratings						
		Strongly Agree	**Agree**	**neutral**	**Disagree**	**Strongly Disagree**	**Total**	**Mean**
Data from the ERP system sometimes needs correction	F	44	116	64	50	10	284	3.47
	%	15.2	40.0	22.1	17.2	3.4	97.9	
Data from the ERP system is current enough	F	27	109	83	55	11	285	3.30
	%	9.3	37.6	28.6	19	3.8	98.3	
ERP system is easy to use	F	59	149	44	31	3	286	3.80
	%	20.3	51.4	15.2	10.7	1	98.6	
ERP system is easy to learn	F	65	150	34	35	3	287	3.83
	%	22.4	51.7	11.7	12.1	1.0	99.0	
ERP system sometimes difficult to get access to information that is in the ERP system	F	29	99	69	72	15	284	3.19
	%	15.2	40.0	22.1	17.2	3.4	97.9	
ERP system meets my requirements	F	38	142	69	32	4	285	3.62
	%	13.1	49.0	23.8	11.0	1.4	98.3	
ERP system includes necessary features and functions	F	59	167	41	18	2	287	3.92
	%	20.3	57.6	14.1	6.2	.7	99.0	
ERP system user interface can be easily adapted to one's personal approach	F	41	134	72	31	5	283	3.62
	%	14.1	46.2	24.8	10.7	1.7	96.3	
ERP system always does what it should	F	35	131	79	32	0	277	3.61
	%	12.1	45.2	27.2	11.0	0	95.5	
ERP system is always up and running as necessary (not always working)	F	25	100	52	90	18	285	3.08
	%	8.6	34.5	17.9	31.0	6.2	98.30	
ERP system responds quickly enough (Fast response)	F	29	92	68	80	15	284	3.14
	%	10.0	31.7	23.4	27.6	5,2	97.9	

ERP system requires only the minimum number of fields and screens to achieve a task	F	24	128	82	44	5	283	3.43
	%	8.3	44.1	28.3	15.2	1.7	97.6	
All data within the ERP system are fully integrated and consistent	F	26	114	84	52	8	284	3.35
	%	9.0	39.3	29.0	17.9	2.8	97.9	
The ERP system can be easily modified, corrected, or improved	F	39	95	82	58	11	285	3.33
	%	13.4	32.8	28.30	20.0	3.8	98.3	
ERP system database content is important	F	78	150	38	16	3	285	4.00
	%	27.4	52.6	13.1	5.5.	1.0	98.3	

As shown in table 4:8, Respondents were asked about ERP system needs data correction, (55 %) of the respondents agreed on data from ERP system often needs correction. (22%) remain neutral and (21%) of respondents disagreed on data from the ERP system often needs correction. This shows that half of the employees assume ERP system often needs data correction.

Regarding the observation of respondent's weather ERP system is easy to use, (72 %) of the respondents agreed on ERP system is easy to use. (15%) remain neutral and (12%) of respondents disagreed on ERP system is easy to use. Based on these statistics we can conclude that ERP system is easy to use for most respondents during ERP post-implementation.

With similar manner question were raised weather ERP is easy to learn or not, (74 %) of the respondents agreed on ERP system is easy to learn. (12%) remain neutral and (13%) of respondents disagreed on ERP system is easy to learn. From respondent's data we can conclude that ERP is easy to learn for employees during ERP post-implementation.

Concerning ERP system requirement, (62 %) of the respondents agreed on ERP system meets their requirements. (24%) remain neutral and (12%) of respondents disagreed on ERP system meets their requirements. From this result, it is possible to say that ERP meets most employee requirements.

About ERP system feature and function, (78%) of the respondents agreed on ERP system includes necessary features and functions. (14%) remain neutral and (7%) of respondents disagreed on ERP system includes necessary features and functions. Based on these statistics we can conclude that the majority of employees believed ERP system includes necessary features and functions for their day-to-

day activities.

Respondents were asked whether ERP system is always up, (43%) of the respondents agreed on ERP system is always up and running as necessary (always working). (18%) remain neutral and (37%) of respondents disagreed on ERP system is always up and running as necessary (always working). This shows only less than 50% of the employees agreed ERP is always working. Form this fact we can interpret that ERP system is not always working.

Employees were asked about weather ERP system responds quickly enough, only (42%) of the respondents agreed on ERP system responds quickly enough (Fast response). (23%) remain neutral and (33%) of respondents disagreed on ERP system responds quickly enough (Fast response). From this result only less than 50% of respondents agreed on ERP respond quickly. This shows that EPR system is very slow or slow performance.

Concerning ERP data integration, (48%) of the respondents agreed on data within the ERP system are fully integrated and consistent. (29%) remain neutral and (21%) of respondents disagreed on data within the ERP system are fully integrated and consistent. From these statistics, we can interpret ERP system data in not fully integrated and constituents.

Employees were asked if the ERP system is easily modified or corrected, only (46%) of the respondents agreed on ERP system can be easily modified, corrected, or improved. (28%) remain neutral and (24%) of respondents disagreed on ERP system can be easily modified, corrected, or improved. From the employees respond we can deduce ERP system is not easily modified or corrected

Finally, Employees response to questioners were summarized as follow

Table 4:9 ERP system quality responses

no	ERP system quality	Percentage
1	ERP system database content is important	80
2	ERP system includes necessary features and functions	78
3	ERP system is easy to learn	74
4	ERP system is easy to use	72
5	ERP system user interface can be easily adapted to one's personal approach	60

Based on table 4;9 statistics it can be assumed that most of the respondents positively agreed on ERP

system is important, easy to learn, easy to use, it includes necessary features and functions and ERP system user interface can be easily adapted to one's personal approach during ERP post implementation phase.

On the other hand, Respondents have given low rate that needs further improvement such as ERP system is often difficult to get access to information that is in the ERP system, Data from the ERP system often needs correction, ERP system is fully integrated and consistent (with other ET software like CRM, BSS, CCB), Data from the ERP system is current enough. ERP system can be easily modified, corrected, or improved, ERP system is always up and running as necessary (always working), ERP system responds quickly enough. Regarding System quality, the major challenges identified from respondent's point of view presented as follows

Table 4:10 ERP system quality challenges

No	ERP system quality challenges	**Percentage**
1	It is often difficult to get access to information that is in the ERP system	55
2	Data from the ERP system often needs correction	55
3	All data within the ERP system are fully integrated and consistent (with other ET software like CRM)	48
4	Data from the ERP system is current enough	47
5	The ERP system can be easily modified, corrected, or improved	46
6	ERP system is always up and running as necessary	43
7	ERP system responds quickly enough (Fast response)	42

4.3.5 Overall Satisfaction

On this research assessment, the full potential of ERP system installed can be exploited if the employees are satisfied with their direct system interaction during post implementations phase. Accordingly, questionaries' that are adopted from Apriori model to assess overall satisfaction shown in table 4.11

Table 4:11 Overall Satisfaction

ERP system overall satisfaction		Ratings						
		Strongly Agree	**Agree**	**neutral**	**Disagree**	**Strongly Disagree**	**Total**	**mean**
ERP Information quality is satisfactory	F	42	155	55	26	6	284	3.71
	%	14.5	53.4	19.0	9.0	2.1	97.9	
ERP System quality is satisfactory	F	33	150	61	35	4	284	3.61
	%	11.4	51.7	21.0	12.1	1.4	97.9	
ERP is enjoyable to use	F	49	144	59	26	5	283	3.73
	%	16.9	49.7	20.3	9.0	1.7	97.6	
Overall satisfaction on training & Support delivered by IS department improved my quality of work	F	20	109	77	58	22	286	3.49
	%	6.9	37.6	26.6	20.0	7.6	98.6	

As it is shown in table 4; 11 (68%) of the respondents agreed on ERP Information quality is satisfactory (19%) remain neutral and (11%) of respondents disagreed on ERP Information quality is satisfactory. This shows that most of the employees have good satisfaction on ERP information quality.

About ERP System quality satisfaction, (63%) of the respondents agreed on ERP System quality is satisfactory, (21%) remain neutral and (14%) of respondents disagreed on ERP System quality is satisfactory. From these statistics, we can infer that most employees are satisfied on ERP system quality.

Respondents were asked to know whether ERP is enjoyable to use, (67%) of the respondents agreed on ERP is enjoyable to use, (20%) remain neutral and (11%) of respondents disagreed on ERP is enjoyable to use. This shows that most of the employee believes ERP is enjoyable.

Regarding ERP Training, (45%) of the respondents assume ERP system related knowledge (Training) has been managed satisfactorily, (20%) remain neutral and (28%) of respondents disagreed on ERP system related knowledge (Training) has been managed satisfactorily. This shows that still some of employees are not satisfied on the given ERP training. Finally, respondents' response on the overall satisfaction of ERP is summarized as follows

Table 4:12 overall satisfaction

No	Overall Satisfaction Survey Report	Percentage
1	ERP Information quality is satisfactory (68%)	68
2	ERP is enjoyable to use (67%)	67
3	ERP System quality is satisfactory 63%)	63
4	Over all, ERP system related knowledge (Training) has been managed satisfactorily (45%)	45

From table 4:12, Majority of respondents have a good level of satisfaction about some variables such as Information quality, System quality and the extent to which the system is enjoyable to use. However, there are also items under the overall satisfaction umbrella (i.e. IS support on ERP training and IT help desk support to solve the ERP related problem) where respondents are not satisfied as shown in the table.

4.4 Factor Analysis of ERP –post implementation success

Factor Analysis is used to determine to traits or factors that comprise a set of data. The KMO (Kaiser-Meyer-Olkin) test is a measure of whether the distribution of values based on the sample is adequate for conducting a factor analysis. This test indicates the amount of overlap or shared variance between pairs of variables. Kaiser (1974) recommends the KMO statistic a bare minimum of 0.5 and the values between 0.5 and 0.7 are considered average; values between 0.7 and 0.8 are considered good; values between 0.8 and 0.9 are considered great; and values above 0.9 are considered super (Hutcheson & Sofroniou, 1999). As indicated in the table 4:13 for the data under consideration the KMO value is .893, which falls into the range of being great, so the study has confidence that the sample size is adequate for principal component analysis (PCA).

Table 4:13 KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	5579.131
	Df	1035
	Sig.	.000

Factor Extraction Output

The factor extraction output shown in table 4;14 lists the eigenvalues associated with each linear component (factor) before extraction, after extraction and after rotation. Before extraction, SPSS has identified linear components within the data set. The output that show the given values associated with each factor represents the variance explained by the particular linear component and also displays the eigenvalue in terms of the percentage of variance explained. Therefore, factor 1 explains 28.92% of total variance. It should be clear that the first few factors explain relatively large amount of variance, especially factor 1. The output shows that the extracts all factors greater than one, which leaves us with ten factors. The eigenvalues associated with these factors were again displayed in the columns labeled extraction sums of squared loadings. After extraction the first factors variance, explain listed 9.839%. As show in total variance table 4:14, from the total listed components the first ten components take 64.926 affected factors for ERP post implementation success at Ethio telecom

Table 4:14 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.304	28.922	28.922	13.304	28.922	28.922	4.526	9.839	9.839
2	3.571	7.764	36.686	3.571	7.764	36.686	4.226	9.187	19.026
3	2.785	6.055	42.741	2.785	6.055	42.741	3.813	8.289	27.314
4	1.914	4.162	46.903	1.914	4.162	46.903	3.771	8.198	35.512
5	1.755	3.815	50.717	1.755	3.815	50.717	3.147	6.841	42.354
6	1.496	3.252	53.970	1.496	3.252	53.970	3.134	6.813	49.167
7	1.389	3.019	56.989	1.389	3.019	56.989	2.231	4.849	54.016
8	1.358	2.953	59.942	1.358	2.953	59.942	2.054	4.465	58.481
9	1.251	2.719	62.661	1.251	2.719	62.661	1.764	3.836	62.317
10	1.042	2.265	64.926	1.042	2.265	64.926	1.200	2.609	64.926
11	.938	2.040	66.966						
12	.900	1.956	68.921						
13	.868	1.886	70.807						

14	.829	1.802	72.610						
15	.768	1.670	74.279						
16	.754	1.638	75.918						
17	.719	1.563	77.481						
18	.663	1.442	78.923						
19	.647	1.406	80.329						
20	.619	1.345	81.673						
21	.577	1.254	82.927						
22	.557	1.210	84.138						
23	.538	1.171	85.309						
24	.512	1.112	86.421						
25	.493	1.072	87.492						
26	.452	.982	88.474						
27	.426	.926	89.399						
28	.421	.915	90.315						
29	.372	.809	91.124						
30	.365	.794	91.918						
31	.352	.764	92.682						
32	.332	.722	93.404						
33	.317	.689	94.092						
34	.300	.652	94.744						
35	.282	.614	95.357						
36	.269	.585	95.942						
37	.232	.505	96.447						
38	.222	.483	96.930						
39	.215	.468	97.398						
40	.210	.455	97.854						
41	.194	.422	98.275						

4.4.1 Determinants of ERP Post-Implementation Success

To determine whether all the scales used in this study have construct validity, to identify representative variables in the subsequent analysis and evaluate the factors determining ERP system post-implementation success, principal component analysis (PCA) is employed. The PCA technique is very helpful to reduce the size of independent variables (dimensions) especially when the number of variables considered is very large.

Rotated Component Matrix Factor Analysis Summary Result

The main identified usability factors (PCA) of ERP post implementation assessment success were shown in table 4:15, which indicates the top ranked PCA factors of ERP post implementation success at

Ethio telecom: According to the PCA finding, the highest factors construct of ERP post- implementation success ERP system is summarized as follows;

- ERP system is always up and running as necessary (always-working) factor were (9.83 %)
- All data within ERP system are fully integrated and consistent factor were 9.187 % of identified
- ERP system responds quickly enough Factor were 8.281% (Fast response);
- ERP system can be easily modified, corrected, or improved: factors were 8.20%
- Overall, the ERP System Quality is satisfactory factors were 8.20%
- Overall, ERP Information Quality is satisfactory 6.8%
- ERP system requires only the minimum number of fields and screens to achieve a task 4.8%

Table 4:15 ERP system determinants Component

Factor Analysis Rotated Component Matrix										
	ERP system determinant Component									
	1	2	3	4	5	6	7	8	9	10
ERP system is always up and running as necessary (always working)	.721									
All data within ERO system are fully integrated and consistent	.679									
ERP system responds quickly enough (Fast response)	.674									
ERP system can be easily modified, corrected, or improved	.634									
Overall, the ERP System Quality is satisfactory	.573									
Overall, ERP Information Quality is satisfactory	.513									
ERP system requires only the minimum number of fields and screens to achieve a task	.506									
Overall, ERP system related knowledge (Training) has been managed satisfactorily	.502									
ERP is enjoyable to use										
ERP system user interface can be easily adapted to one's personal approach										
ERP system always does what it should										
ERP system enhances my awareness and recall of job related information		.789								
I have learned much through the presence of ERP system		.776								
ERP system increases my productivity at the job		.714								
ERP system enhances my decision-, making effectiveness at the job		.712								

ERP has resulted in improved outcomes or outputs		.559								
Ethiotelecoom ERP system has resulted in reduced staff costs			.760							
ERP system has resulted in cost reductions (e.g. Inventory & Material Management)			.713							
ERP system is cost effective			.648							
ERP has resulted in improved business processes			.617							
ERP system has resulted in overall productivity improvement			.593							
ERP has resulted in better positioning for e-Government			.541							
ERP system has resulted in increased capacity to manage a growing volume of activity			.512							
Information provided by ERP system is relevant					.687					
Information from ERP system is concise					.644					
Information from ERP system appears readable, clear, and well formatted					.619					
Information available from ERP system is important					.580					
Information from ERP system is in a form that is readily usable										
ERP system is easy to use						.873				
ERP system is easy to learn						.818				
Information from ERP system is easy to understand						.555				
The ERP system meets my requirements						.510				
It is often difficult to get access to information that is in the ERP system							.768			
Information from ERP system is unavailable elsewhere							.652			
Data from ERP system is current enough							.550			
Information from ERP system is always timely timely available								.739		
Information from ERP system is always available								.716		
Data from ERP system often needs correction									.609	
ERP system database content is important									.565	
ERP system includes necessary features and functions									.513	
Though data from ERP system may be accurate, outputs sometimes are not										.605
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.										

In general, the principal component Analysis PCA finding produced the most critical determinants of ERP post-implementation success in a ranked manner; which helps to prioritize and address the issues based on their total contribution share. From this analysis it can be noted ERP system quality Factors, the first high ranked ERP system is not always up and running as necessary (not always-working), the second highly ranked ERP system data integration problem, the third ranked ERP system response time delay ,4th ranked ERP system cannot be easily modified, corrected, or improved. Therefore, this construct has the highest contribution of ERP post-implementation success to be resolved as highest priority.

4.5 Qualitative data analysis

The researcher has also collected further qualitative information about ERP post-implementation success. To this end, three open-ended questions were part of the data collection instrument. The purpose of these questions was to know more information from respondents about the issues that might not be addressed by the adopted questionnaire. The following are the three questions.

1. Any issue/ problem that employees have observed in ERP Post-implementation phase
2. Possible recommendation for future improvement of ERP Post-implementation success
3. Employee opinion regarding benefits obtained during ERP Post-implementation phase.

For these questions, 122 respondents have provided comments and suggestions. The comments and suggestions obtained were organized as follows;

For the first question(i.e. any other problem that they have observed in ERP Post-implementation phase):- many comments were given but few are summarized as follows; *Frequent ERP system interruptions due to power and network problem , ERP system response time delay , ERP system congestion , lack of continuous training specially for new entrant employees, poor ERP system integration problem with CRM, lack of redundant backup to overcome ERP system interruption, lack of immediate IT-help desk team support(no dedicated team to resolve the problem).*

From the above respondents comments the researcher has understood that ERP system interruptions, ERP system response time, lack of adequate training, ERP system integration problem are the major problems encountered during ERP post implementation phase.

The second question is about the possible recommendation for future improvement of ERP Post-implementation success and their response is summarized as follows; *ERP system failure, ERP system integration & ERP system slow response problems should be solved as top priority to achieve ERP post implementation success. The other recommendation of respondents include ERP system should have back up to minimized service intermittence, Continuous training should be given adequately to better understand the system, IS support for ERP system should be improved, upgrade of ERP server should be in plan to overcome the growing volume of business transaction in Ethio telecom.*

From the above respondent comment about feature ERP improvement, the researcher understood that ERP system interruptions, ERP system slow, lack of adequate training, ERP system integration problem should be solved as top priority for future ERP post implementation success.

The third open ended question were given to respondents regarding their opinion about benefits obtained during ERP Post-implementation phase. Most employees have expressed their opinion as follows; - *ERP system has brought significant change on their work productivity, cost reduction, cost effectiveness, organizational performance, reduced paper works and effective decision making.*

The researcher has noted from the above respondents comment most respondents have good attitude towards ERP system and ERP has brought significant performance enhancement both at individuals and organizational level during post-implementation phase.

4.5.1 Interviews

Interviews were conducted with three Ethio telecom higher management members to investigate the challenges encountered during ERP post- implementation phase. The interview result is used to strengthen and enrich the findings obtained from the survey. The interview was conducted with Ethio telecom Chief Information officer (CIO), IS IT Rollout officer and IS IT-application manager. Accordingly, the interview result conducted presented as follows.

The First interview was conducted with IT Rollout officer about the main challenges encountered during ERP post implementation; - "*The IT Rollout officer has explained that main challenge during post implementation was the integration of ERP system with other software during real time application. The problem is not only ERP problem but also the integration and interface problem of other software. Currently some of the problems were solved and some problems are still not solved and*

working manually.

The other interview was conducted with IT application manager about ERP system service intermittence /outage. "*IT application manager explained that, even though ERP system was working with big workload, the intermittence is not happened frequently. Such kind of problem may happen due to ERP system network infrastructures such as connections, routers and user side problem".*

Final interview was conducted with IS chief information officer (CIO) regarding the challenges of ERP speed problem. *"IS chief information officer has explained that the problem happened due to current ERP system was working with big workload beyond the project scope. At the beginning, the project scope was very limited to run only back office support (internal process) but later on user business need was increasing and expanded to HR, Finance and Sourcing and facility division. Due to current ERP system congestion & workload at the end of the month, some user sections (payroll) were enforced to work at the weekends. To resolve this problem Ethio telecom has planned long term and short-term action plan. The short-term plan tender was disclosed for ERP expansion and the long-term plan is to implement ERP cloud system".*

The other interview was about the IT support and training related challenges, *"IS Chief Officer has explained that the training was challenging early ERP deployments (before almost two year). Now knowledge sharing between the ERP integrator (softpro international LTD) and ET 2nd level (IS) support is done properly. However, the training related to first level business unit (HR, Finance & Sourcing) support problem was happened due to lack of appropriate follow up and commitment problem from the assigned team. The other issue related to support problem was the organizational structure complain from the assigned team. This may be solved by ET HR policy. To resolve training and support problem, currently IS has planned to give adequate training in collaboration with user sections".*

4.6 The major findings and discussion of the study

The major findings and results of the research assessments on ERP post-implementation success at Ethio telecom presented as follows:

4.6.1 The Benefits of ERP Post- implementation in Ethio telecom

The assessment results from Individual impact shows, most of the Employees (81%) assume that ERP system enhances their awareness and recall of job- related information. Therefore, here we can say that the employee's awareness about ERP system and job-related information at good level of understanding. ERP system impact for productivity increment, most Employees believes ERP system has resulted good contribution for their productivity. Thus, ERP system optimizes process management, and increases the productivity of employees in Ethio telecom during post-implementation phase. In addition to this most Employees assumes ERP system has significant contribution to give effective and fast decision on their daily activities. Thus, ERP systems can create a shared database with more and higher quality of information that improves the employees process of decision making. Finally, this finding shows ERP system has significant positive impact on individual productivity and decision making.

The results of study from organizational Impact shows, most of the respondents (86%) assume ERP system implementation has resulted improved out comes & business process at organizational level. ERP system suppresses information barriers between departments by integrating and improving internal communication. As business grows, operations may become more and more complex. To overcome this complexity ERP system automates business operations cross-departmentally, eliminates unnecessary processes & transactions, providing accurate, real-time information to everyone utilizing the ERP system. The finding result show about productivity improvement, most employees assume ERP system has resulted high productivity at organizational level. Thus, ERP system has increased efficiency and productivity by helping users navigate complex processes, preventing data error, and improving functions such as production, order completion and delivery. In similar ways, the majority believe ERP system resulted cost reduction at organizational level. Therefore, ERP system integrates resources and required information for better management & reduces administrative and operational costs. This allows telecom to proactively manage operations, prevents disruptions and helps users make decisions more

quickly. This leads the company to higher performance achievement, the decrease in the number of errors & business costs. Finally, Cost reduction will allow telecom to increasing profit margin.

In addition to this, it is observed that ERP system has resulted better positioning for e-government at organizational level in Ethio telecom, this shows ERP systems technology infrastructure supports processes online, which is essential for e-commerce, and on the other hand, the adoption of ERP systems develops a culture of collaboration between different e-businesses transactions.

The study results from ERP Information quality shows, most of the respondents assumes ERP information is important, easy to understand, clear & brief. This helps employees to have better understanding about work related contents of information generated from ERP system. Thus, ERP information quality is one of the critical issues supporting on their decision-making quality. Similarly, information provided by ERP system relevance, most of the respondents assume that ERP system generates relevant information for required data. This helps employees to get error free information for the required data.

The results from ERP system quality findings shows, most of the respondents have good perceptions regarding ERP system, importance, easy to learn, easy to use, and ERP includes necessary features and functions. Therefore, we can deduce that Employees have not faced difficulties to learn and use ERP system. These shows employees have developed good experience and familiarized themselves with ERP systems

Regarding Over all ERP Post – implementation satisfaction the results from findings shows, over all ERP Information quality and system satisfaction most of the respondents have good level of satisfaction.

4.6.2 Major challenges of ERP Post- Implementation in Ethio telecom

The major challenges identified during ERP Post- implementation phase were summarized as follows:

The study results of ERP system response time delay, most of the respondents reflected the ERP system has delayed response time during post-implementation phase. In addition to the employee response, ET IS chief officer and IT roll out officer confirmed that ERP system slow is the current big challenge for Ethio telecom. Especially at the end of the month or payroll preparation the problem was very critical. To minimize this problem HR and finance sections engaged to work at the weekends.

The reason behind this problem currently the ERP system is working beyond the designed project scope

ERP system data integration, the majority response rate is below 50%. In addition to this the interview with ET IT role out officer indicates that currently ET ERP system has some integration problem with other ET software's and now IS section is working on it to give permanent solution.

ERP system is always up and running as necessary, most of the employees have given low rating. In addition to employee's response, ET IS Application manager explained "previously ERP system faller happened due to ERP system network problem but now the problem is fixed". The other intermittence problem may happen due to network infrastructure problem such as connections, router and user side problems. Therefore, the finding of this study shows that ET ERP system is not always working (intermittent) as it is required.

Overall ERP system related to IT related training & support to solve the problem, most of the respondent's satisfaction is low. This shows that employees are dissatisfied with lack of ERP system related training and delay of IS support during maintenance support is required

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Over view of the chapter

This chapter is organized into three sections. The first section summarizes the research. The conclusions drawn from this research and recommendations for different stakeholders are discussed in the second and third sections respectively.

5.2 Summary

The main objective of this study is to assess ERP post-implementation success at Ethio telecom and give valuable recommendation for further improvement. The general approach of this research was a case study in which a combination of quantitative and qualitative methods has been used to collect and analyze data. The data was collected using questionnaires from sample population of 320 users from HR, Finance and sourcing & facility departments with different job positions, roles, and work experience. The collected data was analyzed using SPSS. In the qualitative study, direct interviews were used to collect data from three executive management members of Ethio telecom. A theoretical ERP success model was used to assess success of ERP Post- implementation at Ethio telecom.

This research has identified the impacts of deployed ERP system at individual and organizational level and also benefits and challenges encountered during ERP post-implementation phase at Ethio telecom. Concerning Individual Impact, most of the Employees believed that ERP system enhanced their awareness and recall of job- related information and assumes ERP system has big contribution for their productivity and brought significant contribution to give effective and fast decision making on their work activities. Regarding Organizational Impact, most of the Employees believes ERP system implementation has resulted improved out comes & business process at organizational level, high productivity, cost reduction, better positioning for e-government at organizational level in Ethio telecom.

The study results of ERP information quality most of the respondents believe Information generated from ERP system is important, easy to understand, clear & brief. Majority of the respondents assumes

ERP system quality is important, easy to learn, easy to use, it includes necessary features and functions. Regarding Employee overall satisfaction majority of respondents have a good level of satisfaction about some variables such as Information quality, System quality and the extent to which the system is enjoyable to use.

Although, Ethio telecom has gained many benefits from deployed ERP system, still there are some challenges encountered during post implementation phase. Among those challenges, ERP system response time delay (slow response), ERP system data integration with other ET soft- wares, ERP system is not always up and running as necessary (not working), ERP system is not flexible as per user's request, lack of training & IT-helpdesk support to solve the problem are the main challenges encountered during post implementation phase. Therefore, the researcher suggest Ethio telecom is expected to resolve above mentioned challenges as top priority to get the full-fledged benefits from deployed ERP System

5.3 **Conclusions**

The following conclusions are drawn based on the summary of the findings.

Concerning Individual Impact, most of the Employees believed that ERP system enhances their awareness and recall of job- related information and assumes ERP system has big contribution for their productivity and has significant contribution to give effective and fast decision making on their work activities. Therefore, deployed ERP systems has created a shared database with more and higher quality of information that improves the employees process of decision making. Finally, this study concludes ERP post-implementation at Ethio telecom has brought significant positive impact on employee's productivity & high-quality decision making.

The study results of Organizational Impact, most of the Employees believes ERP system implementation has resulted improved out comes & business process at organizational level. ERP system has resulted high productivity, cost reduction, better positioning for e-government at organizational level in Ethio telecom. Therefore, this study concludes deployed ERP system has increased efficiency and productivity by helping users navigate complex processes, preventing data error, and improving functions such as production, order completion and delivery. ERP system has integrated resources and required information for better management & reduced administrative and

operational costs. ERP systems supports processes online, which is essential for electronic commerce (e-government).

The study results of ERP Information quality, most of the respondents believe that ERP information is important, easy to understand, clear & brief. In addition to this, most employees assume ERP system generates relevant information for required data. Therefore, this study concludes deployed ERP system helped employees to have better understanding about the contents of information generated from ERP system and gives error free information for the required data & quality of decision-making

The study results of ERP system quality, most of the respondents have good perceptions regarding ERP system importance, easy to learn, easy to use, and it includes necessary features and functions. therefore, this study concludes that employees have not faced difficulties to learn and use ERP system & employees have developed good experience about deployed ERP systems.

On the other hand, most respondents have given low rating on ERP system data integration, ERP system flexibility, ERP system is always up and running as necessary, ERP system response time. Therefore, this study concludes deployed ERP system has lack of ERP data integration, system Flexibility, ERP system is not always working as it is required, and ERP system response time delay is high.

The study results of overall satisfaction of ERP Information quality & System quality, most of the respondents have good level of satisfaction. In addition to this most of the employees believe that ERP system is enjoyable to use.

The study results of Overall satisfaction ERP system related to IS support for training & support to solve the problem, most of the respondents have low satisfaction. Therefore, this study concludes that employees are dissatisfied with lack of ERP system related training and delay of IT-helpdesk support during maintenance support is required

5.4 Recommendations

Based on the findings and conclusions drawn from ERP Post-implementation assessment at Ethio telecom, the following recommendations are forwarded for further improvement on ERP post-implementation success.

5.4.1 Recommendation for Ethio telecom

1. Resolve ERP system intermittence

The PCA result indicates ERP system is not always up (not always working) is one of the highest critical issues than needs improvement to achieve ERP post implementation success. Since ERP allows total access to every important process in the business, the intermittence problem affects the entire business transactions and service delivery. Therefore, it is very important to resolve ERP system intermittence problem during ERP post-implementation as top priority issue.

2. Improving ERP system data integrity with other ET software's

The PCA result indicates ERP system integration problem is one of critical issue than needs improvement to achieve ERP post implementation success. ERP data integration is important to enable business process flows from across financial, customer relationship (CRM) and supply chain functions, E-commerce integration packages for web-based ordering and Facilitates internal & external transactions. Therefore, to maximize the benefit obtained from ERP system, the researcher recommends ERP data integration is one of the critical area needs improvement during ERP post-implementation phase.

3. Improving ERP system response time delay

Based on the PCA finding produced ERP system response time delay is one of the critical areas that need continuous improvement during ERP post-implementation as top priority. The ERP system slow performance problem may occur while the company business transaction grows, operations may become more and more complex, load on the system increases over time, performance can degrade, this may happen due to overloaded on servers or the network parameters like, connections, routers. This problem may halt the performance of operations related to ERP system. Therefore, the researcher recommends

that it is important to run regular tests of ERP system to make sure performance remains acceptable during ERP post-implementation success.

4. Improving ERP system Flexibility in Post implementation phase

The PCA produced output of ERP system flexibility problem is one of the critical areas that need improvement during ERP post-implementation phase. ERP flexibility problem is where an ERP information system is unable to adapt quickly to the user's specific information needs and functional requests. It is the capability of an ERP system that uses a set of resources to respond to the changing needs of the organization. Therefore, the researcher recommends improving the flexibility of the system, improves ERP post-implementation success.

5. Adequate ERP system related training & IT- support during post-implementation phase.

The PCA result indicated that lack of ERP system training & IT help desk is one of employee's dissatisfaction areas that need priority improvement during ERP post-implementation phase. Hence high-quality training, documentations and skilled support employees help end-users to better understand their interaction with the system. As a result, this could help in improving productivity, learnability, awareness, and decision effectiveness of employees. Therefore, the researcher recommends training and maintenance support is one of the areas needs improvement during ERP post-implementation success.

5.4.2 Recommendation for future research

The researcher gives his recommendation for Feature Research on the following area

1. **Measuring ERP Post-Implementation success using BSC**

Rosemann Michael and Jens Wiese (1999) proposed the Balanced Scorecard (BSC) and it is the supplementation of traditional financial measures with three additional perspectives; the customer perspective, the internal business process perspective and the learning and growth perspective. The BSC can be used for evaluation of these tasks and afterwards for the strategic planning of the future expansion of the system based on the assessment results. For using the Balanced Scorecard to control the running of ERP system, the four standard perspectives of the novel model must be adjusted to the specific object of an ERP system. The forte measuring ERP performance using BSC will help organization to know the system

2. **The success of ERP post-implementation on the context of other Ethiopian organizations**

This research has addressed only the ERP-post implementation success the case of Ethio telecom and suggested improvement area of ERP post implementation success. However, other organization post implementation success is not assessed. Therefore, Research on ERP post-implementation on other Ethipoian organization is important to know the impacts of ERP system on individual and organizational performance enhancement.

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5.6 Appendix 1: Survey Questions

ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIIONAL SCIENCE

SCHOOL OF INFORMATION SCIENCES

Dear Sir or Madam:

I am Post Graduate Student of Addis Ababa University Specialized Field of information Science. Currently I am undertaking a research on "**Assessment on ERP Post- Implementation Practice: the case of Ethio telecom"**. The main Objective of the study is to make an assessment on ERP post implementation Practice and challenges encountered in Ethio telecom and to give Valuable recommendation for better improvement.

It is purely academic research will not have any negative effect on you, so that you are kindly requested to fill out this questionnaire. Therefore, the effectiveness of the study depends on your genuine and on time response and your response kept in secret confidentially.

For any question or further explanation do not hesitate to contact me on 0911490159 or **abraham.tadesse@Ethio telecom.et** or **abrish2828@gmail.com**

Thank you in advance for your cooperation!

Abraham Tadess

Part I. General direction

Answer the following questions by putting "□" mark on the box writing on the space provided

Sex Female ☐ Male ☐

2. Age in years 18-25 ☐ 26-30 ☐ 31-40 ☐ 41-55 ☐

3. Working experiences 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐

> 20 ☐

4. Education level Certificate ☐ Diploma ☐ Bachelor'degree ☐ master's degree ☐ other ☐

5. Which division are you working in?

Finance ☐ Sourcing & Facilities ☐

Human Resource ☐ other ☐

6. The position you hold in the organization

Staff ☐ Supervisor ☐ Manager ☐ Officer ☐

Part II

Assessments of ERP Post-Implementation practice and Challenges in Ethio telecom

This questionnaire tries to assess practices, achievements and challenges of ERP post-Implementation in Ethio telecom with the following categories for ease of understanding: 1) Individual Impacts, 2) Organizational Impacts, 3) Information quality, 4) System quality, 5) Satisfaction. Therefore, your answers should relate to your own experiences and perceptions of Oracle ERP system implementation in your organization and to what extent your organization has done the activities to ERP post-implementation. Considering your organization's experience, please use the following scale on each of the identified issues associated with the post-implementation of ERP. Responses to the questions can be selected by clicking **one** check box per question

Rating Scales 5-Strongly Agree 4-Agree 3-neutral 2-Disgree 1- Strongly Disagree

Survey Questions for Individual Impact

Responses to the questions can be selected by clicking **one (□) check** box per question

Where 5-Strongly Agree, 4-Agree, 3-neutral, 2-Disgree, 1- Strongly Disagree

Table 5:1 Survey Questions for Individual Impacts

ERP system influence on your individual performance	Ratings				
	5	4	3	2	1
1. I have learned much through the presence of ERP system.					
2. ERP system enhances my awareness and recall of job- related information					
3. ERP system enhances my decision-making effectiveness at the job					
4. ERP system increases my productivity at the job					

Survey questions: Organizational Impacts

Responses to the questions can be selected by clicking **one (□) check** box per question

Where 5-Strongly Agree ,4-Agree ,3-neutral, 2-Disgree, 1- Strongly Disagree

Table 5:2 Survey Questions for Organizational Impacts

The impacts of ERP system at Ethio telecom Organizational level	Ratings				
	5	4	3	2	
1. ERP system is cost effective					
2.Ethio telecom ERP system has resulted in reduced staff costs					
3.ERP system has resulted in cost reductions (e.g. Inventory& Material Management					
4. ERP system has resulted in overall productivity improvement					
5. ERP system has resulted in improved outcomes or outputs					
6. ERP system has resulted in an increased capacity to manage a growing volume of activity (e.g. transactions, business & staff growth)					
7. ERP system has resulted in better positioning for e-Government					
8. ERP system Has resulted in improved business processes					

Survey questions for Information quality

Responses to the questions can be selected by clicking **one (□) check** box per question

Where 5-Strongly Agree, 4-Agree, 3-neutral, 2-Disgree, 1- Strongly Disagree

Table 5:3 Survey Questions for Information quality

The accuracy/Relevance of Information quality generated by ERP system	Ratings				
	5	4	3	2	1
1. Information available from ERP system is important.					
2.Information from ERP system is always available					
3.Information from ERP system is easy to understand					

4. Information from ERP system is always timely.						
5. The information provided by ERP system is relevant.						
6. Information from ERP system appears readable, clear, and well formatted.						
7. Information from ERP system is concise.						
8.Information from ERP system is unavailable elsewhere						
9.Information from the ERP system is in a form that is readily usable						
10.Though data from the ERP system may be accurate, outputs sometimes are not						

Survey questions for system performance

Table 5:4 Survey questions for system performance

The Oracle ERP system performance	Ratings							
		Strongly Agree	Agree	neutral	Disagree	Strongly Disagree	total	Mean
Data from the ERP system often needs correction								
Data from the ERP system is current enough								
ERP system is easy to use								
ERP system is easy to learn								
It is often difficult to get access to information that is in the ERP system								
ERP system meets my requirements								
ERP system includes necessary features and functions								
ERP system user interface can be easily adapted to one's personal approach								
ERP system always does what it should								
ERP system is always up and running as necessary								
ERP system responds quickly enough (Fast response)								

ERP system requires only the minimum number of fields and screens to achieve a task								
All data within the ERP system are fully integrated and consistent								
The ERP system can be easily modified, corrected, or improved								
ERP system database content is important								

Responses to the questions can be selected by clicking **one (□) check** box per question

Where 5-Strongly Agree ,4-Agree ,3-neutral, 2-Disgree, 1- Strongly Disagree

Survey Questions for Satisfaction

Responses to the questions can be selected by clicking **one (□) check** box per question

Where 5-Strongly Agree ,4-Agree ,3-neutral, 2-Disgree, 1- Strongly Disagree

Table 5:5 Survey questions for overall satisfaction

ERP system overall satisfaction	Ratings				
	5	4	3	2	1
Overall, ERP Information quality is satisfactory					
Overall, the ERP System quality is satisfactory					
ERP is enjoyable to use					
Overall, ERP system related knowledge (Training) has been managed satisfactorily					

5.7 Appendix 2: Open Ended Questions

1. Is there any issue/ other problem that you have observed in ERP Post-implementation phase?

……

……

2. What is your possible recommendation for future improvement of ERP Post-implementation success?

……

3. What is your opinion about the contribution of ERP system during Post-implementation in Ethio telecom? ……

……

5.8 Appendix 3: Interview questions

1. What are the main problems/challenges faced during ERP Post- implementation and how Ethio telecom is solving them?
2. What are the main problems of ERP system response time delay and ERP system integration during post-implementation phase?
3. What are the challenges IS (IT-helpdesk) user support level for ERP system users?