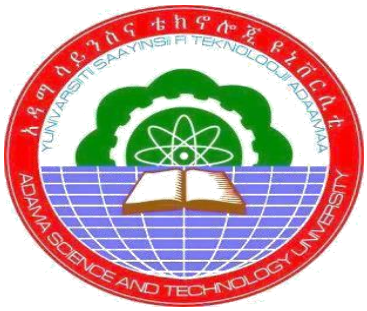

Adama Science and Technology University

School of Electrical Engineering and Computing

Department of Computing

A MASTER'S THESIS

ON

ENTERPRISE RESOURCE PLANNING (ERP) FRAMEWORK FOR ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY

BY:Mebratu Alemu Hailu

Advisor (s):
Shimelis Assefa, Ph.D. Visiting Professor

September, 2016
Adama, Ethiopia

Adama Science and Technology University

School of Electrical Engineering and Computing

Department of Computing

BY:Mebratu Alemu Hailu

A Thesis Submitted to the Department of Computing of Adama Science & Technology University. In partial fulfillment of the requirements for the degree of Master of Science in Information System

September, 2016
Adama, Ethiopia

Adama Science & Technology University
School of Electrical Engineering and Computing
Department of Computing

Enterprise Resource Planning (ERP) Framework for Adama Science and Technology University

BY: Mebratu Alemu Hailu

Names and signature of Members of the Examining Board

1. Shimelis Assefa, ph. Dr _____ _____
   Advisor Signature Date

2. _____ _____ _____
   Chair Person, Examining Board Signature Date

3. _____ _____ _____
   External Examiner Signature Date

4. _____ _____ _____
   Internal Examiner Signature Date

5. _____ _____ _____
   Department Head Signature Date

6. _____ _____ _____
   SoEEC, Dean Signature Date

DECLARATION

This is my original work and has not been submitted for a degree in any university.

MEBRATU ALEMU
September, 2016

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

Shimelis Assefa,ph.Dr

September, 2016

ACKNOWLEDGMENT

Primarily, I would like to thank the almighty God for the endless blessings and grace that has been the reason for this achievement.

Secondly, I would like to express my gratitude and heartfelt thanks to all those who help me in my study I thank them for their guidance, motivation and kindness throughout my study. I could not do much without guidance and support of others.

I would like to express my sincere thanks to my advisor Dr. shimiles Assefa for his overall guidance, understanding, reviews of the work and constructive comments.

I also extend my gratitude to all the evaluation and questionnaire participants for their cooperation and support.

I am also thankful to all my friends and family for their encouragement, and all who have contributed to this work in one way or the other.

ABSTRACT

This research work finds out the factors that determine the design of an Enterprise Resource Planning (ERP) framework with particular reference to Ethiopian Higher education institution. In today's competitive business environment, ERP systems are found to be essential for companies to get competitive and strategic advantages. Developing countries like Ethiopia are not yet benefiting much from ERP systems while these systems are widely adopted in the developed countries. This research takes the ERP framework design in Adama Science and Technology University. The research is type case study which has mainly used observations and a survey as research tools and techniques. Purposive sampling is used to select survey respondents and evaluation among the human resource managers, team leaders, expert's and staff members. Data collected in this study is analyzed by inductive reasoning and triangulation of data from the different sources. The result of this research found for ASTU of ERP framework Design. Factors such as human resource directorate, Finance and budget directorate and student service directorate management for Ethiopian context. Also the perceived benefits from users of the ASTU are taken as targets for designing the framework for efficient ERP framework design in ASTU. The suggested framework, designed with inputs from HEIs in ASTU, will help improve the efficiency of ERP implementation and help the management to reduce the costs and realize the benefits.

Keywords: Higher Education, University Management, ERP Systems, Integration, Quality Services, Evaluation Framework

Table of Contents

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

NTC	Nazareth Technical College
ASTU	Adama Science and Technology University
HEIs	higher education institutions
ACID	Atomicity Consistency Isolation Durability
SME	small and medium size enterprise
SQL	structure Query Language
ASAP	Accelerated SAP Methodology
LUW	Logical Unit of Work
ACID	Atomic, Consistent, Isolated, and Durable
ICM	Internet Communication Manager
SDM	Software Deployment Manager
GUI	graphical user interface
EIS	Executive Information Systems
BES	Business Event System
OSB	Oracle service Bus
AOS	Application object server
AIF	Application integration framework
DAD	Dynamics Application Dictionary
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
ICT	Information & Communication Technology
IT	Information Technology
MRP	Materials Requirement Planning
R/3	Real-time / 3-Tier
SaaS	Software as a Service
SAP	Systems Applications Products in Data Processing
SOA	service oriented architecture

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

In today's business world, companies are increasingly looking for flexibility, cost savings and efficiency in the business applications they acquire. The increased competition among companies has driven to look for new ways to succeed and remain competitive. In this IT led business environment, staying on the cutting edge of new technology acts as an enabler for companies to gain effectiveness and efficiency to face the competition. Enterprise resource planning system is the first generation of enterprise systems meant to integrate data and support all the major functions of organization [1], Big City. Enterprise resource planning system is an attempt to create an integrated product that manages the majority of operations in a company. It integrating the various processes that are essential to running a business, including inventory and order management, accounting, human resources, customer relationship management (CRM) to create a single unified system rather than a group of separate, insular applications [2].

It also facilitates information sharing across organizational units and geographical locations. The central feature of all ERP system is a shared database that supports multiple functions used by different business units. In practice, this means that employees in different divisions for example, accounting and sales can rely on the same information for their specific needs. [3] Almost every organization whether an academic institution or a corporate company uses ERP for managing various activities within the organization. For educational institutions, ERP is an information technology solution that integrates and automates recruitment, admissions, financial aid, student records, and most academic and administrative services. The top reasons educational institution adopt ERP solutions is to replace legacy system, improve customer service, and transform enterprise processes, modernize computer systems, improve administration, maintain competitiveness and increase operating efficiency [4].

Accordingly, this Research will focus on designing ERP framework in Adama Science & Technology University. The current Adama Science and Technology University was initially organized as Nazareth Technical College (NTC) by the year 1993. Later, by the year 2001 its

name was changed to Nazareth College of Technical Teachers Education (NCTTE). Then after, it was upgraded to a university level and named as Adama University (AU) as of 2005, and finally took its current name (ASTU) as of 2011. Based on its mission, currently, the university is structured having three pillars: academic, research and community service, and administration. To its academic and research and community service, it manages four schools, it is educating nearly ten thousand students under different departments at its regular program.

To run the above mentioned huge programs, it manages human resources, academic and supportive staff of about 3000. To manage all its programs with the above mentioned number of staff, currently, the administration wing of the university organized in such a way that it has about three Directorates to run its functions. The major of these include human resource Director, finance and budget Director and student service Director under the administration Department. This study is therefore, Enterprise Resources Planning Framework for Ethiopian Higher Educational Institution the Case of ASTU with particular reference to the above mentioned administrative directorates. Which are found in Ethiopia? Those Adama Science & Technology University have three core processes to accomplish its activity:

- **Student Service Director Process**

  The main activity of Student Service Director Process is focusing on all student service and facility activities of the university. The university has different student service departments and field of studies included under this core process. It leads by vice president of administration. Cafeteria service, clinic service, student welfare, dormitory service activities, Student Service Director are managed and controlled by this process. Each Directorate has its unit head that are responsible for the Student Service activity of the unit head. The major of tasks of unit head are assigning employers for each wings preparing report generating, following up training, and following the worker to do the working.

- **Finance and budget Director Process**

  It is support processes working on financial management, employ salary and management of training and administrative materials in the university. The finance sub process in the main part in the university for running and performing financial activities including payroll for the employee, financial equity management, payment for non-cafe students, payment for purchasing of materials.

- **Human Resource Director Process**

  Human resources support process owners are working on human resource managements. The basic functions of human resource are hiring and recruitment of manpower, selection of suitable personnel for a given job and managing human resource in the university.

Organization structure of ASTU Administration

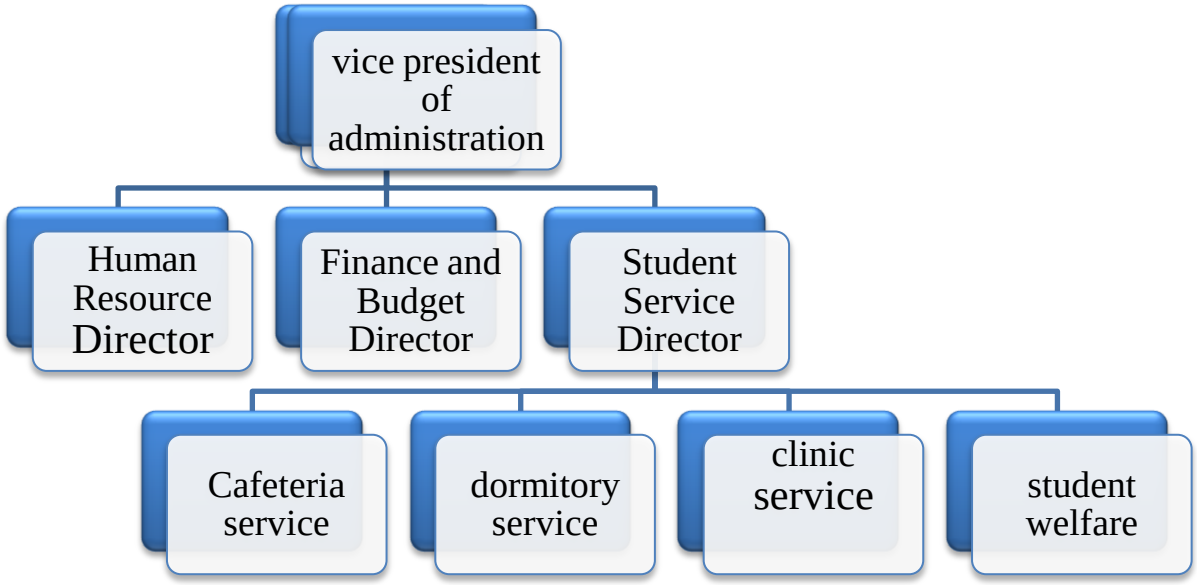

Figure 1.1: Organization structure of ASTU Administration

1.2. Statement of the Problem

The ERP system of the Adama Science and Technology University is done manually, starting from the report up to the signing contact latter. And also the data can be store by using a file cabinet to store and retrieve data; it takes more time to search a particular file and characterized by poor resource management as a result of lack of integration between related directorates in the administration wings. Through manual modes ASTU report generate with various problems such as: - There is no clear information because of the manual based service and it takes Times to provide the progress of the job.

- Heavy paper work
- It is unable to manage and control the available material in the institutions and not effectively utilize the resources.
- Deprived customer satisfaction because of the manual based service and it takes Time to provide the customer queries.
- Lack of accuracy in maintaining the student records.
- Lack of integration among the Director offices.
- The system is less responsive to provide the requested report quickly and it consumes the time to deliver the report to concerned Director.

The preliminary study conducted to know the current state of the fact whether there is ERP system developed and applied at ASTU, shows that ASTU has the aforementioned problems; to overcome this challenge ERP system is essential for ASTU to assure the quality of the services they provide, and to manage the resource easily. Therefore, this study intends to design ERP framework system for ASTU. It is, therefore, very significant to determine the success of ERP implementations, as compared to the current manually being applied system as it may require huge financial and human resources to be invested therein. However, currently there is limited empirical research conducted on the issue under study in the Ethiopian context as there is no Ethiopian higher learning institution that has developed and applied the ERP system.

1.3. Research Questions/Hypothesis

1. To what extent Adama Science and Technology University workers are exposed to ERP frame work design and development System?
2. How are adequate the resources (manpower, financial, and material) in ASTU to Provide training and development for their workers?
3. Is there any effort being made to conduct impact assessment of the design and Development frame work in directorate of ASTU?
4. How the directorates are integrated so that it will be easier to generate Report?

1.4. Objectives of the Study

1.4.1. General objective

The general objective of this study is to design ERP framework for Adama Science and Technology University.

1.4.2. Specific objectives

To achieve the general objectives of the study the following specific objectives are considered:

- To review existing system ERP framework and related Work.
- To ERP framework for administration wings which include finance and Budget directorate, human resource management directorate and student service Directorate's transaction report and processes information in ASTU.
- To identify the extent that Adama Science and Technology University students can benefit from the development of enterprise resource planning framework in the administration wings.
- To an ERP framework for selected directorates of Adama Science and Technology University

1.5. Significance of the Study

ERP systems are often the largest software application adopted by universities with significant amounts allocated to their implementation. However, little research has been conducted about ERPs in a university environment, compared to other environments. Universities differ from other organizations because they have different environments and circumstances, and they use ERP technologies for academic purposes. Faculty and staff commonly interact with core institutional activities through ERPs, and students need more information and better E-learning environments. In sum, this means that the system is, by definition, critical to the institutions' mission. Furthermore, these organizations are governmental organizations and do business for profit and non-profit purposes, which might make ERP systems in these organizations with different concomitances especially with the high percentage of failure implementations. [5]

All of these issues lead to critical questions about the success and the benefit of ERPs for these organizations. The core part of these issues centralizes the study's aim on whether or not the system improves user performance, and also whether ERP systems meet staff requirements in higher education environments. Hence, studying the impacts of ERP systems on user performance is a significant way to assess the utility of these applications in higher education institutions and how they contribute to performance efficiency and effectiveness. When ERP systems are fully realized in business organizations, they yield significant benefits. such as improved access to accurate and timely information. However, higher education institutions do not realize the significance of the ERP systems because of the very few successful implementations and adoption of these applications Therefore, providing knowledge about the fit between ERP applications and users' needs in these institutions should help to at least avoid any failure caused by mismatches between the system and users' needs. [6]

1.6. Methodology

1.6.1. Data Collection

The data for this study is collected through questionnaire by preparing open and close ended questions we asked the respondent people, using observation we tried to understand the business process of the university, domain expert consultation by consulting those people who work on the area and analysis of different the existing manually working ERP systems, some related

works were also reviewed. Appropriate and basic sources of data for case study are documentation, direct observation, participant observation and survey questionnaire. Case study mostly uses qualitative data collection methods with observations and document analysis.

1.6.2. Case Selection and Sampling

Sampling is the process of selecting units or individuals from a population which can be included in the study, for instance, to answer survey questionnaires.

1.6.3. Evaluation techniques

This involves reviewing and analyzing existing literature on ERP systems and the performance of stakeholders. The aim is to establish a comprehensive understanding of ERP systems in higher education from a stakeholders' perspective, from which theory-building can proceed.

The underlying epistemological approach of this research is positivist. This is appropriate to the context for a number of reasons. First, positivist studies generally test theory, in an attempt to increase the predictive understanding of phenomena. Secondly, positivism assumes the existence of an objective physical world independent of human observation and of an equivalent social reality independent of individual perception. Given that the nature of this research is that it investigates the effectiveness of the adoption of ERP in a large organizational context, in which the existential reality of concern to the research is reflected in the organization's output, removed from the particular perceptions of individuals, the subjective and often highly specific and particular data which characterizes qualitative research is in itself unable to shed light on the problems of concern here.

Identifying the appropriate research strategy is important in establishing the general framework of the study. The present research is mainly concerned with evaluating the performance of ERP framework stakeholders in three directorates in ASTU, where the relationships among these elements are unclear. Therefore, multi-case studies constitute the appropriate research strategy.

1.7. Delimitation of the Study (scope)

It is true that it will be more useful to study thoroughly the entire university to get complete picture than what ERP framework does. However, this is practically difficult due to various resource constraints to undertake the study since Adama Science and Technology University is such a very wide higher learning institution and the researcher. Therefore, it is logical for the researcher to delimit the study in three Directorate wings where he has ample information on the prevalence of the problem. Accordingly, the study covered Administration wings personnel at the centre and those that are working at different Directorate with the same positions. The study is aimed at investigating the three namely, of human resources management directorates, finance and budget directorates and student serves directorates in Adama Science and Technology University.

The scope of this study is:

The scope of this research is bound to conducting study to investigate the critical success factors of ERP systems implementation by considering the project at ASTU even though the results of the study can be extended and applied to other organizations and ERP projects. The focus of the study is around the three main ERP modules which are fully designee framework and being used at the case study company. These modules are as listed below. The scope of the study is also within the phases of ASAP ERP implementation methodology covering the period from the ERP project preparation up to the end or cutover of the project. Design the frame work of an ERP system for ASTU Integration of the human resources module with finance module and student Module.

The limitation of this study:

The system will not integrate the whole module to create a unified system. Like any other research, this study has encountered the following limitations and constraints.

- Limited or no literature and research on ERP in Ethiopian context for reference.
- Time constraint of some observation and survey respondents due to busy office works.
- The overall time constraint of the research program.
- Limited availability and access to documents related to the ERP implementation project.

1.8. Organization of the Thesis

The thesis is organized in five chapters as explained below:

Chapter 1 - Introduction

This chapter is introductory in nature, providing a brief overview of the background of the research work. This chapter introduces the structure of the thesis. It covers the role ofenterprise resource planning in technical educational institutions. It also covers the need andrationale for the study.

Chapter 2 – Review of the Literature and Identification of Research Gaps

In this chapter, different views of researchers on ERP implementation and success factors in ASTU are presented. In depth review of the ERP literature helps to know the emphasis and direction in which ERP has developed, the time periods of the studies, the success factors, the inhibitors, the costs and benefits and existing ERP frameworks for ASTU. It helps to identify the gaps in the earlier studies and provide the direction for research.

Chapter 3 – Research Design and Methodology

This chapter discusses the methodology of the research. The study uses both primary data and secondary data. It discusses the different methodologies adopted in the study, the population of the study, tools, and methods of data collection and methods of data analysis. Secondary data has been used to identify the successful ERP practices used in educational institutions in the world.

Chapter 4 – Data Analysis and Discussion

This chapter covers the analysis and discussion of responses gathered through the questionnaires and presents the outcome of the various analyses. The chapter covers the ERP modules in ASTU, the perception gap in the designee framework of these ERP modules in ASTU in Ethiopian. The success factors and predictors of user satisfaction are highlighted through the factor analysis and regression analysis of three directorates. All the aspects i.e., functionality, security, quality, costs, risk handling and user satisfaction are addressed in this framework. It also summarizes the support from the literature supporting the framework. The results of framework validation through case studies have also been summarized.

Chapter 5 – Evaluation Framework

Presents the evaluation of the research objectives, methodology, and validity presents also the limitations of the thesis

Chapter 6 – Conclusions and Future Scope

This chapter covers the learning's, recommendations and conclusions of the study and also highlights the recommendations regarding framework for efficient ERP implementation in ASTU. The chapter also lists the further areas of research in ASTU.

CHAPTER TWO

2. Literature Review

2.1. Over View of Enterprise Resources Planning

In today's information age, the use of computers in any organizational is fundamental. An organization who wants to succeed in today's world cannot afford to ignore computers and information technology. In any industrial, business or administrative organization computers help to process data of different components such as employees, business processes, and the machinery and equipment etc. For this purpose, information systems (IS) was introduced in an attempt to gather required information and store it for efficient running of an organization in order to achieve its goals. [5] In the history of the evolution and development of ERP systems, Material Requirements Planning (MRP) system grew to Manufacturing Resource Planning (MRP II) systems [6] and these systems later evolved to ERP systems; a term coined by Gartner Research Group in 1992 [7].

2.1.1. What is Enterprise Resources Planning?

Enterprise Resource Planning (ERP) is information system software that integrates departments and functions across an organization into one computer system. [8] Integration is an extremely important part to ERP. Davenport claims that "ERP is an enterprise-wide information system, which facilitates the flow of information and coordinates all resources and activities within the organization." According to [9], an ERP system is a packaged business software system that allows a company to: automate and integrate the majority of its business processes; share common data and practices across the entire enterprise; and produce and access information in a real- time environment.

The above [9] and [8] ERP definitions focuses on the integration of various organizational networks, in particular functional divisions within educational organizations like finance, human resource, registrar, department and inventory management while all departments are integrated to the unified system to streamlining the information they provide: "getting all the systems to talk to each other," explains Sean Fleming. [10] support Deloitte's and Davenport's perspective that

they over- emphasize the integration aspect of ERP systems by asserting that ERP is more than a software package that seeks to integrate functional departments within an organization. The main goal of ERP is to integrate data and processes from all areas of an organization and unify it for easy access and flow of work. It aims to improve and streamline internal business processes, which typically requires reengineering of current business processes.

According to [11] ERP is defined from four perspectives:

1. ***Business processes perspective:*** where ERP system is seen as instruments for enabling enterprise to manage and streamline business processes, through crosses functional or cross- organizational integration;
2. ***Technological /technical perspective***: where ERP system is seen as configurable, online real time interactive software package, which comprises of multiple modules (or applications) to support information processing function across the whole enterprise, through single database and uniform operating platform.
3. ***Communication perspective***: an ERP system as enterprise- wide information system that integrates all information flows and provides access to real-time information.
4. **Functionality perspective**: where ERP system is seen as an integrated set of programs that provide automations of various business procedures.

2.1.2. Benefits of Enterprise Resources Planning(ERP)

In the absence of an ERP system, a large enterprise may find itself with many software applications that do not communicate to each other and not effectively interact with each other. There are many advantages of implementing an ERP system some of them are:[11]

- **Improved Efficiency and Productivity Levels**

  ERP systems enhance the efficiency of the whole departments by smoothly integrating its various divisions. It also helps in reduction of paper documents and provides an online service for quick storage and retrieval of information.

- **Integration of Business Functions**

  ERP system integrates data and process from different divisions of an organization. It enables easier access and work flow. Its multiple software modules aid the coordination of various business functions in an organization. This centralization of data in one place

eliminates the problem of synchronizing the changes made by different departments and people.

- **Reduces Operational Time**

  The time factor is one of the most important parts of an ERP system. ERP reduces a huge amount of time for an organization. In the manual system, each and every department is dependent on pen and paper work, so it can take huge amount of time. ERP reduces per activity time because there is no data redundancy and all data are easily accessible, so the data availability is very high.

- **Better Customer Relationship Management (CRM)**

  ERP improves better customer relationship with organization. ERP can store every data of a company. So if any customer losses any data accidentally, the organization can provide each and every thing which a customer requires.

- **Improve Organization Performance**

  With real-time information, employees are better able to help customers quickly and efficiently. ERP system is an efficient, cost-effective way to maintain and improve the operation of an organization.

- **Ensure Data Security**

  Data security is also an important factor while designing an ERP system. ERP ensures complete security of data. Various security measures have been implemented to tighten the security at the database level as well as at the application level.

- **Comprehensive Reporting System**

  Organizations around the world consider effective reporting system as a vehicle for evaluating and enhancing the performance of the entire system. Therefore, reports have become the most vital part of any application software. ERP solution offers a powerful mechanism to generate accurate and robust reports with a great deal of flexibility.

- **Improved Planning and Analysis**

  ERP enables the organizations to fully utilize many types of decision support systems and simulation functions because of the comprehensive and unified management of related business and its data. Decision makers can easily avail the data and hence make better decisions.

- **Flexibility**

  As many companies involve global proportions, it is important to take care of diverse operations related to multinational environments such as language, currency, accounting standard. All such differences can be covered in one system that can manage functions across multiple locations of such companies. Hence, ERP systems have major advantages not simply for development and maintenance but in terms of management.

2.1.3. Associated Challenge of ERP Implementation

Organizations are spending large amounts of money implementing ERP systems in the hope of achieving significant business from integration across functions and business units, as well as from best practices embedded in the software. However, it is not certain that organizations actually experience the expected benefits. Although such blaring benefits and full-scale influences of implementing ERP system have been suggested, many researches indicated that the implementation of an ERP system could be an extensive, lengthy and costly process. Meanwhile, the importance of commitment from top management could not be emphasized more to accomplish the ERP project [12]. These challenges are mainly due to size of the system and its overall effect on the company's business operations. In this section we review the common challenges of ERP implementation.

- **It Requires a Lot of Effort**

  Implementing ERP as a new set of decision –making processes is a major undertaking involving many people throughout the company, including general manager. In essence, the entire company must learn how to deal with demand and supply issues in a new way. The speed of information flow with enterprise software combined with ERP's new

approach to all of the planning and execution system represents a major shift in company thinking – and that means a lot of work.

- **It Requires Top Management Leadership and Participation**.
  If the goal is truly to run the business better, general manager and staff members must be deeply involved because they have the real leverage over how the business is to be managed.

- **It Involves Every Department Within the Company**
  It's not enough for just the manufacturing or logistics or materials departments to be on board. Virtually all departments in the company must be deeply involved in implementing ERP; those mentioned, plus marketing, engineering, sales, finance and human resources [13].

2.2. Definition of Terms and Concept ERP framework

- **CRM** (customer Relationship management). It describes the strategy that a company uses to handle customer interactions. Customer relationship management solutions provide you with the customer business data to help you provide service that your customers want, provide better customer service and understand who the customer is.
- **ERP** (Enterprise Resource planning): - system the integrate internal and external management of information across an entire organization. It facilitates information flow between all business functions inside the organization.
- SAP (system Application& products): - which creates a common centralized database for all the applications running in an organization.
- SOA (service oriented architecture): - It defines how two computing entities, such as programs, interact in such a way as to enable one entity to perform a unit of work on behalf of another entity.
- SQL (structure Query Language): - works with relational databases which all organize data into tables, rows, and columns which correspond to file, records and fields.

2.3. RELATED WORKS

2.3.1. ERP Systems in Education

There are many research works conducted about ERP implementation all over the world and from different countries perspectives. Enterprise Resource Planning (ERP) is a business management system that integrates all component of the business with a view to facilitate the flow of information among all business function. Although a large number of business organizations and higher education institutions abroad have adopted ERP. Many top western universities are running their campus administration though ERP system. Universities are fundamentally different from business organizations in their decision making processes. Consequently, the standard Information system (IS) development strategies developed for business may not be appropriate in institutions of higher education [14].

When it comes to selecting and adopting an ERP system for universities, we need to ensure that it takes care of multiple perspectives pertaining to students, teachers, staff, administration, parents, and alumni. All the data is managed in a time sensitive manner along with the rules and policies applicable at that time, so whenever required, the exact information can be re-produced as it is. Various functions involving a number of campus requirements, human resource, financials and student services should not be integrated. Recently, many higher education institutions want to take advantage of ERP systems. They invest millions of dollars in ERP projects [15].

For example, the study conducted before seven years tell us George Town University in U.S.A spent nearly $60 million on a campus wide ERP [16]. The University of Minnesota had a similar experience, when projected costs of $38 million finally reached $60 million. The investment in ERP systems represents the biggest investment in ICT (information communication technology) for higher education institution [17]. The top reasons why institutes are adopting ERP solutions are to replace legacy systems, improve customer service, transform enterprise processes, improve administration, maintain competitiveness, increase operating efficiency [18]. The main advantages of ERP for higher education institutions are, according to ECAR organization (EDUCAUSE Canter for Applied Research) are the following [19]: improved information access

for planning and managing the institution; improved services for the faculty, students and employees; lower business risks; and increased income and decreased expense due to improved efficiency.

2.3.1.1. ERP in Case of Australia Higher Education

Australian universities have been under more pressures as a result of increasing number of students and increased government pressures to reform their structures, lower their costs and achieve greater administrative efficiency [20]. The Australian government has pressured universities into acting more like businesses, as the level of funding has significantly reduced [8]. The introduction of the ERP in higher education in Australia has resulted in yet a further layer of change in universities to replace old administrative and management systems with new ones [21]. However, one of the reasons that universities have implemented ERP system is to improve performance and learning services, and also to become more efficient in their operation [22]. Consequently, universities in Australia began to implement ERP systems to replace old and out dated systems with more efficient ones [23].

ERP systems have become a standard feature of most Australian higher education institutions and more than 85% of Australian universities have implemented ERP systems [24]. According to the international Journal of human and social sciences, 2010 report, the main reasons for adopting ERP in Australia higher education is the need to modernize systems, create greater usability and flexibility, integration of data and systems, businesses process reengineering, an increase in the degree of electronic data interchanges, and reduced maintenance and risk avoidance.

2.3.1.2. ERP in Case of Romanian Higher Education

Romanian Universities have been choosing information systems based on the need to satisfy different requests in a short time. The universities have been forced to use in house developed information systems or to buy software solutions from small vendors having no experience in the field because of budget restrictions. These information systems have a low integration level and

they are not based on homogeneous framework standards. They increase the proliferation of heterogeneous systems, complicating the integration among the various applications. Each application has its data and functions separated from the other applications already existing in the organization. These applications don't provide an integrated view of all activities in a university [8].

Current information systems have not been developed for strategic analysis and don't store historical data about students, course, and personnel. It is therefore impossible to develop a complex analysis that provides real time reports and useful indicators to the university management. ERP system can be used as a solution to integrate and increase the efficiency of Romanian Higher education processes. An ERP system provides the following benefits to the Romanian Higher Education [25]:

Business benefits:

- Campus wide integration on a common system.
- Improve internal communications.
- Reduce or eliminate manual processes.
- Enhance strategic decision making and planning capabilities
- Enable higher availability of administrative systems
- Integrated workflow, industry best practices, and reduced dependence on paper

Technology benefits:

- Reduce or eliminate the need for backup or shadow systems
- Provide accessible, user-friendly administrative and student support services
- Increase data integrity, validity and reliability
- Create a more seamless integration between technology and education delivery by providing a single platform based on new technologies.
- Access to data in real time.

The ERP system also provides complete management of the main functional areas of the Higher education:

- Planning and controlling (planning and budgeting, research analytics, academic Analytics, student analytics, accounting analytics, HR analytics, HR forecast);
- Accounting (payments, incomes, fixed assets, general ledger, etc.);

- Student and learning (course planning, student services, resources management, Community, e-learning);
- Human Resources (organization management, career, skills management, Training, payroll);

2.3.1.3. ERP in Case of Indian Higher Education

The introduction of the ERP in higher education institution in India has resulted in yet a further layer of change in universities to replace old administrative and management systems with new ones [26]. However, one of the reasons that universities have implemented ERP systems is to improve performance and learning services, and also to become more efficient in their operations, in part to deal with the range of other changes they have been facing. ERP system for Indian higher education developed in the direction of support student administration (student enrolment procedures, student enrolment, and student data), human resource management (monitoring of employees) and finance (accounting, payments, investments and budget). Consequently, Indian higher education began to implement ERP system to replace old and out dated systems with more efficient ones. In Indian higher education institutions that have invested in ERP systems, the magnitude of the implementation project easily become the biggest information system project in the organization's history.

2.3.2. Existing ERP Architecture

To understand the existing ERP architecture, similar works on the area have been assessed. The architecture used is three- tier architecture. Software architecture defined as the structure of a system that comprises basic elements of the system that show the relationship with each element. While reviewing related work on ERP architecture, most ERP vendors like SAP R/3, Oracle and Microsoft Dynamics works based on three-tier architecture. They are presented in the following sections.

2.3.2.1. Case of SAP R/3

SAP R/3 is one of the main products of SAP, where R stands for Real Time and the number 3 relates to three tier application architecture (Data base, Application Server and Client). SAP R/3designed as the integrated software solution for client/server application and the system is provided by SAP. It is the most successful product for ERP, which comprises of modules for human resource management, inventory, finance etc. and for back end it uses commercial relational data base system (like Microsoft SQL server, Oracle etc.) that stores all related data and code of all application program. SAP R/3 is based on a three tier client/ server technology. It is made up of three functionally distinct layers. ERP systems are based on a relational database. Using a relational database and appropriate process design allows companies to capture data once and then make that data available for use throughout the firm; by all appropriate users. ERP system mostly runs on a three-tiered client/server system with three layers of logic as diagrammed in figure 2.1.

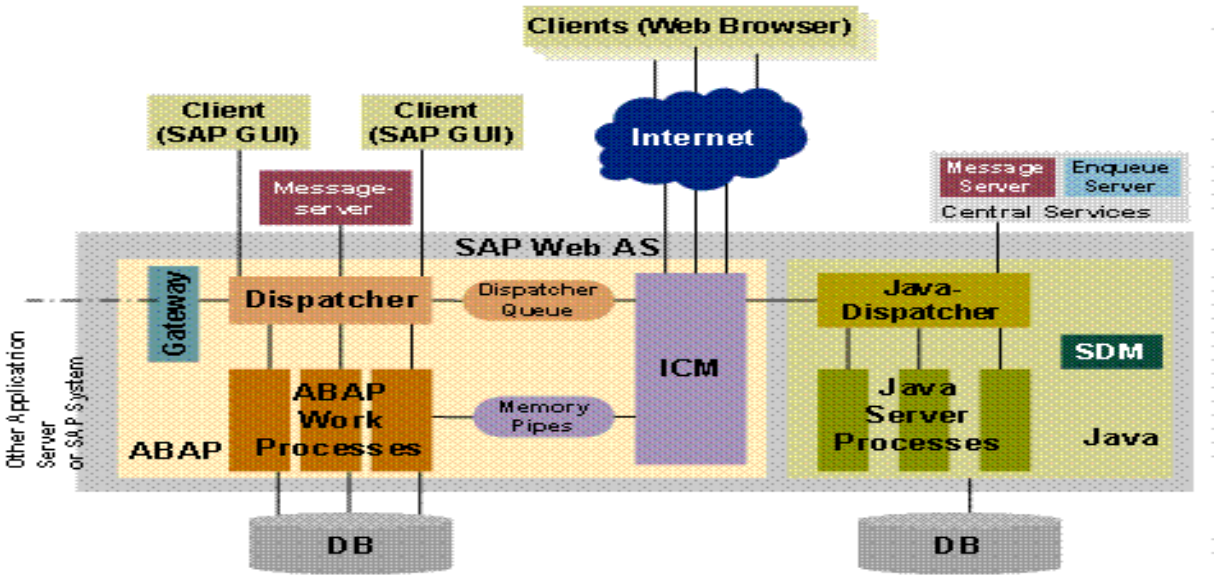

Figure 2.1: Three –tier architecture for SAP R/3 [27]

SAP R/3 uses advanced Business Application programming language (ABAP). It is a high level language created by German software company SAP in 1980s. All ABAP application programs are managed by SAP R/3 data dictionary and the program code are stored in the SAP data base. SAP R/3 also includes software development workbench for developing new application code.

The transaction processing in SAP R/3 is denoted by the term Logical Unit of Work (LUW). The SAP R/3 LUW has the similar ACID (Atomic, Consistent, Isolated, and Durable) properties as database system transaction. SAP R/3 LUW is mapped to data base transaction using complex relationship as there is more than one transaction. Every applications server has one dispatcher process and several work processes.

The dispatcher queues request until a work process is available to carry out the dialog step. The relevant data is rolled into the privet buffer and the ABAP program is interpreted. Thus, a single application server handles every user session, but different work processes may handle dialog steps of the same LUW.SAP R /3 application servers divides the available memory in to several segments. The memory is divided into shared memory, which can be accessed by all working processes and local memory for each individual working process.

Internet Communication Manager (ICM)

The Internet Communication Manager guarantees communication between the SAP systems (SAP web application server) and the outside world via the protocol HTTP, HTTPS and SMTP. In its role as a server the ICM can process requests from the Internet that arrive as uniform Resource Locator (URL) with the server / port combination that the ICM can listen to.

Software Deployment Manager (SDM)

The Software Deployment Manager (SDM) is the standard tool that you use to install J2EE components on the AS (application Server) Java. The SDM is a client/ server application. The SDM server runs on the AS Java side. This server is started automatically with the AS Java. A graphical user interface is available as a client.

- **The presentation layer**

  This is a graphical user interface (GUI) or a web browser which allows users the ability to access and analyse information and system functions. The presentation layer it provides a graphical user interface (GUI) that is connected with the application servers through a local (LAN) or a wide-area network (WAN).

- **The Application layer**

  It consists of business rules, functions, logic, and programs where business processes and end-users interact with the system. The presentation layer it comprises the business administration and responsible for processing of pre-defined and user- defined application programs.

- **The Database layer**

  This is the management of the organization's operational or transactional data. This is usually built up on industry standard relational database systems like Oracle or SQL server. The database layer implemented on top of a commercial database product that stores all data of the system. There are three types of data in ERP systems namely master data, transaction data and configuration data.

  1. Master data is data in database tables which are used as references for day to day Business transactions.
  2. Transaction data is data which contains the day to day business activities.
  3. Configuration data is data in tables which contain the settings and configurations of the system to suit and fit to the business logic of the company.

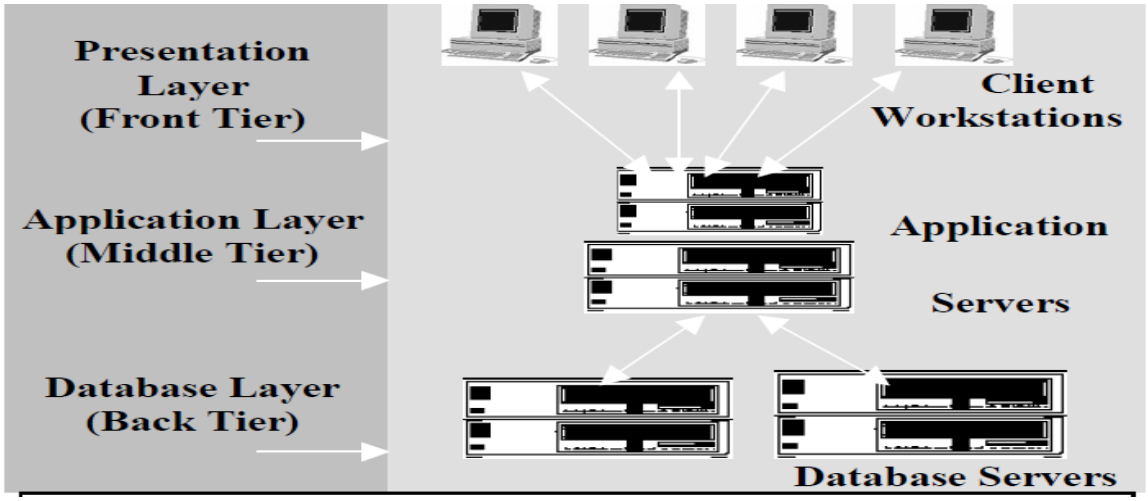

Figure 2.2: A three-tiered ERP architecture (Source: [28] Idea Group Publishing)

ERP system is used not only as operational or transactional system, but also as controlling and executive decision support system. According to [29], the data and information in ERP systems is divided into three layers as operational system (transactional data entry layer), tactical system (controlling layer) and strategic or Executive Information Systems (EIS) layer as in figure 2.3.

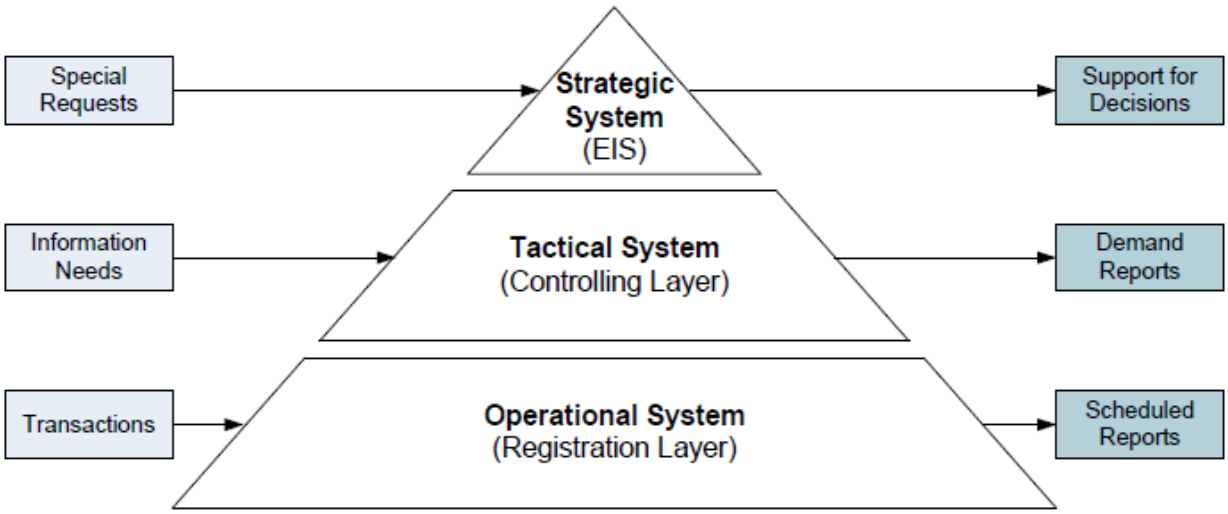

Figure2.3. Data layers of an ERP system (Source: [29])

2.4. Pros And Cons of ERP Systems

There are different initiatives and reasons for acquiring ERP systems. ERP systems have the advantage of seamless integration between all parts and processes of a company, and this in turn gives the possibility of proper control [29].They are used to control and reduce data redundancy and accuracy. Redundant tasks will be removed and the efficiency of the company increases. The other advantage of ERP systems is that easier and timely reports functionality. Users can get self-services of data needs and access. They can run their own reports and have better access to their data and the ability to manipulate and report on this data.

Figure2.4: Architecture of ERP system

(source:http://www.maturski.org/ENManagement/Enterprise-Resource-planning.html)

In general, compared to the traditional functional IT systems, ERP systems provide different benefits to a company and these benefits can be viewed in different dimensions as operational, managerial, strategic, IT infrastructure and organizational as in table 2.1.

Table 2.1: ERP System benefits in different dimensions

Dimensions	**Benefits**
Operational	Productivity improvement Cost reduction Quality improvement Customer satisfaction
Managerial	Decision making Resource management Performance management
Strategic	Business growth Business cooperation Business leadership
IT Infrastructure	Business change flexibility IT cost reduction Increased IT capability

Organizational	Common vision Empowerment Changing work patterns

On the other hand, ERP systems have some drawbacks and limitations. These systems are usually complex. Regardless of their long-term benefits and reduced maintenance costs, initial one time implementation is expensive. And even if data accuracy and integration is achieved by ERP systems, it is hard to correct or amend data once it is maintained in the system as it will affect many modules and processes. While ERP systems have more efficient methods, freedom and self-creativity practice with the system is minimal.

2.4.1. Case of Oracle

Oracle ERP is a three-tier system that is composed of four basic modules namely: Human Resources, project Management, Finance, and Asset Management. These modules are built on top of a unifier Oracle database. The interaction between these modules is achieved via the Business Event System (BES) that triggers message creation or consumption of any registered parties. Oracle currently offers an additional package, namely the SOA (Service Oriented Architecture) suite, which can be integrated with the E-Business suite in order to promote enhanced scalability. ERP application can therefore be exposed on the Oracle service Bus (OSB) as services. Recently, the key features of the SOA suite become an integral part of the Oracle E-business suite R12.1 package with the inclusion of the Oracle EBS adapter However; these added features are sold with different license, which can be very expensive to some organizations.

2.4.2. Case of Microsoft Dynamics

Microsoft offices a number of ERP solution to suite various customer needs. One of ERP solution that is known as a comprehensive solution is dynamics AX [30].It employs the three-tier architectural pattern, namely: client tier, Application object server (AOS) tier, and database tier. The client contains forms and reports code. AOS is used to execute application objects such as classes and queries. The database is normally used to store data for the ERP. Microsoft

Dynamics AX utilizes the Application integration framework (AIF) to facilitate the integration of application-to- application and also business-to-business. AIF supports the creation of generic web services and also document services; it also facilitates the consumption of external web services from within Dynamic AX. Another ERP solution provided by Microsoft is the Dynamics GP, which is also based on a three- tier architectural pattern.

The application tier is composed of three main components: The Dexterity tool and runtime, Dynamics application Dictionary, and SQL server. The Dexterity tool is used to build the forms and also to attach scripting code using san Script to applications. The Dexterity runtime environment is used to enable the execution of a functioning application to end- users. This tool is therefore responsible for the development and the execution of the application interfaces. The Dynamics Application Dictionary (DAD) is responsible for storing the business logics in common component architecture such as COM + and DCOM [24], so other distributed application can use them as service providers. The main design consideration of this dictionary is to separate the presentation logic from the actual business logic of an application, so services can be accessed independently of any form or application of the presentation layer.

2.5. Existing ERP Methodologies in HEIs

Many researchers have studied ERP implementations in various universities and higher education institutions (HEIs). These are represented here in the chronological order from year 2001 to 2012. In 2001, the benefits of ERP as reported by [31] include: improved access to accurate and timely information, user-friendly web-based interface, streamline processes and easy adoption of best business practices, reduced reliance on paper, automated e-alerts etc. They also provided the breakup of the costs for ERP which included the cost of consultants, cost of rent, employees' salaries, capital expenses and operating expenses. The consultant cost was reported as the major contribution of cost. Framework is shown in figure2.5. Below:

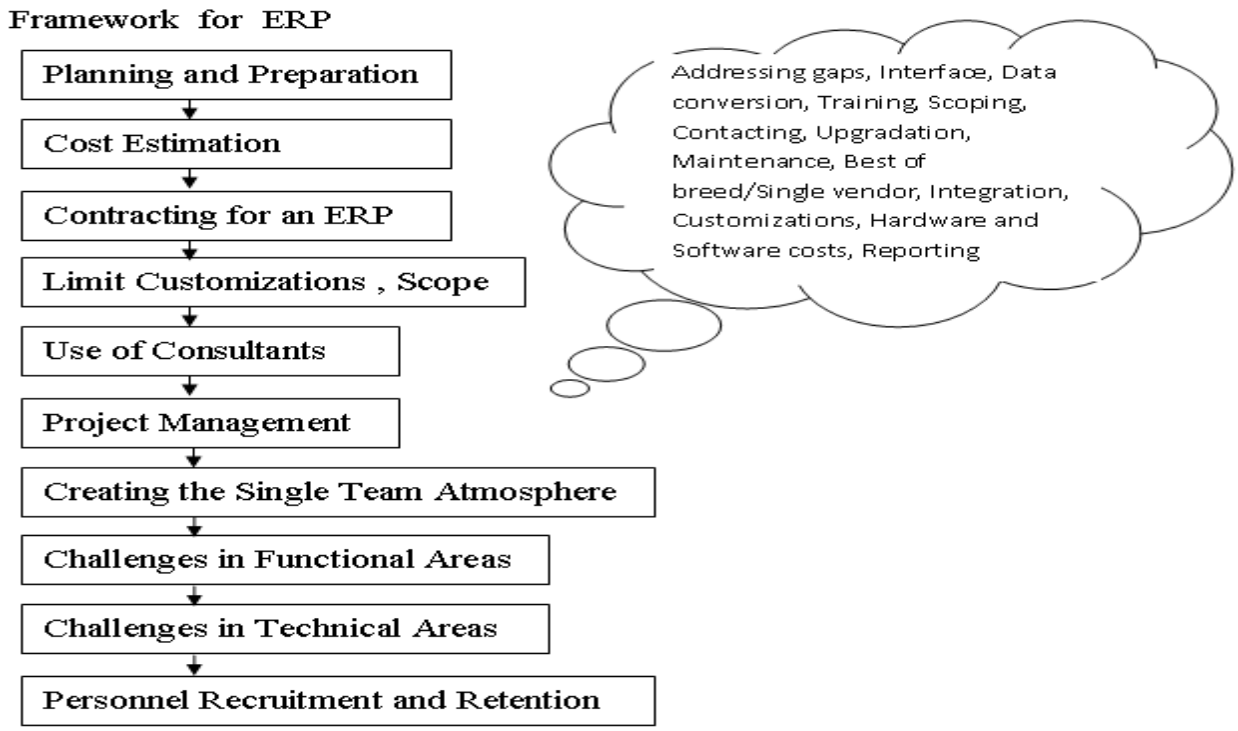

Figure 2.5: Framework for ERP in Universities ([31]

[32] Provided a description of the student's feedback of an international collaboration between two universities (one in U.S. and other in Germany) to address the issues of new e-centric business practices. The collaboration deployed the web to link the students dispersed geographically and a case scenario methodology which utilized SAP R/3 was used. According to [33], the benefits of ERP implementation should be considered from three levels namely the researcher, the University and the broader business community. In 2002, the characteristics identified by the Gartner group for ERP in higher education are modular structure and integrated system along with multiple scopes.

Out of 256 institutions surveyed by Educe Cause Center for Academic Research, [34] identified the factors affecting the vendor's selection; the modules installed by implementers and the reasons for implementing ERP systems. The major challenge identified was the integration of ERP keeping in mind the people perspective instead of solely technical perspective. [35] Investigated critical success factors in Australian University environment. He developed a theoretical framework for use and usefulness of ERP in universities. [36] Compiled a list of ERP implementation best practices for higher education institutions. They sampled 308 chief financial and information officers at 170 higher educational institutions throughout North

America and found that the survey respondents ranked highest the statement regarding the endorsement of the implementation project by executive management.

Top management support along with additional financial support for ERP implementation is the most important factors for ERP implementation success. [37] Identified critical success factors for ERP in public sector institutions. In a case study of four institutions, they suggested that to handle problems in business process reengineering impact of ERP systems, use of communication and change management procedures can help. [38] In a case study of an Australian University, on examination of PeopleSoft Student Administration Module indicated that the users were not satisfied with the benefits of the system and the cost of the system.

In order to get more benefits realized from ERP implementation, user-centered design of interface should be chosen. [39] Have identified the issue of buy versus assemble of ERP software solutions for universities. According to him, assembly approach can provide more independence and flexibility.[40] Have identified the total cost of ownership (TCO) of ERP in universities. They have identified 5 major ERP life cycle costs and direct and indirect costs in ERP.

The costs in ERP life cycle costs are costs of acquisition, implementation, operations, maintenance and replacement. In order to do a total cost of ownership analysis, direct and indirect costs need to be measured. Costs related to hardware, software, clients, servers, networks, peripherals, fees etc are direct or budgeted costs. Indirect costs include the cost of downtime and services to end users. Similarities and differences between other organizations and universities (in UK) in the use of ERP systems have been identified by [41].

According to them, ERP systems are potentially a costly and high risk strategy for two reasons: ERP attempts to integrate and link together the whole range of functions across an Organization and, therefore, if there are any problems with implementation, or if One part of the system does not work as expected, and then the University May Have to write off the whole investment in ERP. Second, ERP systems are built with generic users in mind and systems rarely translate across the boundaries between organizations in the public and private organizations. Because of this generic type of system, universities must be confident that the ERP system implemented is

the best match to their current and future business processes. If the ERP system fails to meet the University's unique needs, then the University must customize the system and this can cause a whole new set of problems [41].

Thus the costliest affair for University authority in ERP implementation is customization because otherwise the cost is of adapting the organizational processes embedded in the software. The universities are to adopt the generic solutions provided by the ERP vendors. So the concern is to have a balance between the benefits provided by generic ERP solutions and specific requirements of the universities. [42] Presents research results in the field of ERP systems and their use in higher education institutions in Slovenia and abroad. The conclusion drawn is that higher education institutions should focus on informatics for quality assurance. [43], in a case study of three Australian universities identified the influences impacting the outcomes of ERP implementations.

The research formed the basis for the development of guidelines for the effective and efficacious management of ERP implementations in these universities. [44] Focused on the characteristics of transformational leadership theory and its significance in predicting performance within a University. He used transformational culture as a predictor of the level of success of an ERP implementation. The case study included 10 campuses in a University system with an installed ERP system. The culture scores were correlated to the institutions degree of ERP implementation success. The results indicated that organizational culture had little or no impact on the successful implementation of an ERP system.

[45] Examined the application of ERP software to the student information management in higher education at a Midwestern University. User satisfaction was found to be the most critical success factor for measuring the success of ERP implementation. The survey responses revealed that if the new system has improved user's work processes, only then it can add to effectiveness of ERP. For this, the users should have adequate support and training. [46] Explored the implementation of an ERP system at King Saud University (KSU) in Saudi Arabia. It is one of the largest universities in Saudi Arabia with 22 colleges and 10 research centres. He highlighted various challenges and the positive factors implementing the ERP. He proposed that investment should be done with regard to change management and should change according to

organizational preferences. A good project team should be selected and communication with the user should be continuous. [47] Has identified major activities in University ERP as shown in Figure 2.6 below:

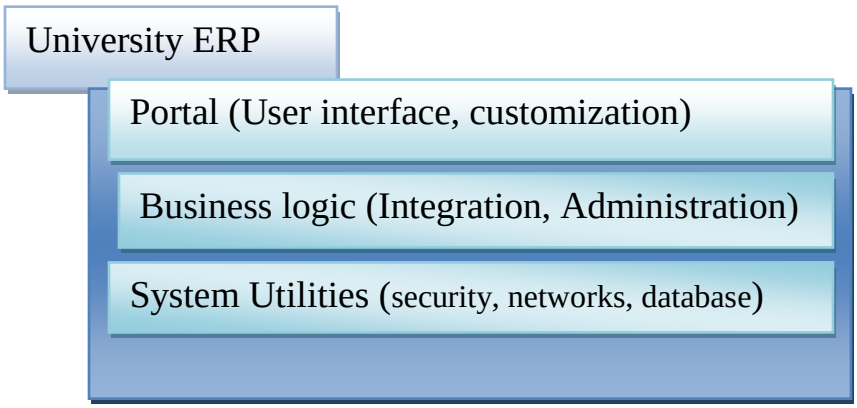

Figure 2:6 Components of University ERP [47]

[48] Have studied the impact of ERP in Thai universities. The main factor found lacking was knowledge related to ERP system. Resources like computer and technology staff were also reported as scarce which limited the benefits which could be achieved from ERP implementation. [49] Have studied an industry-academia qualitative analysis. The emphasis is placed on ERP Tec ovation - diffusion that is required to be executed for optimum ERP-diffusion of knowledge areas.

The collaboration of leadership in industry and academia can provide better resource pooling to balance efficiency and effectiveness. [50]. Have identified how ERP can help in improving efficiency and effectiveness in a Romanian higher education institution. Use of ERP can help in improving the competition in the education sector. High cost and time is required to develop scalable and flexible ERP systems in higher education institutions. Reuse employing object oriented modelling and through the phases proposed in the framework can be one of the solutions to reduce the costs and reap the benefits of ERP.

The important factors identified are higher costs of training and external assistance in ERP. The benefits could be achieved in terms of efficiency, effectiveness, and reduced business risk and customer satisfaction. [51] Investigated post ERP implementation experience in 6 higher education institutions to maximize the benefits. It was found that the ERP did not fit into exact needs of the universities. Also there is a need to improve the user understanding of ERP use to

gain more benefits. So cost is mandatory for training. Technical support is needed at regular basis. [52] Studied an academy-oriented resource planning in Chinese Academy of Science. This study reinforces the need for resources in institutes should be for education and training in ERP. The author has proposed an architecture of academy oriented resource planning and a technical framework. [53] Have given the implications of ERP in higher education through literature review.

They have suggested that most critical factors must be evaluated in order to explain the actual benefits that can be achieved through ERP systems by users and higher education institutes. Lack of user motivation is found to be the main factor that can lead to ERP failure. Further, underutilization of ERP resources is a critical concern for ERP success. [54] Have identified challenges and opportunities for ERP implementations in educational institutions. Benefits reported are classified as qualitative and quantitative. The measurable or quantitative benefits include big savings in person-hours, savings from phased-out legacy systems, increased productivity, efficiency and revenue, automation of various functions and hence streamlining the education processes. Qualitative benefits include improved process, data and operational security. Also transparency and accountability is enforced. [55] Proposed a framework for ERP in a Malaysian institute.

They have identified four phases and critical success factors in ERP implementation for higher education institute. The four phases suggested are project initiation, project implementation, realization, operation and maintenance. Quality assurance and coordination of resources are the critical success factors that are included in all phases. One needs to check for costs of these. [56] Have identified critical success factors of ERP implementation in 12 universities in Saudi Arabia. The critical success factors identified are choice of supplier and his support, resources support and training, project management, business process reengineering and customization. [57] Identified architecture for data warehouse for e-governance in higher education institutions as shown in Figure 2.7 below:

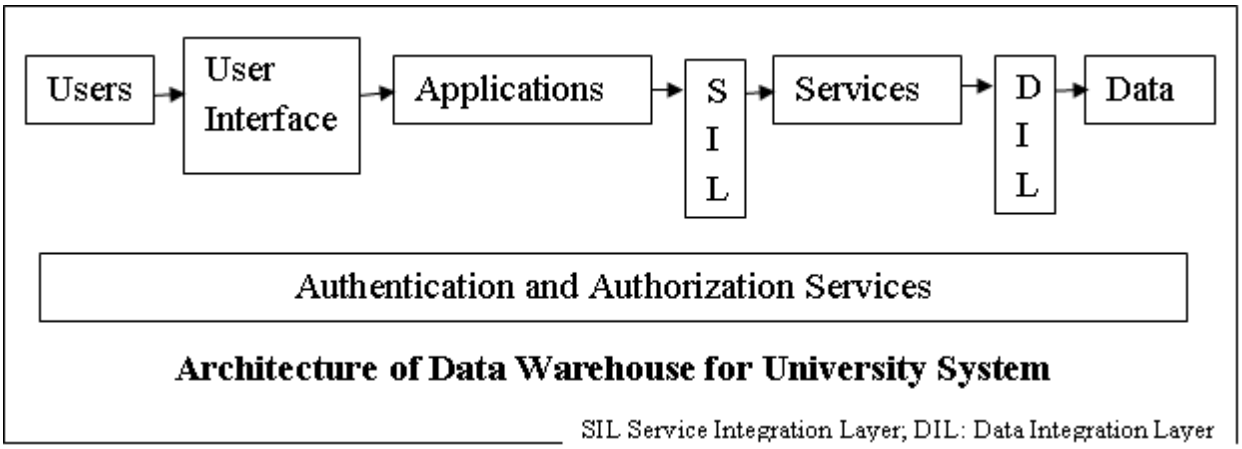

Figure 2.7: Architecture of Data Warehouse for University System [58]

[59] Formulated a framework for effective ERP implementation in educational institutions based on various issues, problems and critical success factors affecting the successful implementation of ERP in educational institutions. Resistance from employees and training cost was affecting the effectiveness of ERP to a high level. The costs of acquisition of software and vendor support were not reported as major hindrance.

Fig. 2.8. highlights the universities implementing ERP included in the literature review.

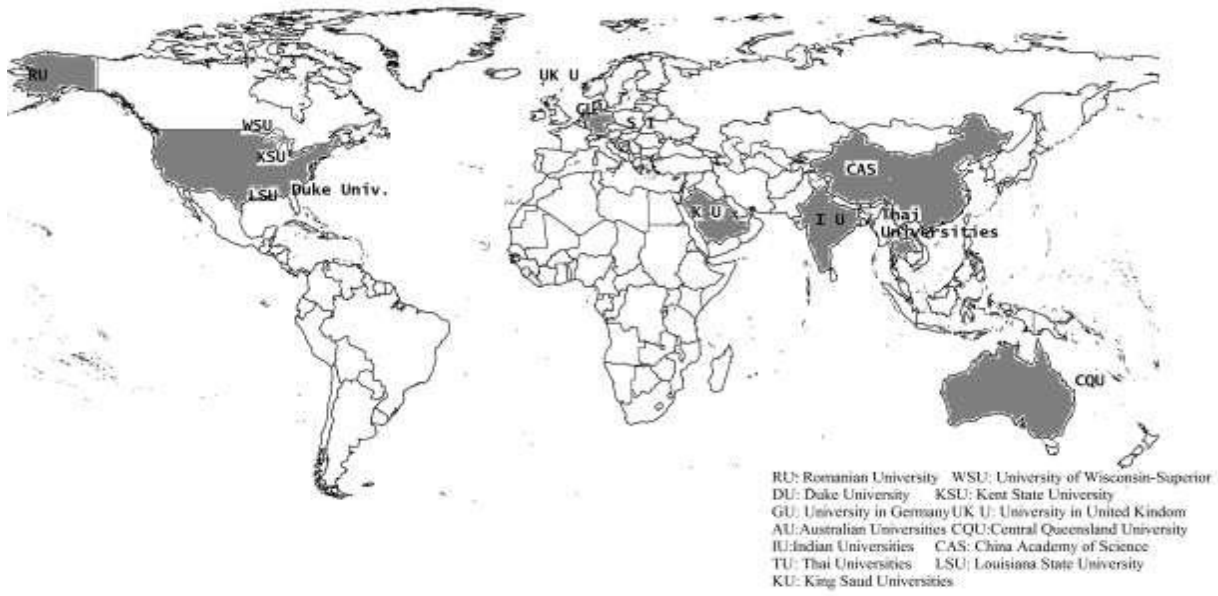

Figure 2.8: Universities with ERP implementations[59]

Thus, the present study has done an extensive literature survey and tried to cover almost all the context to get a deeper insight into the critical success factors, the implementation hindrances and the associated costs and benefits of ERP.

2.6. Challenges in ERP Implementation in HEIs

There are many challenges in ERP implementation. Enterprise systems impose their own logic on a company's strategy, organization and culture. The ERP package contains many modules which need to be integrated. According to Davenport, the larger the number of modules selected, the greater the integration benefits, but also, the greater the costs, risks and changes involved. ERP implementations are challenging due to cross-module integration, data standardization, adoption of the underlying business model, compressed implementation schedule and the involvement of a large number of stakeholders [60].

Due to competition among institutions, there is pressure on management for improved administrative operations [37]. Along with internal integration, an added complexity is the integration of ERP environments with non-ERP environments, which has complex management implications [61]. The complexity increases with increase in the number of implementation modules [62]. The ever expanding amount of information also leads to an increase in system integration complexity [63]. It will be beneficial to fit business processes to the ERP package rather than customizing the package because excessive customization leads to many problems [64].

The level of customization is an implementation approach issue that must be considered when applied to an ERP solution. [65] Argues that from a technical point of view, the key choice in ERP implementation is to find an optimal strategy to balance between customization of the ERP system versus changing the organizational procedure within the company. ERP implemented is not successful in all enterprises. So it is very important to implement ERP in a phased manner and in the proper way to get the maximum advantage of the implementation. Here lessons from ERP implementation in organizations can be helpful for HEIs, in order to avoid the blunders committed in enterprises on ERP implementation.

This has been identified by many researchers. They have also identified the reason for failure of ERP implementation. User's resistance to change and poor training are critical challenges in ERP implementation which are responsible for ERP failure [66]. [67] Have identified an expanded list of challenges faced during ERP implementation in enterprises over 13 years from 1997 to 2009.Excessive customization, dilemma of internal integration, poor understanding of business applications and requirements, lack of change management, poor data quality, misalignment of IT with business, hidden costs, and lack of top management support are the identified challenges as shown in Figure 2.9.

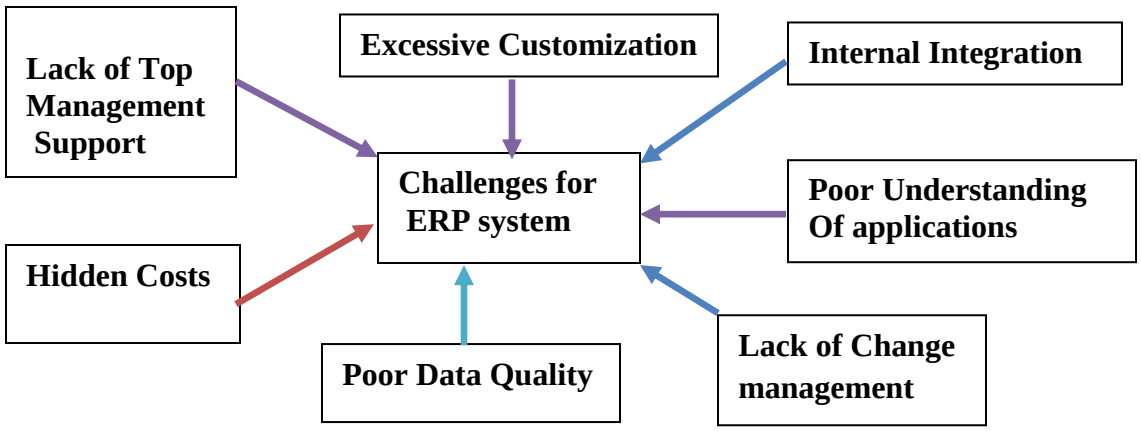

Figure 2.9: Challenges for ERP Success [68]

2.7. Critiques and Evaluation

The existing ERP architecture, which are mentioned in the proceeding sections provide similar kinds of functionality and also they share a common three-tier architectural pattern. Those architectural patterns share the same features such as a single database. In the same way, the application servers enhance the load balance of each user session to decrease the load of server. In SAP R/3 and Microsoft dynamics, the business logic is implemented in the application tier but in case of Oracle, some of the business logic is stored in database. So when there is a need to integrate two or more applications or services together, there is a need to either modify part of the applications code or write an additional mediator application that establishes the linking between the corresponding parties. In the case of SAP R/3 and Microsoft dynamics, their data tier supports any data base server connectivity while the Oracle data tier is restricted to its own platform technology.

All the three ERP solutions do not clearly show the business process integration sequence that is responsible for managing interactions. The architectural patterns also do not show the flows of services, which are going to be invoked to satisfy business requirements. For example, an attendance service might need to issue a request to a finance service to deduct a certain amount from an employee salary. In case of Microsoft Dynamics, there is a work flow engine that defines how document must be flowing within an organization. However, the workflow engine is not designed to facilitate the orchestration and integration of applications or services. The well-known ERP systems mentioned on the preceding sections are built in developed countries and are marketed throughout the world, which includes a large portion of developing countries. However, it is expensive for developing countries to afford the cost of the ERP system for instance Ethiopia Airlines and SAP have signed a contract for ERP acquisition and implementation. The project, valued at $8.5 million.

2.8. Comparison Among Existing ERP Architecture

Table 2.2: Comparison of existing ERP Architecture [68]

Criteria	SAP R/3	Oracle	Microsoft Dynamics
Scalability	√	√	√
Customization	√	√	√
Flexibility	√	√	√
Data tier Extensibility	X	√	√
Business implementation	√	√	√
Security	√	√	√

2.9. Gaps Found in Literature and current report collection methods

Despite several efforts that have been made to address the ASTU report collection challenges using modern ERP system, the demand for improvement is vital. The following are the gaps found in the previous way of collecting and reporting ASTU data in Ethiopia and another developing world.

Gap 1: There was fragmentation of ASTU information system due to un-coordination and un-integrated information flow between different levels of this administration wings and other sub wings.

Gap 2: The current way of collecting and reporting ASTU data from team leader to directorate levels was subject to underreporting due to involvement of human being in collecting and aggregating data.

Gap 3: The way of reporting team leader data to the managerial level was not timely and may lead to delay of crucial time based decisions that could be more effective.

CHAPTER THREE

3. RESEARCH METHODOLOGY

Research methodology is the set of processes, methods, tools and techniques deployed and used to conduct a research and reach to the final output of the study. The methods and techniques used for this research are explained here below.

3.1. Literature Review

Detailed and focused literature review is done to understand more about Enterprise Resource Planning concepts and ERP systems technical and business/service framework. More research works conducted on ERP implementation experiences in developing countries are reviewed. General Enterprise rousers planning mentioned in literature are discussed as a benchmark. This study is trying to identify Enterprise rousers planning in Ethiopian context along with implementation methodology. So, Accelerated SAP (ASAP) methodology is used as a reference here for the study. This ASAP and its phases are reviewed and explained briefly.

3.2. Case Study as Research Method

This research is a qualitative type case-based exploratory study. This type of research method is considered for this studies the following reasons and justifications. First, this type of research aims to identify key issues and variables and it is suited to exploration of issues in depth [69]. Exploratory case study is used to understand what happened within a case by looking beyond descriptive features and studying the respective context [70].

Case study is therefore used as a method of research for this study. A case study is an in depth study of a particular situation or phenomenon in a real world life rather than a sweeping statistical survey [71]. Rather, case study makes analytical generalization in which concepts and implications are developed to contribute to rich insights [72]. And thus, the results of a case study of some organization and context can be extended and applied to other similar organizations and contexts. As clearly stated in [72], case study method is the most widely used qualitative research method for researches in information systems. According to Baxter and Jack

[40], case study is important especially in situations when the focus of the study is to answer why and how questions and when the researcher wants to cover contextual conditions relevant to the phenomenon under study. Higher education institutions which are framework for ERP implementation in different contexts can only be found out with detail investigation studies of real life scenarios or cases. Hence, this research is a single case study of ERP framework at ASTU.

3.3. Case Selection and Sampling

Adama Science and Technology University is selected as a case for this study. This organization was selected based on two reasons. So, it is found appropriate and suitable to conduct the case study at this organization. Sampling is the process of selecting units or individuals from a population which can be included in the study, for instance, to answer survey questionnaires. To obtain reliable data and enable the sample representative enough, out of three directorates the directors together with their unit heads totals 51 which will be taken as a sample. The samples will be selected out of the total population by using purposive sampling technique. Accordingly, from the three directorates, the sample includes the director, unit heads, and team leaders or experts will be included.

There are different sub units and job titles having one hundred forty-five employees working in different sections and departments with various positions in the sample directorates. Out of these 145 total populations of three Directorate 51 (35%) sample population will be selected by using purposive sampling technique because the samples are assumed to be rich in the information required and this technique helps to select required respondents easily. According to [70], case study almost always uses purposive sampling.

The objective of a case study is not to find out how often something occurs in a population, instead what occurred and why it occurred. In case study, the sample units must have the potential and richness in information to be key informants for the study. According to [72], purposive sampling is virtually synonymous with qualitative research. Likewise, purposive sampling is found appropriate and used for this case study. First, initial discussions were made

with the ERP project managers and concerned parts at Ethiopian higher education institution. This, in addition to assisting to get overview of the ERP project and the company, has helped to identify individuals who have detail exposure with the project and who can be contacted as the key informants of this study. Similarly, fifty-one individuals were selected as respondents for the survey questionnaire. Forty-nine of them have responded to the survey while there are two non-responses. These individuals are selected as key informants and respondents based on their involvement, exposure and role in the ERP project and in the company in general in relation to the project. The university managers, team leaders, Directorate, IT staff and business process staff with their regular role or position ranging from non-management, subject matter expert, and management and so on.

3.4. Data Collection Techniques and Tools

Appropriate and basic sources of data,

- direct observation
- participant observation
- Survey questionnaire.
- Document analysis.

However, quantitative methods (surveys) can also be used in a case study. Qualitative methods are concerned with words and meanings whereas quantitative methods are concerned with numbers and measurements. Hence, various data collection techniques and multiple data sources are used for case study research. The main data collection techniques used for this research are observation and document analysis. The other techniques used here survey questionnaire is used for this study. So, primary data sources of this research are observation, participation and surveys whereas secondary data sources are reviews of documents, literature and the Internet. All data collection techniques and tools used in this study are explained as below.

3.4.1. Observation and Participation

The other sources of primary data in this study are observations and participations. In conducting case studies, direct observation is a situation in which the researcher or investigator makes a site visit and collects data from the study area. Participatory observation is an observation in which

the researcher actually participates in the events being studied and related activities. The researcher has made observation on how the ERP system is being used and the users' impression and usage of the system. This has given insights to what is necessary for ERP system implementation. ERP systems especially like that of SAP are complex and their user interfaces are not as simple as the traditional systems we are familiar with. ERP systems get user appreciation as they are used more and more. Based on this, some of the users are observed to appreciate the ERP system while some others are not yet comfortable with the system.

In addition to observations, the researcher has attended and participated different workshops and conferences hosed by the global ERP vendors. These workshops have given understandings about ERP systems as a whole, the need for them, and their demand in Ethiopia and about the conditions to be fulfilled for such ERP systems.

3.4.2. Document Review

Documents and the HRM, Finance and budget and student service of ASTU were reviewed and assessed as additional sources of data and for understanding about the case study company and the ERP project. The University website was assessed for the profile and history of the organization. Even if detail literature review is done, there is limited or no research or document on ERP implementation in Ethiopian context especially regarding the SAP ERP.

3.4.3. Survey Questionnaire

Questionnaires will be prepared and distributed among experts and managers found at Adama Science and Technology University. Apart from the closed - ended ones, some open –ended question items will also be included to freely draw pertinent opinions and comments from the respondents. Accordingly, 32 Expert working at different work units were randomly selected for the study. Following this, 19 managers of three selected departments were selected as sources of data for the study. In total, the study included 51 respondents.

Survey questionnaire is the other primary data source used for this research. Harris and Brown [73] have explained that structured survey questionnaires and semi-structured interviews are often used in studies to generate confirmatory results with interviews being in depth exploratory

while surveys being confirmatory. Based on this, the questionnaire is used for this study mainly to supplement the interviews by adding some breadth and rank the level of Enterprise resource planning (ERP) Framework for Adama Science and Technology University is used to design and distribute the questionnaire. Simple tables and Microsoft Excel 2010 sheets are used to summarize this survey data. The higher education institutions which are identified in the prepared on the survey questionnaire for ranking are listed below.

CHAPTER FOUR

4. Data Presentation and Analysis

The study covers three main modules for the ERP for ASTU. These are Student services module, Human Resource module, Finance module, the functionalities to be provided by these modules are:

- **Student services module:** It should include all the activities for smooth conduct of students and faculty in various departments like accounts and academics. It mainly includes central control of student registration, time table, room's management, result management activities etc.
- ***Human Resource module*:** This module is needed to handle the information about all the recruitments, promotions and other professional records of faculty and another staff. Relationship with students, their parents and with consultants and vendors for ERP.
- ***Finance Module*:** In order to handle all financial transactions like online fee, salaries, fines etc., a finance module is extremely important especially in today's e-environment. There is a difference in requirement of specific modules in ASTU from business organizations. There is a specific requirement of Academic module in ASTU for carrying out all the academic transactions

4.1. ERP Framework Design

During the survey, the important success factors and problems in efficient Design of ERP Framework for ASTU are identified. Various costs incurred in ERP framework have also been identified and their relationship with benefits is analysed. All of these revealed that certain features need to be improved and/or enhanced, while there are certain other activities which need to be controlled to provide an efficient ERP framework Design. All these are highlighted in Figure 4.1 below:

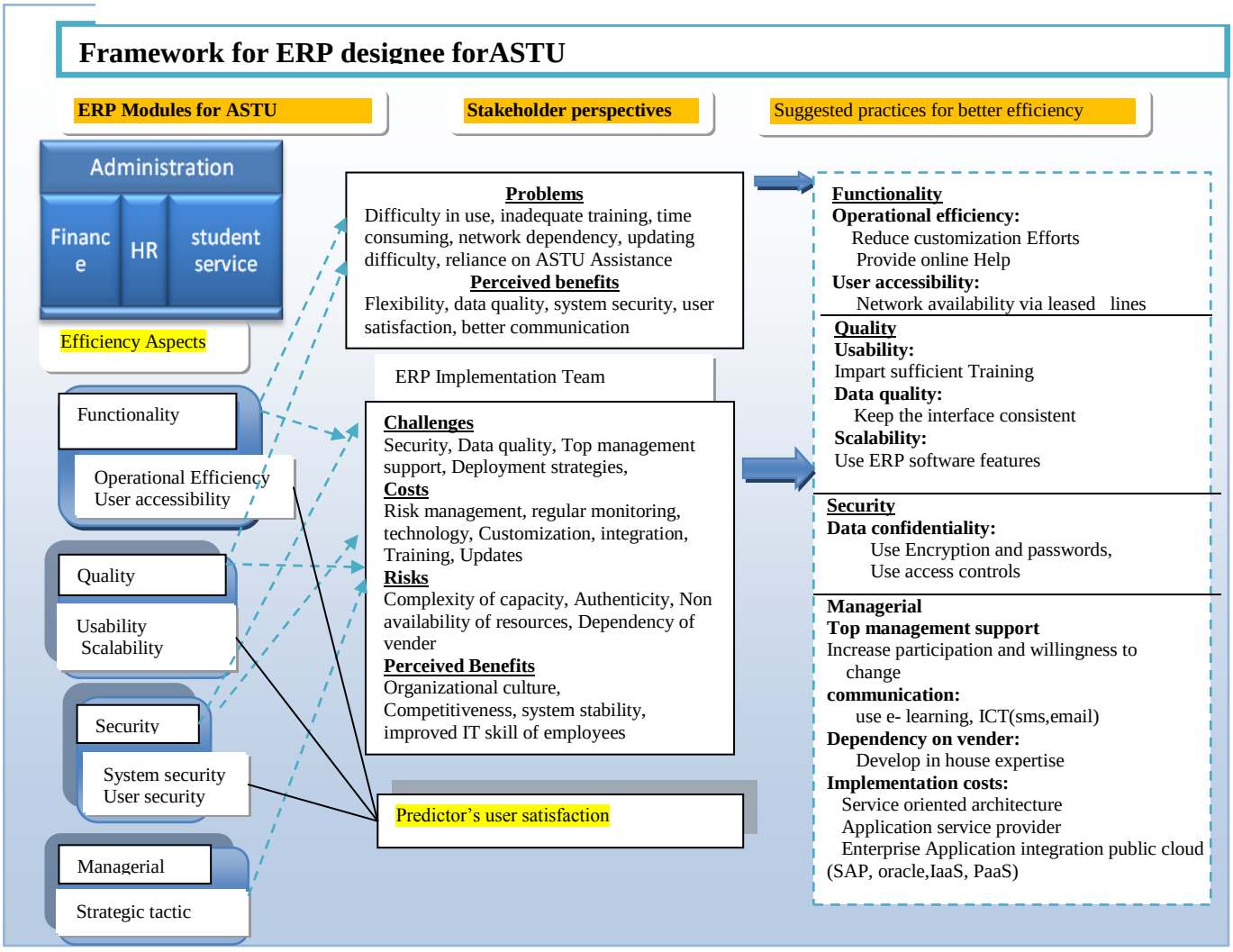

Figure 4.1. Framework for efficient ERP for ASTU

The phases of development of framework are as follows: First of all, modules of ERP used in HEIs are identified. Only Administration module is found to be centralized. There is a need to design student service module, finance module and human resource management module. Next the stakeholders in ERP in ASTU are identified. These are students, employees, management and Expert. As the goals of all these users are different in the sense that management is investing in ERP framework design and has different strategic, tactical and managerial benefits perception for measuring efficiency. The Directorate and team leader have operational and organizational benefits perception as measures of efficiency. So the next step is to identify the different perceptions of efficiency from both types of users. So, four aspects for efficiency are considered.

These are functionality, security and quality from user point of view and managerial efficiency from ERP framework design team (i.e. management) point of view. The factors identified as important in functional efficiency are operational efficiency and user accessibility. The factors identified as important for quality efficient ERP are scalability and usability. System security and user security are identified as factors important for security. The predictors of user satisfaction are operational efficiency, security and usability. Thunders and the reasons of inefficiency of ERP system, problems faced by users were recorded. To achieve a set of goals, perceived benefits are considered from user's point of view.

In order to find the areas of inefficiency in ERP framework design, the challenges, risks and costs are recorded from management point of view through informal interviews. To define the measurement of managerial efficiency, perceived benefits from ERP framework design team are also collected. The suggested practices are provided in four sections namely efficiency in functionality, efficiency through quality, efficiency through security and managerial efficiency.

1. ***Efficiency in functionality***: Operational efficiency should be improved [74]. The processing overhead of the transactions in ERP system should be reduced to improve the speed of transactions. The ERP system should be made customizable so that it can be used by a wide variety of HEIs. The customization efforts should also be reduced in order to facilitate easy use and better operational efficiency [75]. In order to improve user accessibility, network availability should be increased so that the transactions with particular deadline can be completed in time [76]. Strong net work signal strength and its availability is the need of the hour. Top management should ensure timely connectivity for a longer duration. The accuracy of the transactions should be enhanced to minimize the error rates which discourage the users from the use of the ERP system [77].

2. ***Efficiency through quality:*** The interface for various users should be made easy to use[78]. The design of the interface affects the utility of the interface from user or organization point of view [79]. So the complexity of the interface design should be reduced keeping into consideration the different skill sets of users in ASTU. Training or guidance has been identified as a crucial factor for improving usability [80]. Scalability is also one dimension for improving quality. Virtual environments like cloud computing can help in achieving better scalability [81]. The data can be stored on a public cloud and

accessed as and when required. This eliminates the risk of complexity of storage capacity in any ERP system. Using infrastructure as a service can help in scaling ERP systems to multiple resources available on a public cloud [82].

3. ***Efficiency through security:*** System security and user security should be enhanced [83]. User security should be controlled by all possible means, i.e., by incorporating valid authentication and authorization measures [84]. Confidentiality of data should be controlled by encryption or by restricting the data access. For making an ERP system efficient in terms of security, various security measures proposed are use of SAP, biometric measures and access controls for improving security of system from unauthenticated access. The software system can be prevented from unauthorized access using watermarking [85]. The confidentiality of data can be controlled using encryption and passwords. All the University people should be made to learn about security [86].

4. ***Managerial efficiency:*** The top management support can be increased by more participation in decision making, establishing and changing requirements and during auditing. Training can also help in reducing the support costs in ERP [87]. Use of e-learning can improve interactivity [88]. This includes the use of email, SMS, video conferencing etc. to improve communication among various users of ERP. Data quality should be improved through consistent structure of databases and interfaces [89]. Providing adequate documentation can also help in better knowledge management and support training [90]. In order to reduce the cost of ERP implementation, various techniques like service oriented architecture, enterprise application integration and application service provider are suggested [91]. The database in ERP system cannot make decisions automatically. It needs to integrate transactions systems with some decision support system through data warehouse [92]. Also, dependency of vendor should be reduced. All these main wings in ASTU are don't using ERP. Questionnaire and informal interviews were taken as the tool for gathering the information. The team leader and experts were asked about their opinion about the factors proposed in the framework. The results of the case study for individual ASTU and overall mean are summarized in table 4.1.

Table 4.1: Respondents Data

No	Items	Respondents							
		Finance Directorate 38		Student Service Directorate 83		Human resource Directorate 24		Total	
	Sex	No	%	No	%	No	%	No	%
	Male	4	44	21	68	6	55	31	61
	Female	5	56	10	32	5	45	20	39
	Total	**9**	**100**	**31**	**100**	**11**	**100**	**51**	**100**
	Educational Background:								
	10+3/diploma	1	11	10	32	2	18	13	25
	First Degree	8	89	14	45	9	82	31	61
	Master's Degree and above	0	0	7	23	0	0	7	14
	Total	**9**	**100**	**31**	**100**	**11**	**100**	**51**	**100**
	Age								
	20-25	1	11	2	6	0	0	3	6
	26-30	3	33	13	42	2	18	18	35
	31-35	3	33	7	23	2	18	12	23
	36-40	0	0	7	23	2	18	9	18
	Above 40	2	23	2	6	5	46	9	18
	Total	**9**	**100**	**31**	**100**	**11**	**100**	**51**	**100**

As can be seen from table 4.1 above, 4 (44%) of the Finance Directorate and 1 (11%) of the heads are males. 5(56%) of the Finance Directorate and 10(32%) of the Student Service Directorate are females. 21(68%)of the Finance Directorate and 5(16%) of the heads are males.6(55%) of the Human Resource Directorate and 2(18%) of the heads are males. 5(45) of the Human Resource Directorate are females. This lower proportion of male at Finance Directorate, Student Service Directorate and Human Resource Directorate positions might be the result of high rate of males in the heads in general, and in the three Units management in particular experienced for long period of time in the university.

With regards to educational qualification, most of the employees 31(61%), were First Degree holders while 13(25%) were 10+3 (diploma) holders and 7(14%) was Master's Degree and

above holder. Therefore, educational qualification of the respondents indicated that they have the capacity to shoulder the responsibilities of their positions. In relation to Age, 3(6%) of the respondents it has 20 to 25 years youngest. 18(35%) it has for 26to 30 years, 12(23%) were it have for 31 to 35 years, 9(18%) it has for 36 to 40 years, and 9(18%) were it have for 40 years and above**.** This helped the researcher to obtain dependable information, as the respondents were well familiar with the performance of their offices as a result of which they are able to identify good and inefficient performances including the issue of the problem under study. In general, profile of the respondents showed that the human resource in the offices can well reacts with the issues related to the problem under study.

Table 4.2: **Issues related to operate computer system (performing and types of Manual System used).**

No	Question Items	Respondents							
		Finance Directorate		**Student Service Directorate**		**Human resource Directorate**		Total	
	Do you have basic computer skill to operate a common operation related to your work?	**38**		**83**		**24**			
		No	%	No	%	No	%	No	%
1	Yes	9	100	28	90	10	90	47	92
	No	0	0	3	10	1	10	4	8
	Total	9	100	31	100	11	100	51	100
2	Do you face difficulty in performing your job related tasks under existing information system settings?								
	Yes	1	11	8	26	3	27	12	23
	No	8	89	23	74	8	73	39	77
	Total	9	100	31	100	11	100	51	100
3	How do you rate your agreement for automating your department with computerized system?								
	Strongly disagree	0	0	0	0	1	10	1	2
	Disagree	0	0	2	6	0	0	2	4

	Neither agrees nor disagrees	1	11	16	52	0	0	17	33
	Agree	3	33	8	26	5	45	16	31
	Strongly agree	5	56	5	16	5	45	15	30
	Total	9	100	31	100	11	100	51	100
4	Currently, where do you store the data related to your works?								
	On data base	3	33	0	0	4	36	7	14
	in file cabinet	1	11	25	81	4	36	30	59
	On Computer files/directories	5	56	6	19	3	28	14	27
	Total	**9**	**100**	**31**	**100**	**11**	**100**	**51**	**100**
5	How do you evaluate the satisfaction of customers with the existing information system support?								
	Very dissatisfied	1	11	5	16	0	0	6	12
	Dissatisfied	1	11	2	6	0	0	3	6
	Neither	0	0	8	26	0	0	8	15
	Satisfied	6	67	16	52	10	91	32	63
	Very satisfied	1	11	0	0	1	9	2	4
	Total	**9**	**100**	**31**	**100**	**11**	**100**	**51**	**100**

As can be seen from table 4.2 above, With regards to computer operate, most of the respondents 9(100%) of the Finance Directorate ,28(90%) of that of the Student Service Directorate and 10(90%) of the Human resource Directorate have responded that they have to operate a common operation related to your work used was for while few those are it have basic computer skill to operate a common operation related to your work while few 0(0%) of the Finance Directorate and 3(10%) of the Student Service Directorate and 1(10%)of the Human resource Directorate they do not computer skill to operate a common operation related to your work.

when we see the performing your job related tasks under existing information system settings most of the respondents 1(11%) of the Finance Directorate, 8(26%) of the Student Service Directorate and 3(27%) of the Human Resource Directorate responded that they Existing system while few 8(89%) of the Finance Directorate, 23(74%) of the Student Service Directorate and

23(74%) of the Human Resource Directorate that they do not Existing system**.** Similarly, in relation to the rate your agreement for automating your department with computerized system, higher rate 5(56%) of the Finance Directorate ,5(16%) of that of the Student Service Directorate and 5(45%) of the Human resource Directorate responded that they use Strongly agree while 1(11%) of the Finance Directorate ,16(52%) of that of the Student Service Directorate and 0(0%) of the Human resource Directorate that they use the rate your agreement and automating of computer system while few.

Currently, where do you store the data related to your works, higher rate 1(11%) of the Finance Directorate, 25(81%) of that of the Student Service Directorate and 4(36%) of the Human Resource Directorate responded that they use in file cabinet while 5(56%) of the Finance Directorate, 6(19%) of that of the Student Service Directorate and 3(28%) of the Human Resource Directorate that they use the rate you're On Computer files/directories while few. evaluate the satisfaction of customers with the existing information system support ,higher rate 6(67%) of the Finance Directorate, 16(52%) of that of the Student Service Directorate and 10(91%) of the Human resource Directorate responded that they use Satisfied while 1(11%) of the Finance Directorate ,5(16%) of that of the Student Service Directorate and 0(0%) of the Human resource Directorate that they use the Very dissatisfied while few Therefore, the respondents had adequate amount of practical experience which in turn, helped them to respond to the questions raised for the problem under study

Table 4.3: Issues related to reporting system, finance management, and the Relationship the Directorates have with other work units

		Respondents							
		Finance Directorate		**Student Service Directorate**		**Human resource Directorate**		Total	
	Currently, when you request report or data from other department, how often do you get answers?	38		83		24			
		No	%	No	%	No	%	No	%
6	Never	0	0	0	0	0	0	0	0
	Seldom	0	0	13	42	2	18	15	29
	about half the time	3	33	16	52	4	37	23	45
	Usually	2	22	1	3	3	27	6	12

	Always	4	45	1	3	2	18	7	14
	Total	9	100	31	100	11	100	51	100
7	Do you agree if the functional units at ASTU are designed and consolidated under the three directorates such as finance, human resource, and student services?								
	Strongly disagree	0	0	1	3	2	18	3	6
	Disagree	3	33	4	13	1	10	8	16
	Undecided	0	0	7	23	0	0	7	13
	Agree	4	45	17	55	4	36	25	49
	strongly agree	2	22	2	6	4	36	8	16
	Total	9	100	31	100	11	100	51	100
8	How frequently do you get work related information from your lower level employees?								
	Never	1	11	1	3	0	0	2	4
	Rarely	2	22	2	7	1	9	5	10
	Sometimes	1	11	11	35	7	64	19	37
	Very often	2	22	12	39	0	0	14	27
	Always	3	34	5	16	3	27	11	22
	Total	9	100	31	100	11	100	51	100
9	Do you have methods for hiring and promoting employees? Do you have any system to apply								
	Yes	1	11	1	3	2	18	4	8
	No	8	89	30	97	9	82	47	92
	Total	9	100	31	100	11	100	51	100
10	To which of the following functional units do you share your data/ information?								
	A. Finance Directorate	4	44	1	3	5	46	10	19
	B. Student Service Directorate	0	0	25	81	2	18	27	53
	C. Human Resource Directorate	2	22	1	3	2	18	5	10
	D. Registrar	0	0	1	3	0	0	1	2
	E. Library	0	0	0	0	0	0	0	0

	F. Dormitory	0	0	2	7	0	0	2	4
	G. all	3	34	1	3	2	18	6	12
	Total	9	100	31	100	11	100	51	100
11	From which of the following functional units do you receive data / information?								
	A. Finance Directorate	3	33	1	3	5	45	9	18
	B. Student Service Directorate	3	33	27	87	1	10	31	61
	C. Human Resource Directorate	3	34	3	10	5	45	11	21
	Total	9	100	31	100	11	100	51	100
12	Have you used or know ERP?								
	Yes	0	0	1	3	6	55	7	14
	No	7	78	28	90	4	36	39	76
	To some Extent	2	22	2	7	1	9	5	10
	Total	9	100	31	100	11	100	51	100
13	So far, is there any efforts made to implement ERP at ASTU?								
	Yes	8	89	7	23	9	82	24	47
	No	1	11	24	77	2	18	27	53
	Total	9	100	31	100	11	100	51	100

As can be seen from table 4.3 above, With regards to report by which Directorate get, from the respondents, most of the Finance Directorate 4(45%) replied that always is used, while most of the Student Service Directorate 16(52%) replied that they use about half the time and most of the Human resource Directorate4(37%)replied that they use about half the time, few of the Finance Directorate 3(33%) replied that about half the time is used, few of the Student Service Directorate 13(42%) replied that they use seldom and few of the Human resource Directorate 3(27%) replied that they use usually**.**

In relation to the functional units at ASTU are designed ERP framework and consolidated under the three directorates such as finance, human resource, and student services, most of the Finance Directorate 4(45%) responded that they agree, while most of the Student Service Directorate 17(55%) replied that the agree, while most of the Human Resource Directorate 4(36%) replied

that the strongly agree. With regards to frequently do you get work related information from your lower level employees of the management at the university, most of the Finance Directorate 3(34%) of the responded that they use Always, most of the Student Service Directorate 12(39%) of the responded that they use Very often and most of the Human resource Directorate 7(64%) replied that they it takes Sometimes while few, 2(22%) of the Finance Directorate that they use vary often few,11(35%)of the Student Service Directorate that they use sometime few and 3(27%) of the Human resource replied that it takes always.

With regards to have methods for hiring and promoting employees and Do you have any system to apply, most of the respondents 8(89%) of the Finance Directorate ,30(97%) of that of the Student Service Directorate and 9(82%) of the Human resource Directorate have responded that they have do not too used hiring and promoting employees was for1(11%) of the Finance Directorate and 1(1%) of the Student Service Directorate and 2(18%) of the Human resource Directorate thy use while few of methods for hiring and promoting employees use system.

In relation to the question asked to know whether the units share data/ information has relation with other work units, most of the respondents 4(44%) of the Finance Directorate replied that the finance relation with to human resource units while few, while half 25(81%) of that of the Student Service Directorate replied that the student service relation other work units under student service and still few 5(46%) of the Human resource Directorate have responded that of the finance and other work units,3(34%) of the Finance Directorate and 1(3%) of the Student Service Directorate and 2(18%) of the Human resource Directorate replied that the all are relation with other work units. They use receive information to other units and receive data information, most of the respondents 3(34%) of the Finance Directorate replied that the finance receive data with to human resource units and student service units while few, while half 27(87%) of that of the Student Service Directorate replied that the student service receive other work units under student service and human resource still few 5(45%) of the Human resource Directorate have responded that of the finance and other work units,3(33%) of the Finance Directorate and 3(10%) of the Student Service Directorate received data to human resource and 1(10%) of the Human resource Directorate replied that the all Directorate units receive information with other work units.

With regards to the used or know ERP system that is applied between the finance, student service and Human Resource its sections, most of the respondents 7(78%) of Finance Directorate and 28(90%) of the Student Service Directorate replied that they do not know ERP system is through paper, most of the respondents 6(55%) of the Human resource Directoratehave responded that they do have known ERPwhile few, most of the respondents 2(22%) of the Finance Directorate 2(7%) of the Student Service Directorate responded that they to some extent while few, most of the 4(36%) of the Human resource Directorate that they do not know ERP system.

There any efforts made to implement ERP at ASTU, most of the respondents 8(89%)of the Finance Directorate have responded that they while few, most of responded 24(77%) of the Student Service Directorate responded that they do not efforts made to implement ERP at ASTU, most of the respondents 9(82%)of the Human resource Directorate responded that they to some extent while few, most of the respondents 1(11%) of the Finance Directorate responded that they do not efforts made to implement ERP at ASTU, most of responded 7(23%) of the Student Service Directorate responded that they to some extent while few , most of the respondents 2(18%) of the Human resource Directorate responded that they do not efforts made to implement ERP at ASTU.

4.2. Framework Development

This section explains how the Administration to integration Directorate framework was developed and also how it can be applied. The section also shows the various theories, models and/or frameworks on the basis of which the Administration framework was built.
Table4.1. shows the harmonized constructs, ideas and/or variables borrowed from literature and those suggested by respondents:

4.2.1. The Administration integration framework

In this framework, Administration integration can be achieved through three phases i.e. before integration, during integration and after integration. Before integration, a number of activities such as Analyze integration activities, analyze user characteristics, Analyze Administration objects, Analyze the HR, finance and student service environment, identify report generated

methods, compare alternatives, prepare infrastructural budget, and Identify funding sources are carried out. The stakeholders responsible for performing the listed activities include the university, the team leader and the experts [93].

The Employees and the student during the integration phase; a number of activities are carried out. These include implementation of face-to-face and administration strategies, after which, the two methods i.e. face-to-face activities with Directorate activities should be integrated. During integration the implementing universities should ensure that the following Directorate features are present in their Directorate platform. After integration, the following activities should be carried out to ensure that integrated systems work properly according to the plan in phase1. These activities include evaluating integrated systems, evaluating administration' performance, evaluation of team leader and expert' performance, technological improvements, evaluation of challenges, and continuous user training.

The relevant stakeholders for implementing these activities include the university, the administration, the student, government, and the private sector. Each of the above phases has a key deliverable; before integration activities yields into an integration plan; during integration, integrated teaching methods should be developed, while after integration, there should be an integration evaluation report. The relevant theories that guided these three processes are clearly explained by thesis diagram.

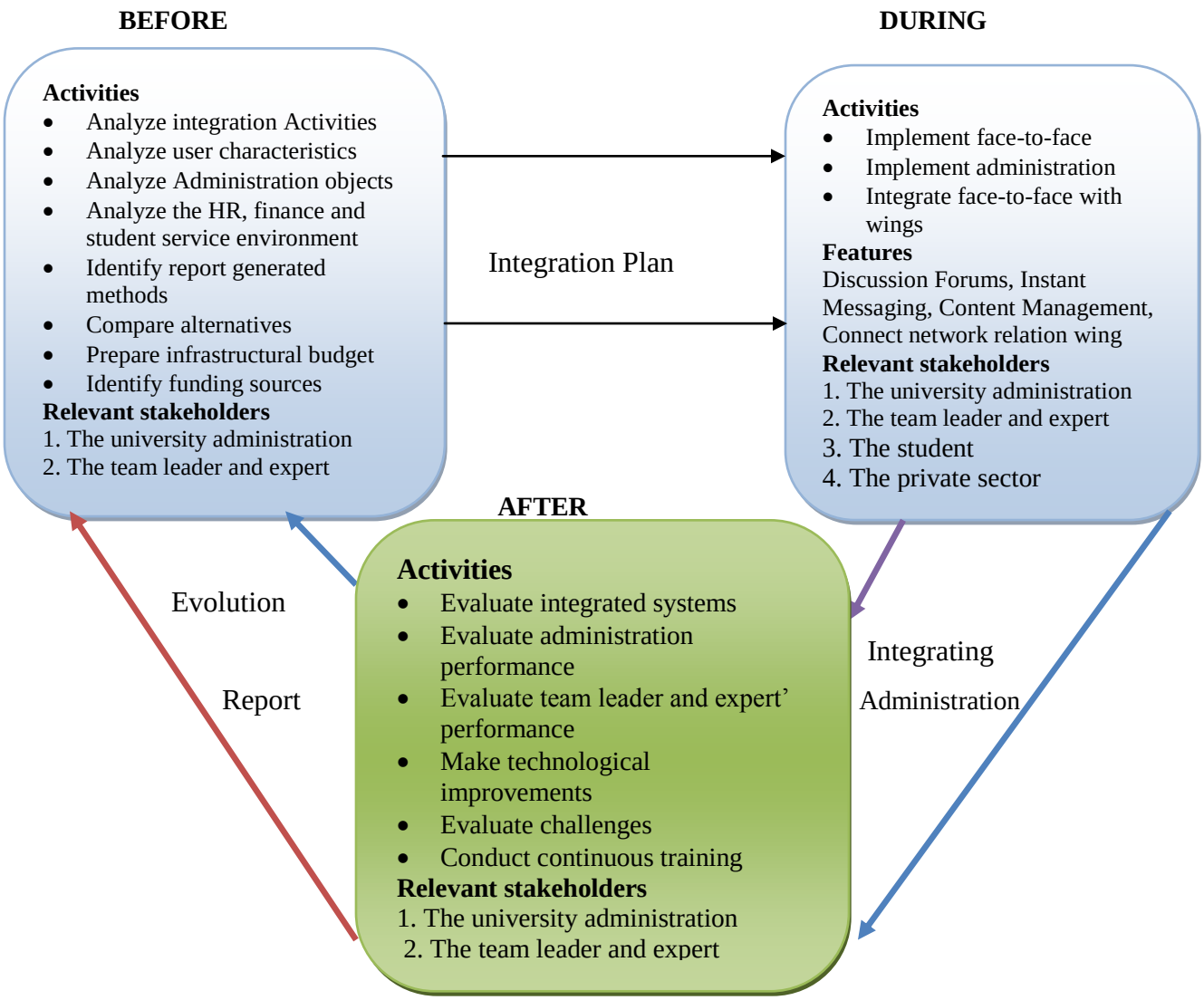

Figure 5.1: shows the Administration integration framework

The proposed framework we use two scenarios to explain how the proposed Administration integration framework can be Design. According to [94], scenarios are used by system analysts to depict the role and activities that each stakeholder should play when implementing an artifact. Given that Administration integration has a number of stakeholders namely; the university, the government and the students we use scenarios to show how they will fit into the integration process as follows:

Scenario 1: the university initiates Administration integration process the University is the main stakeholder in Administration integration. It identifies a need for and initiates integration. The university will also develop a budget and an implementation plan.

Scenario 2: the university champions' integration process as an originator, the primary role of the university integrating Administration is spear heading and championing the implementation process. The university should mobilize resources for integration from the Directorate, team leader and other stakeholders.

CHAPTER FIVE

5. Evaluation of The Framework

Under this chapter the evaluation of the design framework will be discussed. The overall evaluation of the framework was conducted through questionnaire survey.

5.1. Evaluation of the Framework

In evaluating, all selected and contacted participants working in this organization were confident in supporting the idea of introducing ERP framework design are easy to use and affordable by everyone working in this organization of government office. Furthermore, as part of future improvement and real world implementation of the ERP framework design participants of this study suggested the involvement of more stakeholders such as ASTU researchers at the data processing module and addition of more ways of analyzing collected data to improve maximum utilization of administration data. Participants suggested the designee to include a way of doing descriptive analysis on the reported data to improve the work of decision makers. Interestingly, participants were suggesting features which were already included in the framework such as design to analyze data. The overall response for each question from the questionnaire is summarized in Table 5.1.

5.2. Overall Acceptance evaluation of the Framework for ERP design in ASTU

The participants of this study evaluation were selected by the criteria of being an expert in ASTU ICT and computing department staff office with the assumption that they have some knowledge of administration information systems and use this concept in their day to day activities. The priority was given to the people who had knowledge of the Administration information systems. Therefore, the administration directorate, team leader and expert at administration level were targeted. The first acceptance test was done with 4 ICT frontline workers (data collector at ASTU) and 4 individuals from the academic office at program chair and computing department who had experience with ERP framework processing.

The ratings are 1(poor), 2(fair), 3(good), 4(very good) and 5(excellent).

Table below shows performance evaluation by frontline expert (data collector), question and evaluation criteria are referenced from [95].

Table 5.1: The Framework for ERP design in ASTU Evaluation by ICT expert and computing department.

The ratings are 1(poor), 2(fair), 3(good), 4(very good) and 5(excellent).

		Performance value					
No	**Criteria of Evolution**	1	2	3	4	5	Average
1	Increasing Top Management Support			0.12	0.63	0.25	0.33
2	Providing Regular Training		0.37	0.12	0.5	0.12	0.3
3	Reducing the Interface Complexity (using same data formats and adequate documentation)			0.25	0.5	0.25	0.33
4	Providing Online Help			0.5	0.37	0.12	0.33
5	Enhancing Network availability		0.25	0.25	0.37	0.12	0.25
6	Improving Interactivity for Better Communication (email, sms to parents etc.)		0.12	0.25	0.5	0.12	0.25
7	Improving Data Quality (correctness, completeness and consistency of data)			0.25	0.63	0.12	0.33
8	Controlling Data confidentiality (encryption, passwords)			0.12	0.37	0.5	0.33

The above table 5.1. Shows the average value of responses for all the eight experts design in the framework. Values more than 0.25 as response in favor of all the items proposed in the framework verifies and validates that the framework is suitable for improving efficiency in ERP framework in ASTU. If we compare the overall mean score of all these factors, the highest priority is given to providing Regular training (0.3). The second highest priority is given to controlling data confidentiality (0.33) and improving data quality (0.33). Top management support is also among the top priority factors supported by all ASTU with a mean score of 0.33. The next higher priority (mean score 0.33) is given to providing Online Help and Reducing the Interface Complexity Rest all the factors are also considered important by all HEIs in the study. Enhancing Network availability is given the least priority though it is very important factor. This could be due to the fact that ERP implementation is still not complete in ASTU.

CHAPTER SIXE

6. Conclusion and Recommendation.

6.1. Summary of the major findings

The purpose of this study was to investigate the Administration management in Adama Science and Technology University: with particular reference to information, report generates and to identify major factors that had been adversely affecting these practices. A descriptive survey method was employed for the study. Accordingly, thirty Expert working at different work units were randomly selected for the study. Following this, nineteen managers of three selected departments were selected as sources of data for the study. In total, the study included 51 respondents. Questionnaire and Observer were employed for the study as data gathering tools and finally statistical tools, percentage, was used to analyse and interpret the data. Accordingly, the following major findings were drawn from the study.

6.2. Major Findings of the Study

6.2.1. Characteristics of the Respondents

In relation to respondents' characteristics, it was investigated that the majority were males. The proportion of females at both expert and management positions was minimal as a result of which various responsibility positions were occupied by males in Expert management and Directorate**.** With regards to Educational qualification profile of the respondents was dominated by 10+3(diploma) holders even though the range extends from degree holders to master's degree holders level**.** In relation to work experience, the majority of the respondents served from one to ten years even though the range goes from one year to above twenty years**.** From all these, it could be concluded that all categories of respondents have adequate work experience and qualification background which enabled them to respond with ample information that was needed to this study.

6.2.2. The Reporting System of Sections to the Unit Office

The response of respondents for the question raise to know the reporting system being used between the Directorate unit and its section indicated that as the report was communicated through paper works.In similar way the responses for open-ended questions raised to respondents

revealed that lack of absence of coordination, absence of experience, absence of enough knowledge, lack of computer skill, lack of networked system and there no integrated the unit leader to directorate management in ASTU. For the open-ended questions, respondents were asked to mention some of the solutions for the constraints. Following this, they cited the following measures: Providing computer application training**,** provide training on how to integrate the directorate and unit leader in scientific mannerand Networking the main directorate and its sub sections.

6.3. CONCLUSION

Enterprise Resource Planning (ERP) is information system that integrates departments and functions across an organization into one computer system. It runs off a single database, enabling various departments to share information and communicate with each other. The study has conducted detail interview discussions, survey questionnaire, observations and documents review and finally identified eight evaluation criteria important for the design of ERP framework.

In This thesis is designed to make the manual activities of the Adama Science and Technology University computerized. As a result, the proposed thesis integrates all the functions in the Adama Science and Technology University made by administrator, directorate, Team leader and Experts. It is fast, avoids data redundancy and inconsistency, easy accessibility of data, provides a friendly graphical user interface which proves to be better when compared to the manual system, gives appropriate access to the authorized users depending on their permissions, it effectively overcomes the delay in communications, the system has adequate scope for modification in future if it is necessary.

6.4. CONTRIBUTIONS

The contributions made by this research are various, in the theoretical, practical and methodological spheres. This thesis adds value to research and practice communities concerned with ERP systems, higher education, evaluation and public organizations.

Before the remainder of this section details the most important contributions of the study to theory, practice and methodology,

1. To develop a suitable theoretical framework to evaluate the performance of ERP framework in ASTU, from the perspective of their stakeholders based on the integration of the three directorate models.
2. To data collection and analysis in order to design the theoretical framework using an observation, and questionnaire-based surveys, supported with documentary and to evaluate the design of ERP framework in three Directorates in ASTU.
3. This research has proven that administrative work processes should be integrated. The integration between decision makers, executive managers, key users and end users, will have a positive impact on the success of the ERP framework.

6.5. FUTURE WORK

This framework designed avoids the manual work and the problems concern with it. It is an easy way to obtain the information regarding the various services that are present in our framework. Still, we found out that the thesis can be done in a better way. This case study of an ERP framework at various Adama sciences and Technology University has been designed to gather an overall view from the perspective of management, experts and team leader. While the goal of the initial research proposal was effectively designed, response was obtained only from a limited number of Adama sciences and Technology University (51 only). Increased survey participation will improve the validity of a future case study.

But still, the results shown by this study will add valuable information for use by Adama sciences and Technology University in upgrading their ERP software in the future. The present research has identified many important factors which can help in achieving efficient ERP framework design in ASTU. The further step is to implement these in practice. Training and knowledge transfer on ERP system is one of the success factors identified in this study. School of electrical engineering and computing the department of computing can contribute in this regard by incorporating adequate ERP courses in the curriculum.

As a ERP framework design can be extended to support integration with other external organization based on the business needs of ASTU and add different plug in modules. So the researcher recommends and suggests the following points and further research works. Other Ethiopian organizations planning to implement ERP system can consider the success factors identified in this study as input for managing their ERP project. ASTU can also use this study as post project lessons assessment.

References

[1] Moller,C., "ERP II: aconceptual modal for next generation enterprise system," *Enterprise information Management,* pp. 18,4,pp.483-97, 2004.

[2] Almadani .R, integrating diverse ERP system., 2004.

[3] Bingi.Sh, "Critical issues Affecting an ERP Implementtion. Information systems management" pp. 5-12, 2004.

[4] davenport, "putting the enterprise intoenterprise system," *harverd business review,* pp. 221-131, 2009.

[5] Motiwalla&thompson, In the history of the evolution and development of ERP systems, 2009.

[6] Chung and Snyder, Material Requirements planning (MRP) system grew to Manufacturing Resource Planning (MRP II) systems. 1999;2000.

[7] Johnson, a term coined by Gartner Research Group in 1992, 1999.

[8] davenport, integration is an extremely important part to ERP. the higher education in australia has resulted in yet a further layer of change in university. 2007.

[9] Deloitte, an ERP system is a packaged business software system that allows a company. 2009.

[10] shaehab et al, Support Deloitte's and Davenport's persportive that they over- emphasize the integration aspect of ERP systems. 2010.

[11] Yan,Rahmati &Lee, advantagy of implementing ERP is defined from the business processes perspetive and technology. 2008.

[12] welti, challengese to size of thre mainly due to size of the system. 1999.

[13] Rajagopal, "Implementing ERP those mentioned plus marketing engineering sales, finance and human resource." 2002.

[14] Alshawi et.al, "The standard Information system (IS) development strategies developed for business." 2004.

[15] Huang, "They invest millions of dollars in ERP projects." 2011.

[16] A.R.Bologa, "the university of minnesota had a similar experiece when projected costs," 2011.

[17] Liu, "The top reasons why institutes are adopting ERP solutions are to replace legacy systems.improve custemer service." 2000.

[18] Alshawi et.al, "The main advantages of ERP for higher education institution are according to ECAR organization," 2004.

[19] Chu, "improved information access for planning and managing the institution improved services for the faculty." 2002.

[20] Huang, "the australian government as pressured universities into more like businesse as the level of funding has significantly reduced." 2011.

[21] Tsai, "one of the reasons that universities have ERP implement system is to performance and learning services." 1999.

[22] lfenedo.p, "Consequently ,university in australia began to implement ERP systems to replace old and dated systems." 2008.

[23] Lucas, "ERP system to replace old and out dated systems with more effcient one." 1998.

[24] Chu, "human and social sciences 2010 report the main reasons for adopting ERP in austalia higher education." *international journal* , 2008.

[25] A.R.Bologa, "ERP system can be used as a solution to integrate and increase the efficiency of romanin higher eduction," 2011.

[26] Hung, "one of the reasons that university have impleented ERP system is to improve performance and learning services," 2002.

[27] Manjinder. s, "orginal SAP R/3 release6.20," 2003. [Online].

[28] Rashid et al, "A three- tiered ERP architecture," *idea group publishing* , 2002.

[29] Boo Young chung, "AN ANALYSIS OF SUCCESS AND FAILURE FACTORS FOR ERP SYSTEMS IN ENGINEERING AND CONSTRUCTION FIRMS", professor miroslaw j.skibniewski,Department of civil & environmental engineering , 2007.

[30] Bingi.sh, thhree-tier architectural pattern, namelye, 1999.

[31] Swartz,D.and Orgill,K., "Higher education ERP: Lessons learnd -using this framework for ERP could save Your University Millions of Dollars", *Educause Quarterly* pp. 2,20-27, 2001.

[32] Antonucci.y.L and muehlen.M.Z, "Deployment of Business to Business Scenariosin ERP Education :" in *Evaluation and Experience from an International Collaboration.Seventh Americas Conference on information systems*, 2001.

[33] McConachie, J. The Effect of Sub-cultures on the Implementation of an Enterpries system, an australian Regional university perspective : QJER,17, 2001.

[34] King et al, institution surveyed by Educe cause Center for academic research, 2002.

[35] Nielsen,J.L, "Critical Success factors for implementating an ERP system in a university environment: A case study from the Austealian HEs, Faculty of Engineering and Information Technology." in *Brisbane, Griffith University Bachelor*, 2002.

[36] Frantz et,P.S.Southerland, A.R.& Johnson,J.T., "ERP Software implementation estpractices,QDUCAUSE Quarterly," pp. 4,38-45, 2002.

[37] Allent et al, Due to competition among institutions, there is pressure on management for improved administrative operations . 2002.

[38] Thavapragasam,X.T, "ERP systems and user perceptions: An Approach for Implementation Success." *Issues in Information Science and Information Technology,* pp. 521-531, 2003.

[39] Weir.B and Mickool.R, "For Enterprise Applications and Data, the Question is Notmake Versus Buy...," *EDUCAUSE Quarterly* pp. 1.5-9, 2003.

[40] West.R & Daigle.S, "Total Cost of Ownership: A strategic tool for ERP planning and implementation.," *EDUCAUSE Quarterly,* pp. 1,1-14, 2004.

[41] pollock.N and cornford.J, "ERP systems and the university as a "unique"organiation. *Information Technology&people,* pp. 17(1),31-52, 2004.

[42] zornada.L & velkavrh.T.B, "Implementing ERP System in Higher Education Institution." in *27th Int.Conf. Information Technology Interfaces ITI,* cavtat, croatia. 2005.

[43] Fisher,M.D, "Staff perceptions of an Enterprise Resource planning System Implementation:" *A Cae study of three Australian Universities. Queensland CentralQueensland University.phd thesis.,* 2006.

[44] Mehlinger.L.B, "Indicators of Successful Enterprise Technology Implementations in Higher Education Business Morgan state University,phd thesis," pp. 1-147,3216235, 2006.

[45] Davis.M.J & Huang.Z, "ERP in Higher Education: A Case Study of SAP andCampus Management.," *Issues in Information Systems,* pp. 8(1), 120-126. 2007.

[46] Alghathbar, K., "Practical ERP implementation in Government Organization.," in *International Conference on E-Learning, E-Business, Enterprise Information Systems, andE-Government,* 2008.

[47] Kwon H., "Security Engineering in IT Governance for University Information System." in *proceedings of International Conference on Security and Assurance, ,* 2008.

[48] Vathanophasa, V. & Lindsay, S. "Enterprise Resource Planning: TechnologyAcceptance in Thai Universities." *Enterprise Information Systems,* pp. 3(2), 133–158., 2009.

[49] Rashid et al, have studied an industry- academia qulitative analysis., 2009.

[50] Iuliana et al, the collaboration of leadership in industry and academia can provide better resource pooling to balance efficiency and effectivenes. 2009.

[51] Sullivan, "Investigated post ERP implementation experience in 6 higher education institutions to maximize the benefits," 2009.

[52] Wang,xin-li, "Study on Academy-Oriented Resource Planning," in *2nd internationalConference on Education Technology and Computer (ICETC),* 2010.

[53] Abugabah,A & Sanzogni,L, "Enterprise Resource Planning (ERP) System in HigherEducation: A literature Review and Implications." *International Journal of Human and SocialSciences, ,* pp. 5(6), 395- 399., 2010.

[54] Maheshwari 'S.P.,Singh,P.& Tripathi,L.K. "ERP Implementation in EducationalInstitutions: Challenges and Opportunities." in *Eighth AIMS International Conference onManagement, January* , 2011.

[55] Ahmad et al, "proposed a framework for ERP in malaysian institution," 2011.

[56] Aldayel et al, "Have identified critical success factors of ERP implementation in 12 universities in Saudi Arabia." 2011.

[57] Bhanti P.Kaushal,U & Pandey, A. "E-Governance in Higher Education: Conceptand Role of Data Warehousing Techniques." *International Journal of Computer Applications,* pp. 18(1), 15-19. 2011.

[58] Bhanti,p. Kaushal,U& Pandey,A, "E-Governance in Higher Education: Conceptand Role of Data Warehousing Techniques." *International Journal of Computer Applications,* pp. 18(1), 15-19. 2011.

[59] Ghuman,K, "Incorporation of ERP in Educational Institutions: An Empirical Study." in *International Conference on Technology and Business Management,* March 26-28 2012.

[60] Soh, C.Kien,S.S&Tay-Yap,J, "Cultural fits and misfits: is ERP a universalsolution," *Communication of the ACM,* pp. 43(4), 47-51, 2000.

[61] Ash,C & Burn,J, "A strategic framework for the management of ERP enabled ebusinesschange." *European Journal of Operational Research,* pp. 146(2), 374-94, 2003.

[62] Aloini, D. dulmin,R &Mininno,V, "Risk management in ERP projectintroduction: review of the literature." *Information & Management,* pp. 44(6), 547-67, 2007.

[63] Youngberg, E., Olsen, D. and Hauser, K, " Determinants of professionally autonomousend user acceptance in an enterprise resource planning system environment." *InternationalJournal of Information Management, InternationalJournal of Information Management,* pp. 29,138-144, 2009.

[64] Momoh, A., Roy, R. &Shehab, E, "Challenges in Enterprise Resource Planningimplementation:" *state of the art. Business Process Management Journa,* pp. l, 16 (4), 537-565, 2010.

[65] Helo,P, "Expectation and reality in ERP implementation: consultant and solutionprovider perspective." *Industrial Management & Data Systems,* pp. 108 (8), 1045-59, 2008.

[66] Koh, S.C.L., Simpson, M., Padmore, J., Dimitriadis, N. &Misopoulos, F, "Anexploratory study of enterprise resource planning adoption in Greek companies." *IndustrialManagement & Data Systems,* pp. 106(7), 1033-1059, 2006.

[67] Momoh, A., Roy, R. &Shehab, E, " Challenges in Enterprise Resource Planningimplementation:" *state of the art. Business Process Management Journal,* pp. 16 (4), 537-565, 2010.

[68] Momoh, A., Roy, R. &Shehab, E, "Challenges in Enterprise Resource Planningimplementation:" *state of the art. Business Process Management Journal,* pp. 16 (4), 537-565, 2010.

[69] Ash, C. & Burn, J, " A strategic framework for the management of ERP enabled ebusinesschange." *European Journal of Operational Research,* pp. 146(2), 374-94, 2003.

[70] Xu, H., Nord, J. H., Brown, N. & Nord, G. D, " Data Quality issues in implementing an ERP." *Industrial Management and Data Systems,* pp. 102(1), 47-58, 2002.

[71] Yakovlev, I. V, " An ERP Implementation and Business Process Reengineering at aSmall University." *EDUCAUSE,* pp. 2, 52-57, 2002.

[72] Allen, D., Kern, T. &Havenhand M, " ERP critical Success factors: An Exploration ofthe Contextual Factors in Public Sector Institutions." in *Proceedings of the 35th HawaiiInternational Conference on System Sciences,* 2002.

[73] Youngberg, E., Olsen, D. and Hauser, K, " Determinants of professionally autonomousend user acceptance in an enterprise resource planning system environment." *InternationalJournal of Information Management,* pp. 29,138-144, 2009.

[74] Calisir, F. & Calisir, F. " The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end-user satisfaction with enterprise resourceplanning (ERP) systems." *Computers in Human Behavior,* pp. 20, 505–515. , 2004.

[75] kahn et al, "The customization efforts should also be reduced in order to facilitate easy use and better operational efficiency," 2011.

[76] Kahn, B. K. et al, " Information quality benchmarks: Product and service performance." *Communications of the ACM,* pp. 45(4), 84–192. , 2002.

[77] Willis, T. H. & Willis-Brown, A. H, " Extending the value of ERP." *Industrial Management and Data Systems.* pp. 102(1), 35–38, 2002.

[78] Davis, M. J. & Huang, Z, "ERP in Higher Education: A Case Study of SAP and Campus Management," *Issues in Information Systems,* pp. 8(1), 120-126, 2007.

[79] Piramuthi S., & Shaw M.J, " Learning-enhanced adaptive DSS: a Design Science perspective," *Information Technology Management,* pp. 10, 41-54, 2009.

[80] Maheshwari, B., Kumar, V. & Kumar, U, " Delineating the ERP institutionalization process: go-live to effectiveness." *Business Process Management Journal* , pp. 16(4), 744-771, 2010.

[81] Creeger, M, " CTO Roundtable: Cloud Computing:" *An Overview) ACMQueue* , p. 7(5), 2009.

[82] Goscinski, A. & Brock, M, " Towards Dynamic and attribute based publication,discovery and selection for Cloud computing." *Journal of Future Generation Computer Systems* , pp. 26, 947-970, 2010.

[83] Wang, R.Y. et al, " Beyond accuracy: What data quality means to data consumers." *Journal of Management Information Systems, Spring* , p. 5–33, 1996.

[84] Zhang, Z., Lee, M.K.O., Zhang, L., & Huang, X, " A framework of ERP systemsand authorization measures implementation success in China: An empirical study." *International Journal of Production Economics,* pp. 98(1), 56-80 , 2005.

[85] Mahalaxmi, D. S. and Raju, S. V, " Revolutionary Approach from Protecting the Software." *International Journal of Engineering Research and Applications,* , pp. 1(4), 1579-1582, 2011.

[86] Manson, D., Meldal S., Sledge C.et al, "Panel Session - Learning Modules for Security, Privacy and Information Assurance in Undergraduate Engineering Education," in *36th ASEE/IEEE Frontiers in Education Conference,* 2006.

[87] King, P., Kvavik, R. B. & Voloudakis, J , "Enterprise resource planning systems in higher education," *EDUCAUSE Research Bulletin* , pp. 22(22), 1-11, 2002.

[88] Anderson, J, "IT, e-learning and Teacher Development," *International Education Journal: ERC004 Special Issue,* pp. 5(5), 1-14, 2005.

[89] Singh, R, and Singh K , "A Descriptive Classification of Causes of Data Quality Problems in Data Warehousing," *International Journal of Computer Science Issues,* p. 7(3: 2), 2010.

[90] Sharma, N., Singh, K. & Goyal, D. P, "Adoption of Knowledge Management Practices in Software Engineering Organizations," in *2012 IEEE Second International Conference on Advanced Computing & Communication Technologies,* 2012.

[91] Singla A.R , "Enterprise Resource Planning," *Cengage learning.* 2008.

[92] Shafiei, F., Sundaram D. & Piramuthu S, "Implementing a Multi-Enterprise Collaborative DSS," in

IEEE Enterprise Distributed Object Computing Conference Workshops, 2009.

[93] Kituyi G. M. and R. Kyeyune, ""“An Analysis of E-learning Information System Adoption in Ugandan Universities: Case of Makerere University Business School”. *Information Technology Research Journal Vol* . pp. 2(1), pp. 1 – 7, April 2012 , 2012.

[94] Kaira J. G. , ""“MUELA:A generic web-based courseware content authoring system”. An," *An unpublished dissertation, Makerere University* , 2012.

[95] Piette John, S. J., “Experiences in mHealth for Chronic Disease Management in 4 Countries,” in Disease Management, pp. pp. 1-5. , 2011.

APPENDIX I: SAMPLE FORM OF ASTU COLLECTION

አዳማ ሳይንስና ቴክኖሎጂ ዩኒቨርሲቲ

ሳምንታዊ እቅድ እና ሪፖርት መከታተያ ቅፅ

የስራክፍሉስም ----------

የክንውንወቅት----------

ተ.ቁ	የሰራተኛውስም	1ኛሳምንትከ------እስከ------ 2008		2ኛሳምንትከ------እስከ------ 2008		3ኛሳምንትከ-----እስከ------ 2008		4ኛሳምንትከ-----እስከ------ 2008		አስተያየት
		ዕቅድ	ሪፖርት	ዕቅድ	ሪፖርት	ዕቅድ	ሪፖርት	ዕቅድ	ሪፖርት	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										

የክፍሉሃላፊ ----------ፊርማ ----------ቀን----------

APPENDIX II: Survey Questionnaire

ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY
SCHOOL OF ELECTRICAL ENGINEENRING AND COMPUTING
DEPARTMENT OF COMPUTING

Questionnaire to be filled by Experts

RESEARCH TOPIC: **Enterprise Resource Planning Framework for ASTU**

Dear Experts!

The purpose of this questionnaire is to gather relevant data that will help to assess the practice of Enterprise Resource Planning Framework for Ethiopian Higher Education Institution by taking ASTU as a Case or model. I would like to assure you that this study is purely academic and hence would not affect anyone in any way as all the information will be kept confidential. Rather, the results of this study are believed to be invaluable input to improve the practice of integrating different stakeholders and functional units. Therefore, you're genuine, frank, and timely responses are of prime importance for the success of this study. Thus, you are kindly requested to respond to each question items carefully and responsibly.

General Direction

- You are not required to write your name.
- Respond to all closed-ended question items by putting (√) mark in the boxes and to all Open- ended ones by writing your comments on the spaces provided.
- It is possible to use **Amharic** or **English** in giving comments.

Thank you!

Name of Institution _____

Department_____

The aim of this questionnaire is to collect information to fulfill the requirement to design Enterprise Resource Planning framework for Ethiopian higher education institution the case of ASTU to integrate all internal departments. Enterprise Resource Planning Systems are software packages that provide the complete integration of information of various functional processes (Directorate) within an organization. Enterprise resource planning (ERP) framework for Ethiopia

higher education institution the performance of organizations mainly depends up on the knowledge, skill and ability of employees.

PART I – PERSONAL DATA

1. Sex: a) Male ☐ b) Female ☐
2. Age: a) 20 – 25 ☐ b) 26 – 30 ☐
   c) 31 – 35 ☐ d) 36 -40 ☐ e) above 40 ☐
3. Educational Background
   a) Level /certificate ☐ b) College Diploma ☐ c) First Degree ☐ d) MA/MSc. ☐
4. Current position/job title

   _____
5. Years of service: a) in current position _____
   b) In previous position(s) _____
   C) Total _____

PART II: Questions Related to the Research Topic

1. Do you have basic computer skill to operate a common operation related to your work?
   Yes: ☐ No: ☐
2. If your answer for question one above is "Yes", where did you get the training?
   Through college education: ☐ on the job training organized by the university: ☐
3. If your answer for question one above is "No", what do you think is the reason?
   a. _____
   b. _____
   c. _____
4. Do you face difficulty in performing your job related tasks under existing information system settings?
   Yes ☐ No ☐
5. If your answer for question four above is "Yes", what do you think needs to be done to improve the existing information system support?
   i. _____
   ii. _____
   iii. _____

iv. _____

v. _____

6. How do you rate your agreement for automating your department with computerized system?

   Strongly disagree: ☐ Disagree: ☐ Neither agrees nor disagrees: ☐ Agree; ☐ Strongly agree; ☐

7. Currently, where do you store the data related to your works?

   On data base ☐ in file cabinet; ☐ On Computer files/directories; ☐

8. Currently, how much time it takes you to provide data needed by customers?

   a. _____

   b. _____

   c. _____

9. How do you evaluate the satisfaction of customers with the existing information system support?

Very dissatisfied; ☐ dissatisfied; ☐ neither; ☐ Satisfied; ☐ Very satisfied; ☐

10. If your answer for question nine above is "Negative", what do you think is the problem?

    i. Lack of training for existing staff on basic computer utilization

    ii. Lack of automation of the functional areas

    iii. Lack of better data/information management

    iv. Lack of appropriate software to support functional areas

    v. Lack of knowledge and skill

    vi. Underestimating the benefit of information system

11. Currently, when you request report or data from other department, how often do you get answers?

    Never; ☐ seldom; ☐ about half the time; ☐ usually; ☐ always: ☐

12. Do you agree if the functional units at ASTU are designed and consolidated under the three directorates such as finance, human resource, and student services?

    Strongly disagree: ☐ Disagree: ☐ undecided: ☐ Agree; ☐ strongly agree; ☐

13. How frequently do you get work related information from your lower level employees?

    Never; ☐ Rarely; ☐ Sometimes; ☐ Very often; ☐ Always ☐

14. Which types of information system you were applying for graduate student identification system in ASTU?

_____

_____

_____

15. What types of system you are using currently in ASTU?
    i. SAP (System Application and purchasing)
    ii. Oracle
    iii. PHP (Hypertext pre-processor)
    iv. Other_____

    _____

16. How are you receiving and delivering information from and to your staff members?

_____

_____

_____

17. Do you have methods for hiring and promoting employees? Do you have any system to apply?

    Yes: ☐ No: ☐

    If "Yes", how?

_____

_____

18. If "No", what is the problem with the existing system?

_____

_____

_____

19. Is there any system to investigate the equipment that your organization purchasing?

_____

_____

_____ _____

20. To which of the following functional units do you share your data/ information?

A. Finance Directorate
B. Student Service Directorate
C. Human Resource Directorate
D. Registrar
E. Library
F. Dormitory
G. all

21. From which of the following functional units do you receive data / information?
    A. Finance Directorate
    B. Student Service Directorate
    C. Human Resource Directorate

22. Have you used or know ERP?

Yes: ☐ No: ☐ To some Extent: ☐

If "No", how do you rate your agreement for using ERP in the future?

Strongly disagree: ☐ Disagree: ☐ undecided: ☐ Agree; ☐ strongly agree; ☐

23. So far, is there any efforts made to implement ERP at ASTU?

Yes ☐ No ☐

24. If "No", what do you think was the reason?

i. Lack of experts in the field
ii. Lack of financial resources
iii. Lack of material resources
iv. Lack of attention from the part of the management

Thank you!