IDENTIFYING RELATIONSHIP BETWEEN STAKEHOLDERS' GOALS AND ERP FAILURES; AN EMPIRICAL STUDY

A THESIS PRESENTED TO

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BY

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Final Approval

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DEDICATION

This thesis is humbly dedicated to

ALMIGHTY ALLAH,

Who has always showered His endless blessings upon me;

I also dedicate this work to my

PARENTS

Who have supported me all the way since the beginning of my studies

&

Whose sincere prayers and love were a source of strength for me

and made this project successful.

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DECLARATION

I hereby declare that this Thesis **"Identifying Relationships Between Stakeholders' Goals And ERP Failures: An Empirical Study"** neither as a whole nor as a part has been copied out from any source. It is further declared that I have done this research with the accompanied report entirely on the basis of my personal efforts, under the proficient guidance my supervisor **Dr. Saad Naeem Zafar**.

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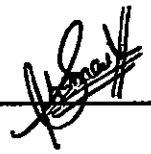
No portion of the research work presented in this thesis report has been submitted in support of any other degree or qualification of this or any other university or institute of learning.



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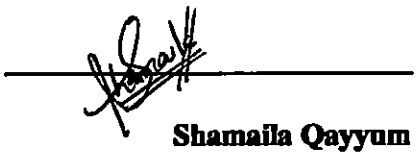

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THESIS IN BRIEF

Thesis Title:	Identifying Relationship Between Stakeholders' Goals and ERP Failures; An Empirical Study
Aim:	The aim of research is to find out the relationship between the ERP failures and the users' goals, through a case study
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ABSTRACT

ERP software projects are gaining popularity in the industry. The rapid growing ERP industry is however, facing many failures. To avoid failures it is vital to spot those aspects which are the hindrance to software's success causing a failure to it. Moreover, the success criterion for software should be defined, for which the software should be evaluated for success. There is a long list of factors which are known to affect the success or failure of an ERP. There are many studies which empirically validate a few of these factors. However, there is still space in literature for empirically validating those factors that affect the success/failure of ERP. This study is then intended to empirically investigate the factors affecting the success/failure of a system by using user satisfaction as a success criterion. The methodology for this study is a case study. The usability is studied for the ERP which resulted to be very poor. The actual reasons of failures are identified based on the probable factors using focus group interviews. The results showed that the main reason for failure is that the software does not meet its main purpose and is not according to users' requirements. A relationship is then built that shows how they cause the failure of the system.

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ABBREVIATIONS

BPR:	Business Process Re-engineering
CFF:	Critical Failure Factors
CMS:	Campus Management Server
CSF:	Critical Success Factors
ERP:	Enterprise Resource Planning
HR:	Human Resource
IBM:	International Business Machines
IS:	Information System
ISO:	International Organization for Standardization
IT:	Information Technology
MUMMS:	Measures the Usability of Multimedia Systems
SMTH :	Semiconductor Manufacturing in Thailand
SUMI:	Software Usability Measurement Inventory

CHAPTER 1

INTRODUCTION

Enterprise Resource Planning (ERP) is the strategic tool that is used by an organization to achieve its business goals [1]. The technological needs of business worldwide have increased the trend for the organizations to adapt the ERPs, which are considered as large packaged ready-made solutions to organizational information system requirements. In an ERP, the functional areas of the business processes of an organization are re-engineered and integrated into one package commonly referred to as Enterprise Resource Planning. In the software industry it is one of the most rapidly growing software markets and in 2004 the ERP market grew at a rate 0f 14% [2].

However, the ERP implementation is not always a successful project [1-3]. In fact, the ERP implementation failure rates are very high[4, 5]. It is suggested that to reduce the failure rates of ERP implementation, proper strategies and adaptations should be done[1]. In order to reduce failure rates those factors are needed to be identified that cause the system to fail. A lot of work has been done in the past to understand the causes of failure.

Despite having known the factors or causes of ERP failures, it is quite difficult to measure the success of an IS on economic or quantitative measures. Also, it is to be considered that the success is measured for whom, among the stakeholders[6], as the success or failure of the project depends on the stakeholder's perspective. The goals are the objectives of a system that the system must meet[7].

For an Information System to be successful, its users should be satisfied with it. If the users are not satisfied then it means the software is problematic for them[8]. One reason of the users' dissatisfaction can be that the software does not achieve its main purpose [8]. So, we

assume that in order to reduce the failure rates of an ERP, the software must meet its main purpose.

1. 1 Aims

The aim of research is to find out the relationship between the ERP success/failures and the factors effecting the success or failure.

1.2 Case Study:

1.2.1 Background: In this thesis we analyze the results of ERP implementation in an educational institution. The ERP is referred to as Campus Management System (CMS). In addition to academic management the software system supports management of Financial and Human Resource records. After deployment of the ERP was observed that the users were frustrated while using the ERP. It was assumed that it might be because users were not accepting change. Therefore, the organization conducted the usability study for the software. The results of the study showed that software's usability was very low. The organization then, studied the usability of the software in another organization using the same software, which was also reported to be very low. Based on the usability results, the organization emphasized on selected in-house customization of the ERP.

1.2.2 The Study: After two years of deployment of ERP, user's dissatisfaction with the software was still reported. This study aims to investigate the causes of reported dissatisfaction of the software.

1.3 Problem Statement:

This study intends to measure the usability of the software and investigate the probable causes for dissatisfaction of users.

1.4 Objectives

The objectives of the study are:

- Validating the reported dissatisfaction of users through standardized usability surveys.
- Comparing the usability results with the previous results
- Investigating the probable causes of low usability
- Identifying the actual factors of ERP failure

1.5 Research Question

What are the factors that cause low satisfaction among users?

1.6 Research Method

We have studied the usability of the software deployed at an organization. The usability study was then compared with the previous studies. All these usability studies were carried out using SUMI (Software Usability Measurement Instrument) which measures the users'

satisfaction for any software. It gives a list of probable factors that caused failure. Based on those factors, we identified the actual failure factors by conducting focused group interviews.

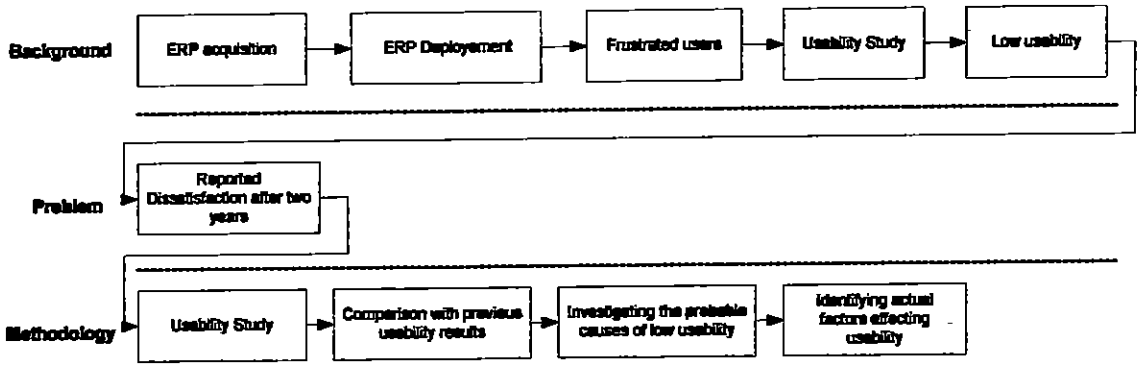

Figure 1: Research Method

1.7 Thesis Outline

The rest of the thesis is structured as follows:

Chapter 2: Chapter 2 contains the relevant literature pertaining ERP failures, factors for ERP failures, empirical studies, SUMI and focused group interviews.

Chapter 3: Third chapter presents the methodology, the details of the case study and the method of our work.

Chapter 4: Chapter 4 presents the implementation of the study, usability results and investigation of factors using focus groups.

Chapter 5: This chapter discusses the findings of our study and justifies it with the literature.

Chapter 6: This chapter concludes the study and discusses the main contribution of the research

CHAPTER 2

LITERATURE REVIEW

ERP software business is getting popularity across the world. Organizations opt to have an automated system to enhance their services. However, ERP softwares are not always successful [9]. There are a number of ways in which ERP's success can be identified. Literature gives a wide range of success criteria for software. Several factors are involved in the success/failure of an ERP. It is recognized that stakeholders' goals also affect the success/ failure of a system [10].

This chapter involves a detailed literature review on the ERP failure factors, success criteria, measuring success and identifying the factors. The breakdown of the literature review is as follow:

- ERP
- ERP failure
- ERP success criteria
- Factors effecting ERP success/failure
- Instruments for measuring success
- Focused group interviews

2.1 ERP

ERP stands for Enterprise Resource Planning. For many organizations it is turning to be a vital tool, for achieving their business goals[1]. ERP is a software package that provides a seemless integration of all kinds of information flow within a company. This means that instead

of working separately with Finance, Human Resource (HR), Accounts and other business areas of an organization, integrated software is provided that deals with the information flow within these departments. Hence internal processes are streamlined that allow easy retrieval of data and make it more comprehensible. However, implementation of ERP is considered a complex and a lengthy process [5, 9, 11]. Therefore a high failure rate of ERP implementation is noticed. So, in order to lessen ERP failures, considerable focus is given on identifying the reasons that lead to ERP failure [5, 9]. A lot of studies are conducted to identify the failure factors of ERP, a few studies have been done for identifying success factors, as well.

2.2 ERP Failure

Normally software projects are evaluated for success and not for failure. Software project that does not fulfill the defined success criteria of an ERP is said to be a failure. So it can be said that software failing to achieve its defined success criteria is said to be a failure. In order to learn about the failures of ERP, we should first get the knowledge about success criteria for ERPs.

2.3 ERP Success Criteria

Success criteria for an ERP mean the basis on which software can be evaluated for its success. Literature gives a wide range of success criteria for Information Systems (IS). However, it can't be said that any single particular success dimension is significant for measuring success of all softwares[12]. According to a model proposed by W. John[12], success is measured in terms of process, user information, satisfaction and product.

Delone and Mclean[13]picked a vast variety of success criteria from the literature, analyzed them by dividing them into six dimensions and proposed a model. This model is based on the six dimensions of success, by categorizing success criteria's huge list :

- System quality: This is the measure of quality of software itself. Quality of software can be measured in different ways. It can be accessed in terms of reliability, response time of the system and its convenience of access. Moreover, the quality of the system can be ensured if it utilizes the investment, resources and the system is well integrated.
- Information quality: It is the measure of the output of an information system (IS). The output of an IS can be measured in terms of accuracy, precision, completeness and conciseness of its data. The output data should be relevant to the requirements. It should be useful and understandable for the user. The information that an IS produces is mainly in the form of reports.
- Information use: This is the measure of the use of the output of IS. It could be measured by measuring the extent and nature of use. As by measuring the frequency of use or voluntariness of use. In order to measure the frequency of use, the numbers of minutes used can be measured. Measuring the number of queries or hour per work also gives the frequency of use.
- User satisfaction: It is the most widely used single IS success measure. This can be measured in terms of user's response. User satisfaction is said to be achieved if the user enjoys working with the software, user is happy with the information and the working of system and there is nothing that user is annoyed by.
- Individual Impact: It is the measure of the effect on a person's information who is working with the system. Individual impact can be measured in terms of the improvement

in individuals' decision caused by the use of IS. Moreover, it can be measured through the time taken to complete the job or improved personal productivity.

- Organizational impact: this is the measure of the organizational performance affected by the use of IS. The empirical measures of organizational impact can be profit performance, economic performance and marketing achievements.

Literature emphasizes on user satisfaction as a criteria of success for an IS. However, user satisfaction is related to the usability, which is also a success criterion for ERPs. Usability and user satisfaction are described in details, below:

2.3.1 Usability: Usability relates to different aspects of an ERP. The term usability has different dimensions relating to the use of software. It considers different factors as ease of use, how flexible the software is , how much error handling it supports, etc [14]. Usability can be thought of as " a quality of interaction between user and system"[15]. Many producers are giving a high profile to usability now a days. A lot of investment has been done in improving usability. Developers and producers want their software products to be effective, efficient, satisfying, easy to learn, easy to use, easy to install and usable. All these factors are getting significant importance in todays' marketplace and can become critical at times [14].

With increased usability of an Information System, work productivity and efficiency also increases[15]. Usability's broad definition come from ISO 9241 [16], and according to it, usability consists of three things:

Effectiveness: It means the software is accurate and complete for the achievement of user's goals[8, 17]. Hence it is an output variable [8].

Efficiency: It refers to the sources spent to achieve those goals, like completion time and learning time [8, 17], hence it is a user performance variable [8].

Satisfaction: Satisfaction means the user's comfort with the use of system [8] and is therefore, an internal state variable [8, 17].

2.3.2 User Satisfaction: As defined by the ISO 9241 standard, user satisfaction is among the three key aspects of usability. In addition, from the literature we have seen that user satisfaction is discussed a number of times as a success criterion for an information system. It is important to examine how users are getting along with the software. If the measurement results for satisfaction are low, it means using the software gives stress to the user. The stress can degrade the system in many ways. So no matter how much the efficiency or effectiveness of a software is rated, if the users are not satisfied with a software, it reflects that they are having problems with the software [8]. User satisfaction is further divided into five aspects [8]:

Efficiency: it means that the software is performing the required tasks in proper, efficient and quick way.

Affect: it is normally used for the user's feeling while or after when he is working with the software.

Control: it refers to the perception of user that how the software answers to the inputs and commands.

Helpfulness: it means how the users find the software to communicate and assist in operational problems.

Learnability: it refers to the feeling of the user that how feel about learning and getting familiar to the software. There is also a sixth scale known as global usability that is the general satisfaction measure [8].

Knowing the criteria for a software's success is not enough, it is very important to know about those factors as well that cause a success or failure to the software. Knowing the success criteria only helps in evaluating a software if it is successful or not, but having known the factors affecting success or failure, and practicing them can lead to project's success or avoid the failure of a software project.

2.4 Factors Affecting ERP Success/Failure

ERP success/failure is affected by different factors. These factors are either critical success factors (CSF) or critical failure factors (CFF). Any factor that is needed to be addressed properly in order to assure a successful implementation of a project is known as critical success factor [18]. However, a factor that causes an ERP implementation failure is known as critical failure factor [18]. There is no consensus on CSFs or CFFs for any project; they vary from project to project. There is a wide variety of CSFs and CFFs provided in the literature. A set of CFFs and CSFs[1, 5, 9, 11, 12, 18-21] are given in the tables below.

Table 1: set of CFFs

Sr. no	Critical Failure Factors
1	Poor consultant effectiveness
2	Poor quality of BPR(Business Process Re-engineering)
3	Poor project management effectiveness

Table 2: set of CSFs

SR. no	Critical Success Factors
1	Vision
2	Scope
3	Goals

4	ERP software misfit	4	Approach
5	High turnover rate of project team members	5	Project Champion
6	Over reliance on heavy customization	6	Change management
7	Poor knowledge transfer	7	Manage cultural change
8	Poor It infrastructure	8	Project team
9	Unclear concept of the nature and use of the ERP system from the user's perspective		
10	Unrealistic expectations from top management concerning the ERP systems		
11	Too tight project schedule		
12	User's resistance to change		
13	Poor top management support		
14	Poor quality of testing		
15	Scope creep		
16	Uneasiness of the system		

Table 2 and Table 3 give us sets of critical failure factors and critical success factor, respectively, as extracted from literature. There does not exist any single factor that is considered to be the only reason for ERP failure. For every project there can be different causes of its failure. Similarly, there can be different factors that lead the project towards success.

ERP may fail if the consultants don't have experience with ERP systems and are not good at effective communication. Because of it a knowledge gap occurs that can lead to failure of the project [1, 5, 11, 18]. If the top management does not support the project, it may face financial problems, lack of knowledge transfer, staff turnover or political problems. These all are the hindrances to successful ERP implementation [1, 5, 9, 11, 18]. In addition to these, some core factors resulting in ERP implementation failure can be a failure of plan, failure of lead, poor managing and monitoring of a project [1, 5, 11, 18] . Hence, it shows that project management must be effective or otherwise some issues may occur that are the hindrance to project's success.

Top management always plays an important role to make a project successful. Sometimes, their unrealistic expectations concerning the ERP system become a problem. High

expectations from the ERP regarding great problem solving may cause a superficial project planning. When the project cannot fulfill those unrealistic tasks, the project management considers it as a failed project [5, 18]. It is deemed necessary to select an individual that possess strong leadership skills and managerial competencies, defined as project champion[11] in the literature. Stakeholders also play a very important role for the success or failure of a project. Cultural changes are important to be managed in order to reduce the adoption costs from different stakeholders belonging various cultures [11, 18].

Other than top management and other stakeholders, users sometimes do not accept such changes as automated systems, due to which their participation is found minimum and their perspectives are not clear. Moreover, users resist to use the system, this can cause the system failure as well [1, 5, 18]. So, proper communication is needed for effective knowledge transfer [9, 11, 18]. As, if the rationale for implementing ERPs is not clear, a resistance to change from the users might be faced. This could lead into political problems and resistance to using the system [5, 11]. In addition to this, users must be trained properly about the software otherwise they cannot effectively use the ERP system. If the users are not trained properly about the software, they cannot effectively use the ERP system [1, 5].

ERP systems should comply with the business strategies and organizational goals. Wrong ERP selection and its poor evaluation causes the ERP to ill-fit with business requirements [5, 11, 18]. It is because; ERP systems should provide support for business. For this, business processes should be reengineered properly, so that the ERP system usage adopts the new business process [5, 18]. Keeping in mind that the scope of the system is defined i.e. including essential business functions that are needed to be addressed and refining the un-needed functions [18]. Moreover, the strategic goals of the business should be clear. These are the expectations from the project

and its benefits. These goals are needed to be identified at the first stage [18] .ERP implementations may result into a failure if the strategic goals are not paid proper attention. Due to which, ERP then may creep away from the required scope [1]. So proper attention should be paid to the overall formal approach and methodology for ERP implementation, which otherwise can cause project to be failed [18].

However, ERP can be successful if it achieves the purpose for which it was built, it is of use for the stakeholders, is according to the requirements of stakeholders, and is developed within budget and time [19, 20]. Moreover the software success can be assured in terms of meeting its defined objective and quality of software [20]. Software project success is defined by Westhuizen[21] as the success of project management and the success of project product. Project management's success is said to be achieved if the project is built within the scheduled time, its budget does not get over run and works according to its specified requirements. Product's success is achieved by the quality of services and user satisfaction [21]. W. John [12] says, the six most common factors for ERP success are; it meets user requirements, software achieves the purpose for which it is build, it is developed in the given timescale, software is developed within the budget, users are happy with the software and its of a good quality

A very important role is played by the development team, in the success/failure of the ERP. Literature mentions the importance of hiring the brightest and best individuals capable of performing the challenging tasks of ERP implementation [9, 11, 18]. But the high turnover rate of the project team members is a problem. With the resignation of team members, already working with the project, a problem of inadequate knowledge of ERP arises and often the skills are not transferred effectively among team members. This may also result in the poor development and ultimately poor performance of the project [1, 5]. Moreover there are often

requests for change from client side that often create conflicts and delays. Development team should formally manage a change management program [11]. Another reason for project failure can be too tight project schedules. They also contribute negatively to project success. Too much workload affects the performance of the developers. At the end, either some of the tasks are missed or system is not performing effectively [5, 11, 18].

Apart from these human dependent factors, there are some technical factors too, that affect the success or failure of a project. If IT infrastructure is poor, it causes the slow processing of an ERP system [1, 5, 11, 18]. Or sometimes, customization is needed for the project. Over reliance on heavy customization is not encouraged. Customization can cause project delays, and if not done properly, it may result in an unreliable system [5, 11]. In addition to these testing should be of good quality. Software should only be deployed if testing indicates that software can go live. If software is implemented without any authentic test assuring that software can survive, the software project may incur a failure [1, 5, 18]. And at the end, system must be easy for users. If the system is not easy to use, it may fail [1].

2.4.1 Case studies empirically validating success/failure factors: There are various case studies empirically finding the failure reasons of ERP implementation; some are as follow:

1. **Validating three social enablers; leadership communication and team:**

Sarkar and Lee [9] used an empirical case study to validate the three human/organizational factors. These factors are also known as social enablers that are considered important for the success of ERP implementation. These three social enablers are leadership should be very strong and dedicated, communication must be open and unbiased, ERP implementation team should be authorized. And their case analysis validated the first

preposition. However the other two prepositions have not been considered as the generalisable essential situation for successfully implementing all stages of ERP.

2. **Case study analyzing leadership, communication, HR issues and IT issues as failure factors:**

SMHK is a semiconductor manufacturing company based in Hong Kong. They implemented an ERP in SMTH (Semiconductor Manufacturing in Thailand). But the ERP failed and the reasons analyzed for this failure were that the leadership was not good, communication difference, HR issues and the IT related issues[1].

3. **AML analyzing lack of expertise, support, training and rules as failure factors:**

AML is a public sector company in Egypt. Some unique challenges were faced during the implementation of the ERP for AML, this ERP implementation was also a failure and the problems were; Lack of expertise, lack of technical and financial support, lack of training and building such rules in the ERP software which are not compatible with the already developed thinking criteria within the organization [1].

4. **Four companies: analyzing a set of Critical failure factors:**

A case study is presented in [5]. This case study was adapted to determine the specific CFF's (critical Failure factors) for ERP implementation. Four companies were studied for this purpose. The criterion for selecting the companies was that they had completed the ERP implementation, they faced the failures, and the project team and other stakeholders showed their

agreement to discuss the results. A general set of critical failure factors from the participants from all four companies, is given below:

ERP system misfit , High turnover rate of project team members, Over-reliance on heavy customization , Poor consultant effectiveness, Poor IT infrastructure, Poor knowledge transfer, Poor project management effectiveness, Poor quality of Business Process Reengineering (BPR), Poor quality of testing, Poor top management support, Too tight project schedule, Unclear concept of the nature and use of ERP system from the users' perspective, Unrealistic expectations from top management concerning the ERP System and Users' resistance to change

5. Case study analyzing failure factors; scope creep, BPR:

COMP Group Middle Eastern manufactures is a network of qualitative companies. The comp group intended to grow its business dramatically through improved IS functions. An ERP was implemented for this purpose and business process reengineering was done continuously. After the implementation though a few consultants considered the changes taken place to be beneficial, but overall software was a failure and even according to the president this business process reengineering was a failure. The reasons analyzed for the failure were the scope creep; as the BPR-related change principles were compromised and the project's focus was shifted from the BPR to functional optimization efforts. Other reasons of failure were top management was not enough supportive and lack of knowledge, change management was not proper, communication was not supported, performances were not measured, tendency of separating IT from business dealings [1].

Knowing the factors that affect the success/failure of a software and keeping them in mind while developing/ deploying a software can lead into a successful software project. There are a number of criteria on the basis of which software can be evaluated for its success. User satisfaction is given much emphasis in this regard. To measure the success of a software according to some predefined criteria any success measuring instrument can be used.

2.5 Instruments for Measuring Information System Success

There are different instruments used for measuring the success of an ERP [22]. SERVQUAL is a measuring instrument that measures the success of a system using perceived quality. It measures service quality following a number of steps. Most of the instruments use user satisfaction or usability as a measure of success. Some of these are specifically meant for web based applications. Normally the evaluation criteria for these instruments are questionnaires. Usability of the systems can be measured through MUMMS, USE, SUS. USE also measures satisfaction and ease of use. Ease of use and user's response for websites is measured through WAMMI. However, user satisfaction can be measured through EUCS, QUIS, USE, CSUQ and SUMI (Software Usability Measurement Inventory). MUMMS measures the usability of multimedia systems. It is designed for rapidly changing technology of computing.

The instrument used in MUMMS is questionnaire. USE also use questionnaire to measure the three dimensions, which are, usefulness, satisfaction and ease of use. SUS uses questionnaires as well and measures system usability scale. It gives a subjective assessment of usability using ten item scales. CSUQ, EUCS and QUIS measure the user satisfaction of a system using a questionnaire. Whereas, EUCS is used specifically for measuring user satisfaction for websites using usability perspective and QUIS measures system satisfaction along six scales.

2.5.1 SUMI: One way of measuring user satisfaction is SUMI. SUMI measures the user satisfaction by measuring the software quality from the view point of end users [8]. Hence, it helps in identifying the most appropriate software for the organization. It measures the two most cited success dimensions i.e. software quality and user satisfaction. It is based on a 50 point questionnaire that is to be filled by the end users. SUMI gets the responses of users in terms of agree, disagree and undecided.

The SUMI questionnaire is then mapped over the six dimensions of success to see how much it supports its claim to measure quality from end users' view.

Table 3: Mapping SUMI Questionnaire over the Six Dimensions of Success

SUMI Questions	SIX DIMENSIONS OF SUCCESS						Justification w.r.t the measure of success dimensions
	System quality	Information quality	I/S Use	User Satisfaction	Individual Impact	Organizational Impact	
This software responds too slowly to inputs	√				√		Responce time – time to perform a task
The instructions and prompts are helpful	√	√		√			Ease of use – usefulness – user information satisfaction
The software has at some time stopped unexpectedly	√		√	√			Convenience of access – amount of use
Learning to operate this software initially is full of problems	√			√	√		Ease of learning - learning
If this software stops, it is not easy to restart it	√		√		√		Flexibility of system – ease of use – individual productivity
It takes too long to learn the software commands	√				√		Learnability - learning
This software seems to disrupt the way I normally like to arrange my work	√		√	√	√		Ease of use – motivation to use – user satisfaction - individual productivity
I prefer to stick to the facilities that I know best.	√			√	√		Convenience of access – user satisfaction – individual influence

I think this software is inconsistent	√			√	√		Consistency – user satisfaction- correctness of decision
This software is awkward when I want to do something which is not standard	√			√	√		Consistency – user satisfaction- correctness of decision
Tasks can be performed in a straightforward manner using this software	√		√		√	√	Ease of use – is Use-individual productivity-productivity in production
The speed of this software is fast enough.	√			√			Response time
Learning how to use new functions is difficult.	√			√	√		Learnability – learning
There are too many steps required to get something to work	√		√				Ease of use - use
software has a very attractive presentation.	√			√			quality
I sometimes wonder if I'm using the right command.	√	√		√	√	√	Data consistency – satisfaction – individual productivity- productivity in production – reliability – ease of use
I find that the help information given by this software is not very useful	√	√		√	√		Usability of information – accuracy of decision – usefulness of specific function
The way that system information is presented is clear and understandable	√	√		√			Understandability – convenience of success
I feel safer if I use only a few familiar commands or operations		√	√	√	√		Reliability – amount of use – satisfaction- accuracy of decision
The software documentation is very informative		√					informativeness
There is too much to read before you can use the software		√			√		Understandability- time to perform a task
I have to go back to look at the guides		√		√	√		Understandability- enjoyment - time to perform a task
The organisation of the menu or information lists seems quite logical	√	√		√			Informativeness – user information satisfaction – perceived usefulness of IS
Error prevention messages are not	√	√			√		Informativeness – accuracy of decisions

adequate							
I will never learn to use all that is offered in this software		√	√	√			Sufficiency – amount of use-enjoyment
Either the amount or quality of the help information varies across the system	√	√					informativeness
It is easy to see at a glance what the options are at each stage		√		√	√		Informativeness – time to take decision
Getting data files in and out of the system is not easy	√	√	√	√			Usefulnesss of information – use – IS sophistication
I would like to recommend this software to my colleagues			√	√		√	Amount of use – enjoyment – productivity in production
I sometimes don't know what to do next with this software	√	√		√	√		Understandability – satisfaction – decision making
I enjoy my sessions with this software				√	√		Enjoyment – individual productivity
Working with this software is satisfying	√		√	√			Amount of use - satisfaction
Working with this software is mentally stimulating	√		√	√	√		Amount of use – enjoyment – individual productivity
I feel in command of this software when I am using it	√			√	√		Satisfaction – individual productivity
I would not like to use this software every day	√		√	√	√		Frequency of use – enjoyment – individual productivity
I can understand and act on the information provided by this software		√	√	√	√		Informativeness – use-satisfaction – individual productivity
Using this software is frustrating	√		√	√	√		Amount of use- satisfaction – individual productivity
This software has helped me overcome any problems I have had using it	√			√	√		Overall satisfaction – accuracy of decision
It is obvious that user needs have been fully taken into consideration.	√			√			User satisfaction – perceived usefulness of IS
There have been times in using this			√	√	√		Motivation to use – satisfaction – user confidence

software when I have felt quite tense							
The software allows the user to be economic of keystrokes.	√			√			User satisfaction – convenience of access
I think this software has made me have headache on occasion.	√			√	√		Enjoyment – individual productivity – convenience of access
It is easy to make the software do exactly what you want	√			√	√		Satisfaction – accuracy of decision – reliability – perceived usefulness of IS
The software hasn't always done what I was expecting				√	√	√	Satisfaction – efficient decisions – productivity in production
It is relatively easy to move from one part of a task to another	√			√	√		Satisfaction – user confidence – convenience of access – ease of use
It is easy to forget how to do things with this software.				√	√		Software satisfaction – information understanding
This software occasionally behaves in a way, which can't be understood.	√			√	√		Software satisfaction – information understanding
This software is really very awkward	√			√			Software satisfaction
I have to look for assistance most times when I use this software.	√			√	√		Software satisfaction – time to reach the decision – ease of use

Analysis:

System Quality: 37

Information quality: 16

I/S use: 16

User Satisfaction: 40

Individual Impact: 32

Organizational Impact: 4

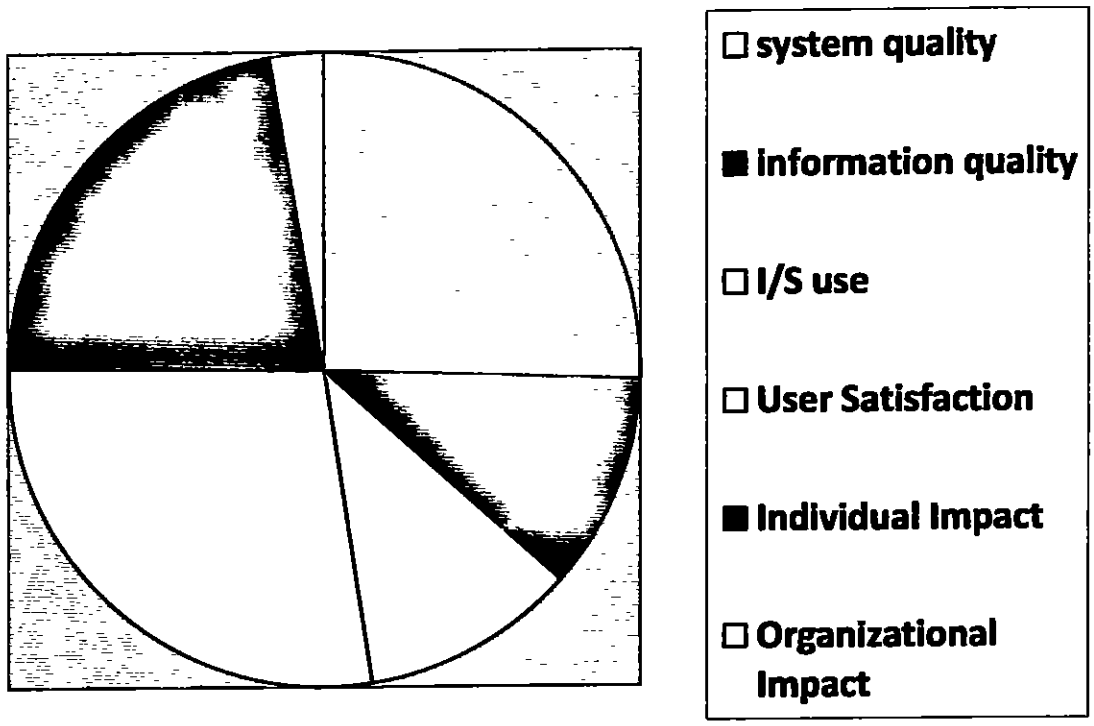

Figure 2: Representing the Six dimensions mapped over SUMI through Pie Chart

Every question of SUMI is mapped against all six dimensions of success as by [23]. It can be seen from the analysis and figure that the main focus of SUMI is on quality and user satisfaction. It also doesn't neglect any dimension of success and evaluates other 4 success dimensions as well. The last column of the table gives the justification w.r.t the measures of success dimensions i.e. for what measures of any success dimensions; the question is justified for it.

2.5.2Use of SUMI:SUMI evaluation has been used by many researchers to measure the usability of different projects. Minucoet. Al. used SUMI to measure the perceived quality and usefulness of Hospital Information System application, and have interpreted results using graphs and measurement scale given by SUMI [24]. Same way, R. Kline and A. Seffah used SUMI for measuring the experiences of novice and expert developers using CASE tool for C++. They have presented SUMI results in graphs showing medians for all sub scales, and interpreted them using the SUMI measurement scales given [25]. An open workflow laboratory facilitating experimental research in the area of workflow software had started in University of Twente. The usability study for it was also carried out using SUMI. The results were interpreted using the SUMI score scales [26].

C. P Lea and Texeiria used SUMI for testing the usability of an interface for human comfort learning tool. It was applied to four different group of academic users, students of 12^{th} (secondary group), University students (University group), Post graduate students of MSC (Postgraduate group) and several university professors (Professor Group). The results were shown in the form of graphs showing the acceptance for usability at each level [27].

SUMI was then used in an industrial case to evaluate the usability of a market driven packaged software development. The results of this SUMI evaluation were then generated by Item Concensual Analysis [28]. Tanja and Blazic used SUMI for evaluating the usability of EducaNext Portal and interpreted the results using Item Consensual Analysis [29]. Debeveet. al used SUMI for exploring the usability of an E-learning system. The results were presented in terms of means and upper/lower confidence level [30].

SUMI then provides a set of factors that are likely to be a reason of low usability in any particular aspect.

2.5.3Probable factors for low usability:

Efficiency:

If the efficiency of the ERP is found to be low, it may mean that software works in an inconsistent way or it is not working to achieve the goals. Either there was no training for the users or users' tasks are not in their competence range. Another reason can be that the installation of the software is improper.

If efficiency is low and control has also low usability, it means basic functionality is poor, however, if efficiency is low and learnability is also low, the reason may be lack of training for users [8].

Affect:

If the usability is low in this aspect then the graphics and layout of the software may not be appropriate. Software may be imprecise or confused. Sometimes, due to the customization low usability of affect arises as the users are too used to of the older version and resist the changes [8].

Helpfulness:

The probable factors of low usability in this aspect can be faulty helping functions. Improper communication, explanation and required knowledge can also be a reason or the messages conveyed are not easily understandable [8].

Control:

Poor feedback or complex commands can be a reason for poor control. Moreover, unorganized or badly labeled layouts hinder the control of user [8].

Learnabilty:

No training and limited or no access to manuals can be the probable factors for low learnability [8].

The actual factors affecting the usability can be identified out of these probable factors. These factors acknowledged from the users. Any appropriate data gathering technique can be applied to gather this information from the users.

CHAPTER 3

METHODOLOGY

From the literature we have got to know that if users are not satisfied with the software, no matter how much the software is efficient and effective, it is not considered successful. It also comes from literature that in order to measure the success of the software, it must be first identified that for whom the success is to be measured. We have seen that one of the critical failure factors of ERP implementation is that the ERP being implemented is not fulfilling user's goals. Since, no empirical evidence of this statement has been found from the literature yet. To fill this gap, we are conducting a study to empirically proof this statement that if the software is achieving users' goals, it reduces ERP failure rates.

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For this reason, we have selected a case study to find out the relationship between stakeholder's goals and ERP failures. The case study was an ERP whose usability was evaluated using SUMI, and it turned out to be very low. Probable factors for low usability were provided by the SUMI, which were then identified properly using focused group interviews.

This chapter provides the detailed research design, design of the case study including the rationale behind its selection. Moreover the details of SUMI evaluation, SUMI feedback and focused interviews is also presented in this chapter

3.1 Research Design

The detailed research design is shown in Table 4.

Table 4: Research design

Research Design	Case Study
Type	empirical
Objective	To find out a relationship between targeted stakeholder's goals and ERP implementation failure/success.
Case	A case of Campus Management Server is selected that is repeatedly reported to be a failure
Unit of analysis	Median of subscales evaluated by SUMI, factors of failures.
Subject	Targeted Stakeholders
Object	Already implemented CMS
Data points	• Usability from users perspective • SUMI results • Failure factors extracted through interviews • Goals of users
Data collection methods	Questionnaire, Focused group interviews
Results	*Our* results will be in the form of suggestions/hypothesis that how the goals of stakeholders can becomes a reason of ERP failures.

3.2 Data Collection Methods:

3.2.1 Questionnaire: SUMI questionnaires are used to study the usability of the system. In order to carry out a SUMI evaluation, the steps [8] are:

- The context of use study should be carried out i.e. user analysis; that who uses the software, task analysis; what do they do with the software, environment analysis; where is the software used.
- Planning the usability study, in order to get real and actual usability results.
- Gathering the data using SUMI questionnaire. The questionnaires are sent to the targeted users and are received back after filled in by those users.
- Analyzing, interpreting and reporting of the data. After getting back the questionnaire, each paper is labeled, assigned three digit unique code. First a data file is created in order to carry out computerized scoring. The file contains only ASCII characters. The

responses are coded as

Agree 1

Undecided 2

Disagree 3

If any question is not answered it is coded as 0. The answers are coded as the subsets of 10, forming five subsets. The data file is then sent to HFRG for evaluation.

Interpreting SUMI: The output from SUMISCO is a file that contains tables. To interpret the data it is suggested to make graphs out of some tables.

The output can be divided into three components:

- Scale scores
- User scores
- Item Consensual Analysis

There are five subscales and a global scale in SUMI. Every sub scale is made up of 10 different questionnaire items. To interpret the SUMI, first a table is created using the output data from file. It is suggested to use median/mean to interpret results. For every sub scale its median is observed. If the median is below or at 50 for any sub scale, it means that usability is low in that particular aspect. Remedial action is needed if median for any subscale is below 40 or even at 40. However, if it is above 60, it shows the usability is good in that aspect [8].

3.2.2 Focused Group Interviews: Focused group interviews are used to identify the actual factors affecting the usability. Focused group interviews are gaining popularity in exploring the believes of people and rationale behind their behaviors [31-33]. They focus on the people to be interviewed and the main objective of the interview [34]. Focused group is defined as "*a technique involving the use of in-depth group interviews in which participants are selected*

because they are a purposive, although not necessarily representative, sampling of a specific population, this group being 'focused' on a given topic" [35]. Feelings of the people and their ideas can be understood well with te help of focus groups. Not only this, but they also help in understanding the difference of ideas among people belonging to different groups [31, 32]. This technique of interviewing is unique in the sense that the data is produced by the mutual discussion among the group members [31, 33].

Steps in conducting focused groups are, selecting the team, selecting the participants, deciding on the location, preparing decision guide, conducting the interview, recording the discussion and analyzing results [33, 36, 37]. Focus group interviews are helpful as they provide knowledge from experts and represent diverse opinion and ideas [36]. Open ended questions are asked in focus groups to gather maximum response on the topic from participants [36, 37]. In fact questions should be designed that yield powerful information [37]. The data gathered from focus group interview is usually deeper and richer as compared to other one-one interviewing techniques [31-33, 36].

While selecting the interviewees for focus group, it should be considered that they can speak on the topic, feel comfortable with each other, have same socio-economic traits and belong to same age group [31, 36]. Focus group helps in producing mutual discussion among the group members [31, 33]. For such reasons, the group is needed to be homogeneous. But some researchers, although not disagreeing from the importance of homogeneity, still emphasize on gathering the group members who are strangers to each other, as the data then produced would be more honest and spontaneous [31, 36].

According to Kinger[31, 36], 3 to 4 focus groups are enough if the research question is simple [31]. The number of participants in every group varies. However, according to Kruger,

greater potential is shown in smaller groups; hence the optimum number of participants is suggested to be 6-8, and generally it can be 4-20 [31]. Approximate time for a focus group interview is 1-2 hours depending on the topic. While considering focused group interviews, confidentiality should be assured [31, 36].

Comparing focused groups with surveys gives us different ways in which focus groups differ from survey methods. Focus groups tend to get the insight knowledge that is vast rather than making the people bound to limited questions. It is social, as it is a group interview and not individual. Focus groups are flexible and homogeneous unlike surveys which are diverse and standardized [38].

Focus Group Data Analysis: A large amount of data is produced through qualitative research that usually overwhelms the researchers. There are many approaches for qualitative data analysis; however, many researchers analyze their data by combining these approaches. For focused group interviews, data analysis occurs at the same time as of gathering data. Krueger suggests a continuum of data analysis, i.e. unrefined data, expressive testimonial and understanding. However, it is not a linear process, but the steps are overlapped [37]. Jr. Walsh et al [39] used the Krueger's continuum of data analysis for their focus group data to identify factors effecting healthy weight maintenance in college men

Ritchie and Spencer [40] describe a framework analysis; the steps of which are, getting familiar to data, making a framework according to objectives, indexing, charting, mapping and understanding. The familiarization of data takes place by listening to tapes and reading notes. Thematic framework can be identified by writing memos and phrases next to text. Indexing refers to highlighting and sorting of quotes and comparing the cases. Charting means re-arranging the quotes according to newly developed thematic content. Data is managed and

reduced in indexing and charting. The last stage is mapping and interpretation. It means to make sense of individual quotes, their relationships and links.

Focus group analysis given by Tyson Dudley provides detail steps for analyzing focus group data. According to this guide, before starting the data analysis, the analyst or researcher should review the focus group objectives and specific research questions. After this, it is time to assign a unique code to focus group participants. The audio tapes should be listened carefully and the transcripts should be read multiple times. Notes are to be made from audiotapes, and researchers are required to read them multiple times. After it, the data is to be organized according to research question. Responses are assembled. At the end data is interpreted by making links between the data. Findings are reported after interpretation [41].

From the literature it is clear that there are many factors that affect the success or failure of the software. However there are some studies that empirically validate these factors. Stakeholders' goals are also among these factors, but literature lacks any study yet, which empirically finds that how the stakeholders' goals effect the success or failure of a software.

CHAPTER 4

Implementation of CMS: A Case Study

4.1 Case Study

4.1.1 Background: The case selected for our study is implementation of an ERP at a Pakistan based educational organization. It is a private sector university that has different departments. Besides offering a variety of programs to the students, for which a number of qualified and experienced staff is hired, the university has its own vast managerial staff, consisting of finance, human resource and administration for the better provision of services by the organization. We refer to this university in this thesis as University A.

4.1.2 Campus Management System (CMS): The software system selected in this case study is a selected is a CMS that is being implemented in the organization. CMS is an ERP facilitating different departments of the organization i.e. teachers, finance and administration. Teachers normally use the CMS for course management, attendance and results, while finance department uses the CMS for its billing, accounting fees etc. The administrative department uses the CMS for the administrative purposes as assigning the roles etc. as shown in Table 5.

Table 5: CMS users

Departments	Description	CMS usage role
Teachers	Teaching	• Course management • Attendance • results
Administration	Administer the information of teachers and student	• Assigning roles • Attendance report
Finance	Billing and fees	• Accounting • Billing • Fee • reports

4.1.3 The Problem Background: CMS was basically purchased from a third party. At the time of purchase the software was already in use at another university. We refer to the university as University B in this thesis. After deployment of the software at University A, a high level of frustration by the users was reported. The university decided to conduct a usability survey to understand the weakness in the software. A very low usability was identified in the survey. To further investigate the problem, the university decided to conduct the usability survey at University B. A low usability of the software was also reported there. The university further investigated the reasons of low usability and decided to make some changes to the software. After two years of deployment and making some changes to the software, the university decided to conduct another usability study, as users' dissatisfaction with the software was still reported. It is shown diagrammatically in Figure 3.

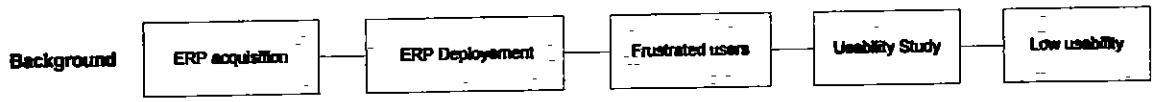


Figure 3: The problem background

4.2 Usability Surveys

Usability is thought to be criteria for evaluating software's success [16]. It relates to different aspects of a system as ease of use, flexibility, error handling etc [14]. According to the definition from ISO usability comprises of effectiveness, efficiency and satisfaction [16]. Researchers, argue that if the user is not satisfied with the system, no matter how good the software may be, in fact users would be having problems with It [8].

There are different ways of evaluating the user satisfaction. The instrument selected for conducting usability study was SUMI; it is a 50 points questionnaire and is widely used by the

researchers for evaluating usability. It finds the usability of software from user's point of view, so it's more appropriate for our study as it considers the users goals and identifies the best software for organization. The five sub scales of user satisfaction that are used in SUMI are:

- Efficiency
- Affect
- Helpfulness
- Control
- Learnabilty

SUMISCO suggests looking at the median / mean for every sub scale in order to interpret the SUMI results [8]. The usability of software can be measured from the median of every sub scale. If for any subscale the score is 50 or below 50 it means for that particular aspect the usability is low. Remedial actions are needed if the subscales are at 40 or below that. However, if the subscale score 60 or more, then the software is considered as good software. Keeping in mind the scale for measuring usability we developed graphs against every group showing their usability for each sub scale. The Table 8 shows the medians for each sub scale for every group along with a graph. This helps in interpreting the usability results for every group, and shows the usability at each sub scale level.

4.2.1 Results of previous surveys: The previous usability results of CMS in university A and university B are given below:

University A:

Table 6: Usability scores for University A

University A				
	Teachers	Finance	Admin	Comprehensive
Efficiency	41.6	30	35.4	39
Learnability	33.3	30	35.8	32
Controllability	36.3	39.6	43.3	38
Helpfulness	39.2	47.3	45.6	42
Affect	42.9	30.6	48.2	41
Global	39.6	36.6	42.7	39.8

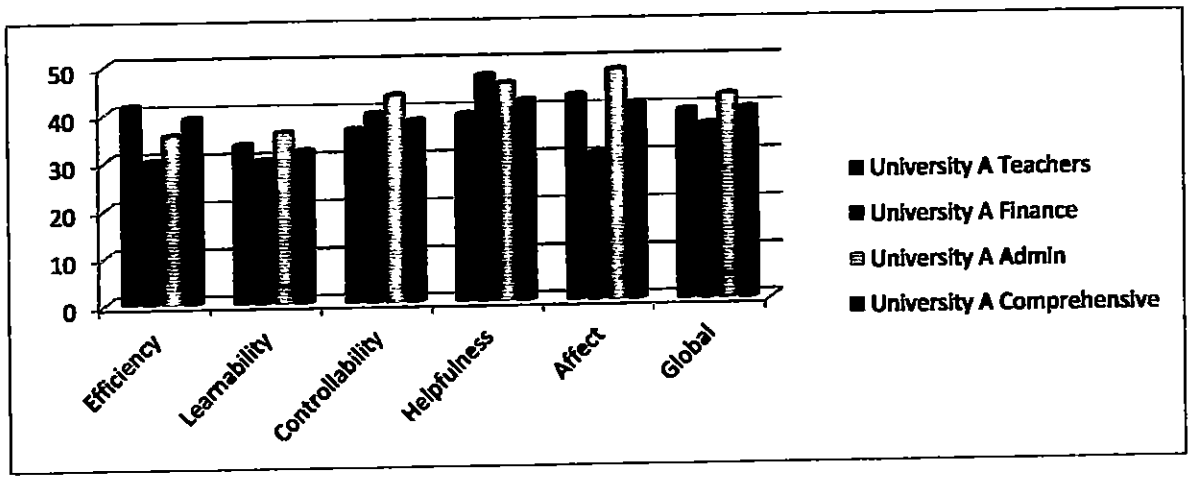


Figure 4: Usability Scores for University A

University B:

Table 7: Usability scores for University B

University B				
	Teachers	Finance	Admin	Comprehensive
Efficiency	47.8	41.67	41	43
Learnability	43	41	41.9	42
Controllability	41	45.33	40.6	41
Helpfulness	45.6	45	50.4	48
Affect	45.6	37	51.2	47
Global	44.8	44	48.2	46

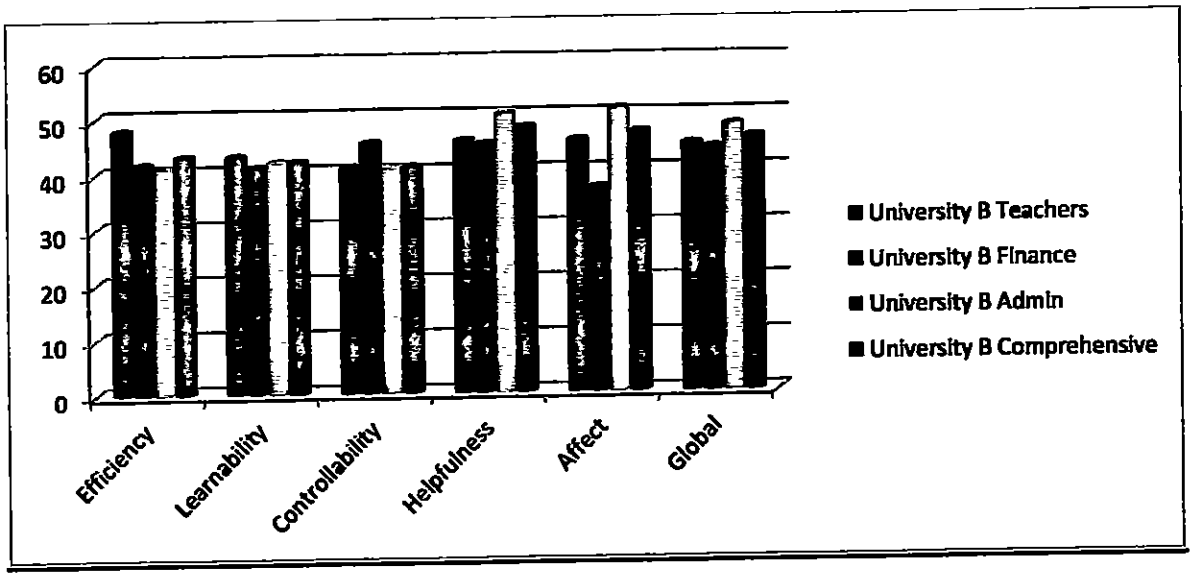


Figure 5: Usability scores for University B

Analysis: The usability of CMS was found to be very poor in both the universities as all the aspects were below 50.

4.2.2The need for further investigation: After two years of deployment, it was reported the users were still not satisfied with the software. So it was needed to conduct another usability study for CMS and identify the factors that cause dissatisfaction among the users. The third usability study for CMS was carried out in university A, and the following steps were followed in carrying out this study.

4.3 Repeat usability survey at University A

1. Carrying out the context of usability study

The first step to SUMI evaluation is carrying out the context of usability study. In this step three questions are to be followed that give three types of information; User analysis, task analysis and environment analysis.

Our users were three groups that were interacting with CMS, teaching group, finance group and administration group. They had their particular roles with the software, teachers were using it for uploading lectures, solutions, attendance, assignments and results, finances uses it for its financial purposes as billing accounting, reviewing reports etc. Administration used it for assigning roles, students information etc. These were the three users group that we selected for our study; teachers, finance and administration.

2. Plan the usability evaluation

For our study, we planned the survey mode for gathering the data. The SUMI questionnaires with the user certificate and a letter-head were sent to every targeted user. The users were planned to be approached personally in order to avoid any confusion while filling the questionnaire and to brief them the purpose of the questionnaire.

3. Gather the usability data

All the users were approached personally, were briefed about the purpose of the SUMI questionnaire and after each meeting the filled questionnaires were collected back.

4. Analyze, interpret and report

After receiving all the questionnaires from the users it was time to create a data file to be sent to HFRG for evaluation. The data file consisted of only ASCII characters. All the responses were coded and typed. The responses were coded as follow:

Agree 1

Undecided 2

Disagree 3

The answers were coded forming five subsets; each group was a block of ten questions without space. Three data files were made for each group and a comprehensive file. The sample size for teachers group was 14 and that for finance and administration were 5 each, hence the comprehensive size was 24. Thus 24 users were approached for the survey. These files were then sent via email for the evaluation. The feedback from SUMI was an output file, consisting of three types of scales

- Scale scores
- Individual Users Scores
- Item Consensual analysis

4.3.1 Results of usability study after two years: The Table 8 shows the usability results for 4 groups; comprehensive, teachers, finance and administration. We start discussing from the comprehensive group that shows the overall usability rate from all departments. According to the scale score, if any subscale has median low than 50, its usability is low, we can see clearly that, according to this rule the overall usability of project A is very poor in all aspects, from the perspective of all groups. Looking deeply into every aspect of usability we see that learnability is at the lowest overall. The projects' controllability and helpfulness is poor as well. Efficiency, too is very poor but affect is better, but again as they score below 50, the usability in affect is also very poor

Table 8: 2nd usability study for the project A in University A

Comprehensive (University A2)

Subscales	Mean
Helpfulness	44.2
Affect	46.2
Global	44.2
Efficiency	46.4
Controllability	44.9
Learnability	40.7

Teachers(University A2)

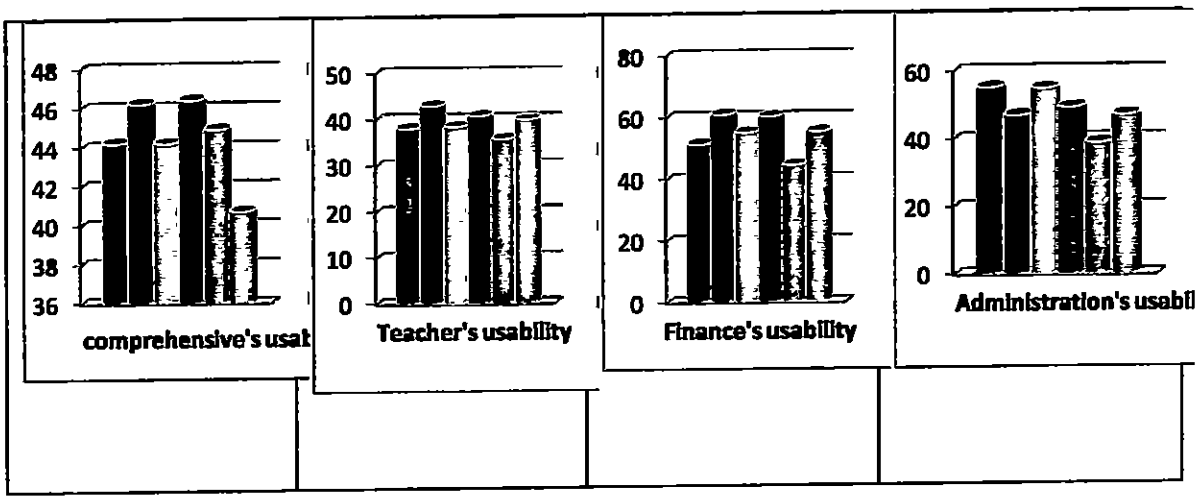
Subscales	Mean
Affect	38.0
Efficiency	42.9
Global	38.4
Helpfulness	40.7
Controllability	35.7
Learnability	39.9

Finance (University A2)

Subscales	Mean
Helpfulness	51.3
Controllability	60.9
Global	55.1
Affect	60.3
Learnability	44.6
Efficiency	55.4

Admin (University A2)

Subscales	Mean
Affect	55.2
helpfulness	46.9
Controllability	54.9
Global	49.3
Learnability	38.9
Efficiency	47.1



4.3.2The usability data analysis: Now we will, examine every group separately.

Looking from the teachers' perspective, it is shown that controllability is worst in teachers group. Controllability, affect and learnability have such low usability score that they need remedial action. Efficiency is just 42, it is also considered as very poor usability. Overall from teachers' perspective we find that the software needs remedial actions to improve. The global variable for teacher group is just 38, depicting the overall worst usability at teachers' end. Looking at finance results, we get to know that controllability and affect are very good for this group as they both are above 60. Efficiency and helpfulness are also not very bad, but learn ability is poor. The global subscale for finance group is satisfactory. Now looking at the administration group, learnability in this group again needs remedial actions. Controllability and affect are not very bad but efficiency and helpfulness are poor.

1. <u>GroupWise Usability Analysis</u>: Now we will see a group wise analysis of all these sub scales.

From the Table 6 we can see that teachers' usability is at the lowest, administration's usability is at the middle however, finance's usability is better. But overall usability of the project A is low, as we can see from the graph and Table 9.

Table 9: Group wise usability analysis

University A 2				
	Teachers	Finance	Admin	Comprehensive
Efficiency	42.9	55.4	47.1	46.4
Learnability	39.9	44.6	38.9	40.7
Controllability	35.7	60.9	54.9	44.9
Helpfulness	40.7	51.3	46.9	44.2
Affect	38.0	60.3	55.2	46.2
Global	38.4	55.1	49.3	44.2

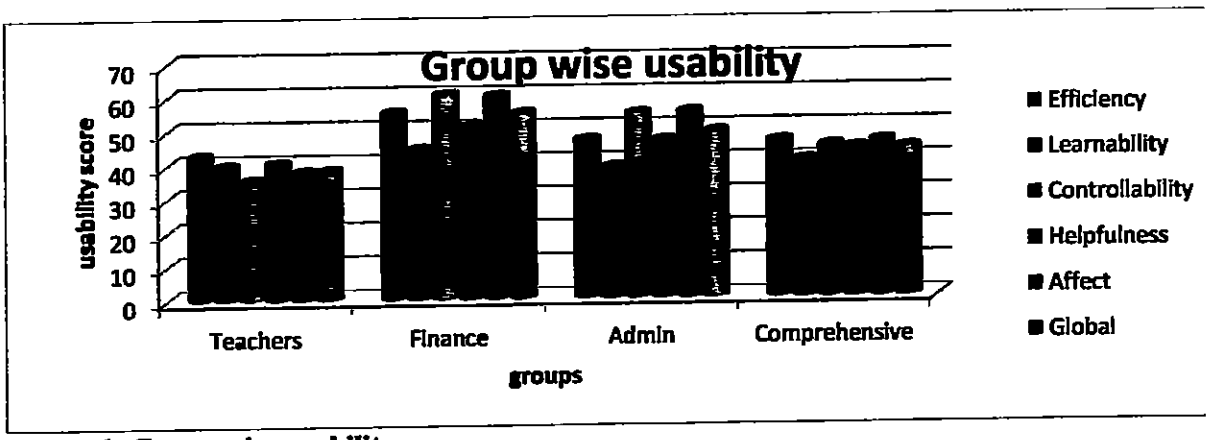


Figure 6: Group wise usability

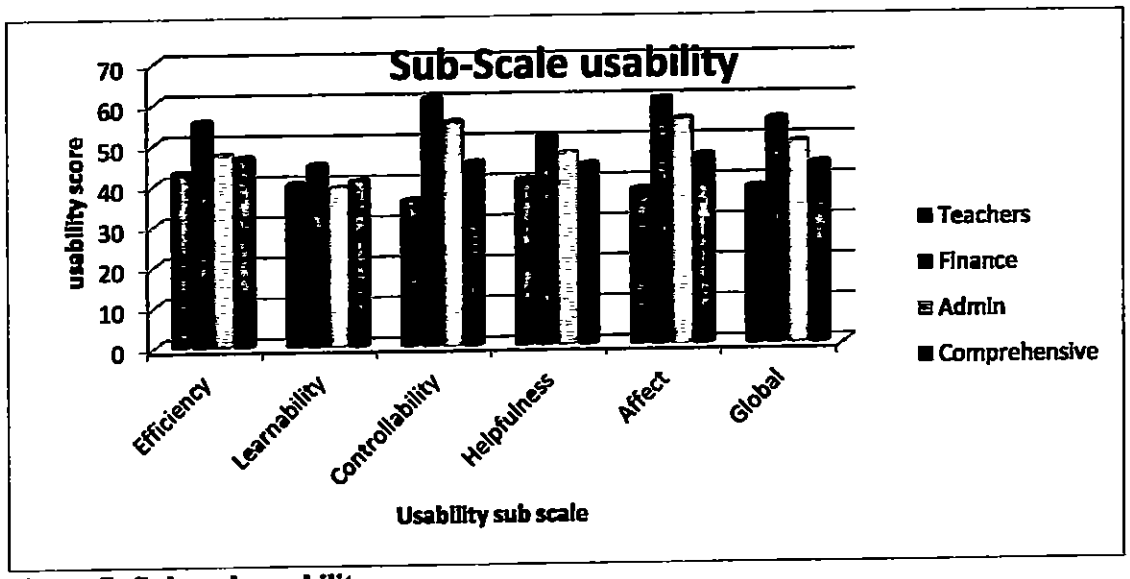


Figure 7: Sub scale usability

2. **Sub-scale usability:**

From the Figure 7 we can see that efficiency is lowest among teachers, poor efficiency is shown in admin as well. Though efficiency is better in finance but overall the efficiency rate is low. Learnability is very poor in all the groups and needs remedial actions. Controllability is very good in finance, better in administration but needs remedial action in teachers group. Helpfulness is better in finance but poor in other departments and hence overall it's poor. Affect needs remedial action in teachers group but is very good in finance.

We have noticed that varying results were obtained through different groups, only learnability was consistently low in all groups, helpfulness was not good thoroughly, but affect and controllability have amazing results, at one side they need remedial actions but on the other side they are considered good. Efficiency couldn't reach the level of good in any group and is considered very poor. All five sub-scales overall, are analyzed to be very poor according to the scale score.

4.4Comparing Usability Results with the previous results

Three usability results are compared here. First usability evaluation for CMS was done in University A, soon after it was deployed there , the results were low usability these results are shown as University A1, second evaluation was done in University B. Usability was reported as low, these results in the figures are shown as University B. The third study was again carried out in University A, after two years, and is referred as University A2.

Table 10: efficiency score for three studies

Efficiency				
	Teachers	Finance	Admin	Comprehensive
University B	47.8	41.67	41	43
University A 1	41.6	30	35.4	39
University A 2	42.9	55.4	47.1	46.4

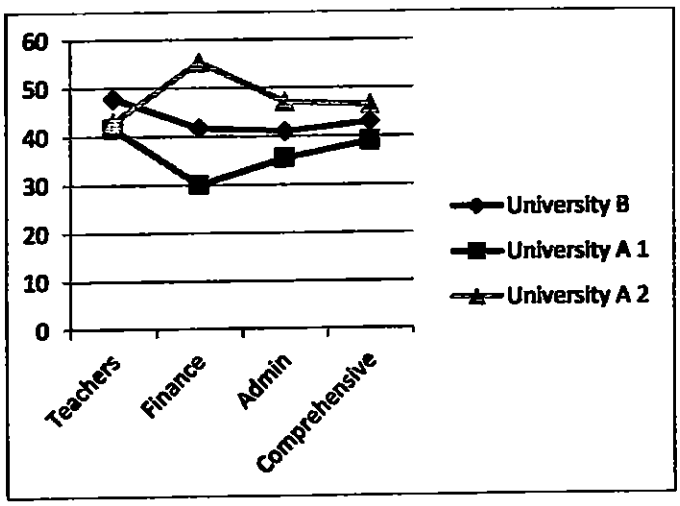


Figure 8: Efficiency score for three studies

We can see that efficiency was lowest when the software was first installed in University A, however it has improved a bit with the time. But the noticeable improvement is only in the departments of finance. No remarkable changes made in the teachers department or administration. But still the efficiency had poor usability in all the departments except finance department for University A2, and overall usability in this aspect, among all three studies is very

poor. We can't find a single case where the comprehensive efficiency was good. So it is really worthy to find out the reasons for the low usability of CMS in the aspect of efficiency

From Figure 9, we can see that learnabilty is very poor in all cases in all departments. When the project was first deployed in University A, the learnability need remedial actions, though it was very poor in University B and still it hasn't improved and needs remedial action still.

Table 11: Learnability score for three studies

Learnability				
	Teachers	Finance	Admin	Comprehensive
University B	43	41	41.9	42
University A 1	33.3	30	35.8	32
University A 2	39.9	44.6	38.9	40.7

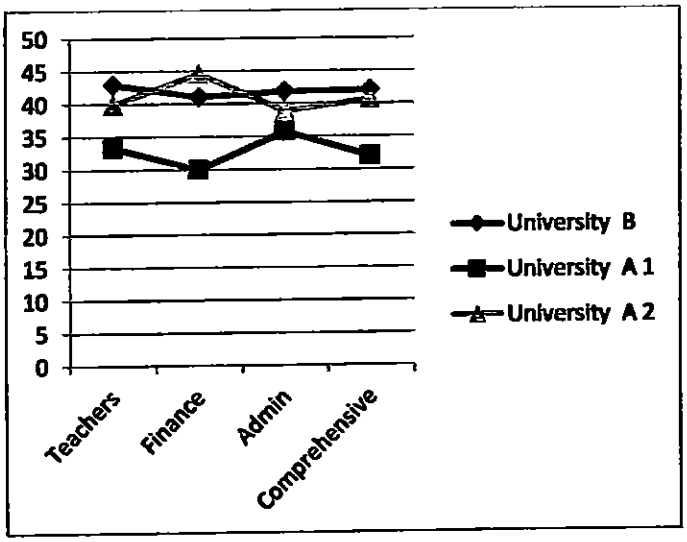


Figure 9: Learnability score for three studies

Controllability was very poor in the first study, but when the project A was deployed in University A the controllability was worst. The controllability is increased after two years but only in finance and administration departments. In teachers department the controllability is still under 40, that means it needs remedial actions as shown in Figure 10.

Helpfulness was low in University B, very poor in University A and it is still very poor in University A after two years. This can be shown in Figure 11.

Affect was very low in University B, very poor in University A and still very poor in University A2, however we can see that in finance and administration department it has increased a lot and software is good in terms of affect for finance, but it needs remedial actions for the teachers, and overall the usability of software is still very poor in this aspect, as shown in Figure 12.

Figure 13 shows the global subscale. The general usability was very low in University B, it was worst in University A in the start and it is still very low. In all three departments of the three cases, the general usability remained very poor.

Table 12: Controllability score for three studies

Controllability				
	Teachers	Finance	Admin	Comprehensive
University B	41	45.33	40.6	41
University A 1	36.3	39.6	43.3	38
University A 2	35.7	60.9	54.9	44.9

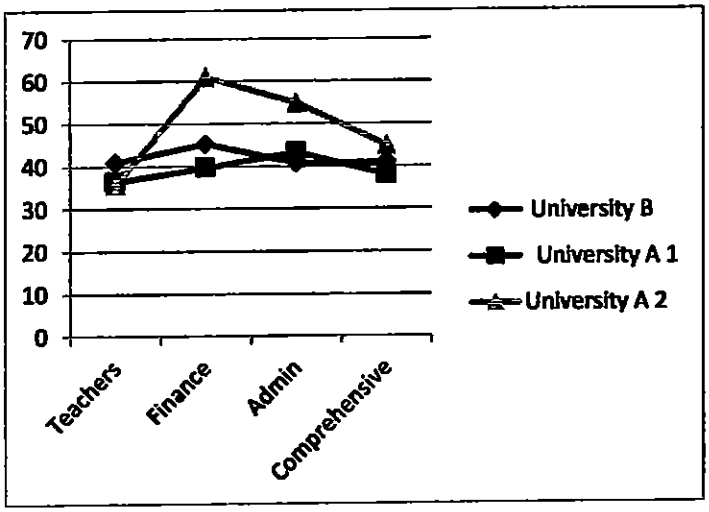


Figure 10: Controllability score for three studies

Table 13:Helpfulness score for three studies

Helpfulness				
	Teachers	Finance	Admin	Comprehensive
University B	45.6	45	50.4	48
University A 1	39.2	47.3	45.6	42
University A 2	40.7	51.3	46.9	44.2

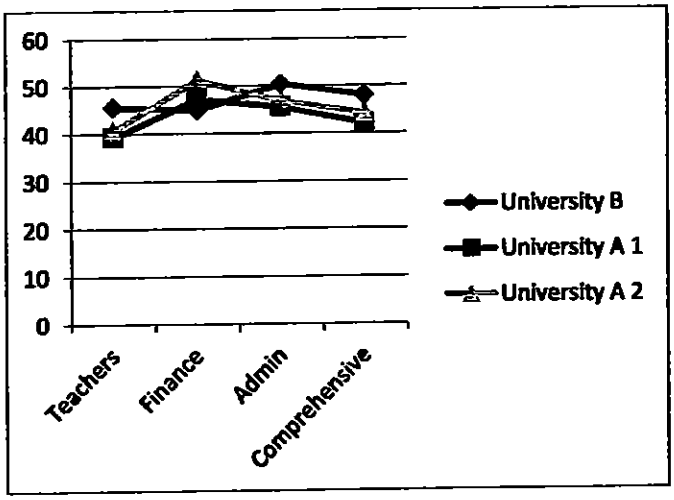


Figure 11: Helpfulness score for three studies

Table 14:Affect score for three studies

Affect				
	Teachers	Finance	Admin	Comprehensive
University B	45.6	37	51.2	47
University A 1	42.9	30.6	48.2	41
University A 2	38.0	60.3	55.2	46.2

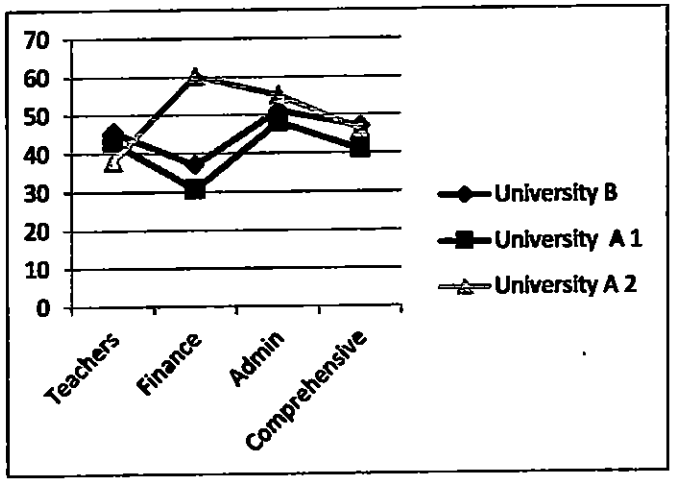


Figure 12: Affect score for three studies

Table 15: Global score for three studies

Global				
	Teachers	Finance	Admin	Comprehensive
University B	44.8	44	48.2	46
University A 1	39.6	36.6	42.7	39.8
University A 2	38.4	55.1	49.3	44.2

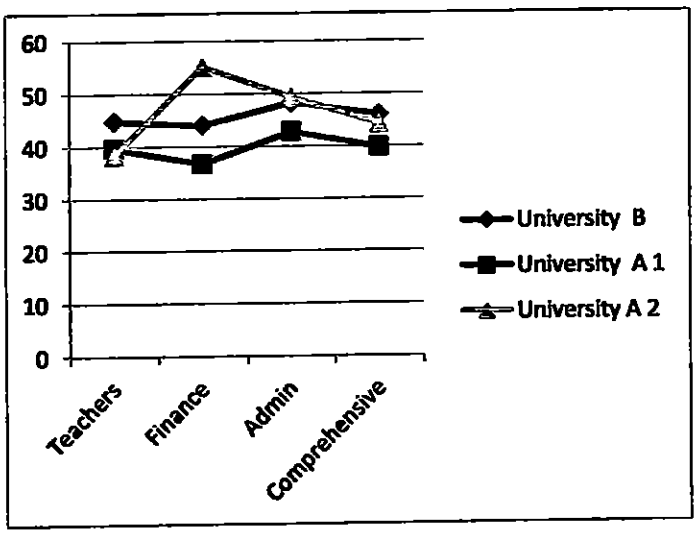


Figure 13: Global score for three studies

4.5 Probable factors of Failure

SUMI gives the probable reasons for the failure of usability in every aspect [8].

Efficiency

- Software works in an inconsistent way
- Software is not achieving the goals
- No training for users
- Improper software installation

Affect

- Inappropriate graphics and layout
- Imprecise or confused software
- customization

Learnability

- No training
- No manuals

Controllability

- Poor feedback
- Complex commands

Helpfulness

- Faulty helping functions
- Improper communication or messages by software

Once we got the usability results and the probable failure factors for those results, it was time to identify the actual factors that cause failure. For that purpose, focus group interviews were conducted. The whole process along with the research contribution is shown in Figure 14.

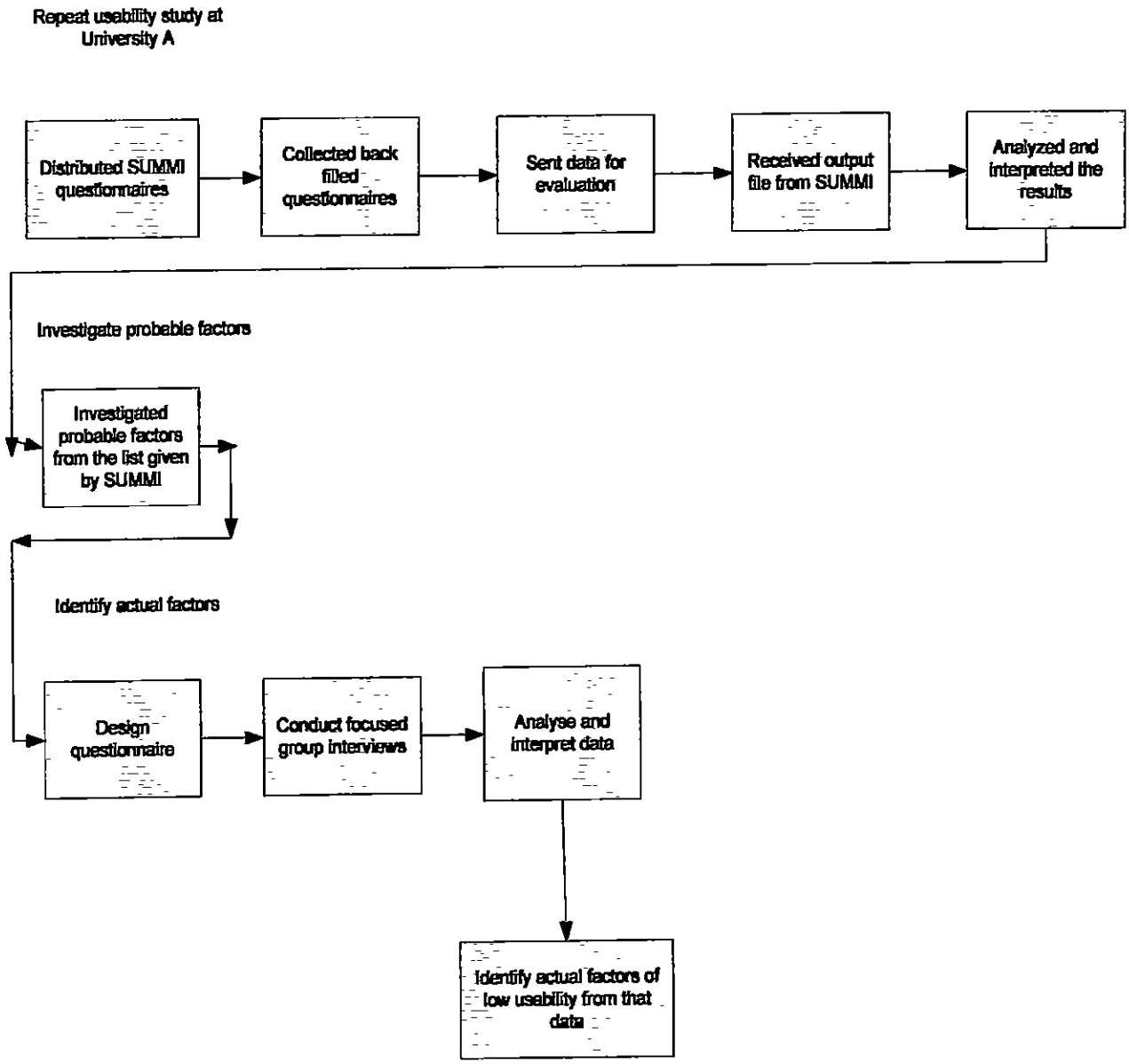


Figure 14: Thesis contribution

4.6FOCUS GROUP INTERVIEWS:

Focus group interview is a method of collecting qualitative data. It is focused in two ways, i.e. the group is focused and the topic is focused. Focused group interviews are conducted when we need to know the users perception on the topic in depth. The members of the groups are selected on the criterion that they can speak on the topic, have the knowledge about the topic, and they should bear similar traits [31, 36]. The questions asked are open ended and the interviewees should feel free to share their experiences. No multiple choices or closed ended questions are asked in focused groups rather interviewees are given chance to express their ideas freely.

4.6.1 Rationale for using Focused groups: We conducted the usability study for CMS. We got varying results among different groups. The groups we selected were, teachers, finance and administration. We have a set of possible factors that affect the usability of the system. We now want to identify the actual factors that affected the usability of the system. But, as the usability results vary among different groups, we find it appropriate to interview every group separately as the factor effecting usability may vary among different groups.

4.6.2 Focus Group Questions: The focus of the study is to identify the factors that resulted in the low usability of the ERP. We had the probable causes of the failure and had to dig out the actual causes through focus group interviews, as focus group interviews give a truthful and vast range of data. The questions were designed by the research team considering the probable causes of low usability in all five aspects that have been studied already. Literature gives the probable failure factors for each aspect. The questionnaire was made, considering that it should not deviate from the topic and the main focus was centered to the factors of failure of

the software. The questionnaire was reviewed for the readability and understandability of the users.

Questions were asked in order to find the factors of failures for each of the five aspects of usability. Starting from the efficiency, as the probable reasons for low efficiency were stated as inconsistent software, not according to goals, improper installation, untrained users, the questions were asked as '*do you find the product working for you? How?* ',' *what is the level of training by the users?*, ' do *you think the users are given tasks outside their range of competence?*', '*do you think the product is properly installed on the correct machine?*". At the end of these questions, two general questions were asked for each subscale of usability, in order to get more insight of the user's view and let them talk more about their experience on that particular aspect. For efficiency the questions were, 'what do you feel about the efficiency of this software?' and 'what are your suggestions to improve the efficiency of the software?' For every aspect the particular questions were asked according to the said failure factors and two questions in general about every sub scale; one question to know their opinion about that particular aspect of the usability and other asking about their suggestions to improve in that particular aspect. 23 questions were asked in total.

At the end of the interview two concluding questions were asked from every group to dig out any point if missed. 'What were your expectations from this software?' and 'Do you think the product is fulfilling your expectations? How or how not?' These questions proved to be very helpful as they let us know a lot more about the users' opinion about the software and helped us a lot in generalizing and analyzing results from the interviews.

The whole questionnaire is shown in the Table 16:

Table 16: Questions designed to find the causes of low usability

Results	Probable causes	Focused group questions to identify actual causes
Poor efficiency	- Software works in an inconsistent way - Software is not achieving the goals - No training for users - Improper software installation	- Do you find the product working for you? How? - What is the level of training received by the users? - Do you think the users are given tasks outside their range of competence? - Do you think the product properly installed on the correct machine? - What do you feel about the efficiency of this software? - What do you suggest to improve the efficiency of the software?
Poor learnability	- No training - No manuals	- What is your idea about getting familiar to this software? - Did you get any manuals for the software? - What do you say about the quality of documentation for this software? - What do you feel about the learnability of this software? - What do you suggest to improve the learnability of the software?
Poor affect	- Inappropriate graphics and layout - Imprecise or confused software - customization	- Do you like the software? - How do you feel using this software? - What do you say about the graphics and layout of the system? - Does the software express a personality that is domineering and inflexible or confused and imprecise? - Whether the customizing was allowed and carried out? And was it effective? - What do you feel about the affect of this software? - What do you suggest to improve the affect of the software?
Poor control	- Poor feedback - Complex commands	- What do you say about controlling over the functions while operating the software? - What do you feel about commands/ labels, feedback of the system and their organization? - What do you feel about the control of this software? - What do you suggest to improve the control of the software?
Poor Helpfulness	- Faulty helping functions - Improper communication or messages by software	- What do you think about the communication of the software? - What do you feel about the helpfulness about the software? - What do you suggest to improve the helpfulness of the software?
- Concluding questions -		- What were your expectations from this software? - Do you think the software is fulfilling those expectations? How?

4.6.3 Conduct of the Focus Group Interviews: Three focus groups were planned, each comprising of 4 members. The groups were, teachers, finance and the administration. The members for focus group were selected on the criterion that they interact

more with the software so they had more experience and knowledge to share about the software. Each group members were from the same department and performing almost the same type of tasks. The focus group interviews of the teachers was held in the staff room, and the rest two were carried out in their respective offices. During the interview all members were given the opportunity to share their views. At the start of the focus-groups the audio tape was turned on and the answers from the respondents were also noted down on the interview sheets.

4.6.4 Focus Group Data Analysis: Before starting the analysis the topic and the focus of the study were kept in mind. All the interview sheets were read thoroughly and many times to get a proper understanding of the views of the users. Moreover, the audiotapes were also listened a number of times to become fully aware of the users point of views. While reading the interview sheets the major issues were highlighted and while listening to the tape the main points were noted down as well. The transcripts of the audio tapes, interview sheets and a list of factors affecting the usability were all used for the analysis of data. The analysis was done using focus group analysis guide [41], as shown in Figure 15. After reading the transcripts, notes and listening to the tapes, the data was organized. For this, the responses were assembled according to each subscale of usability. Major quotes, key points and themes were highlighted.

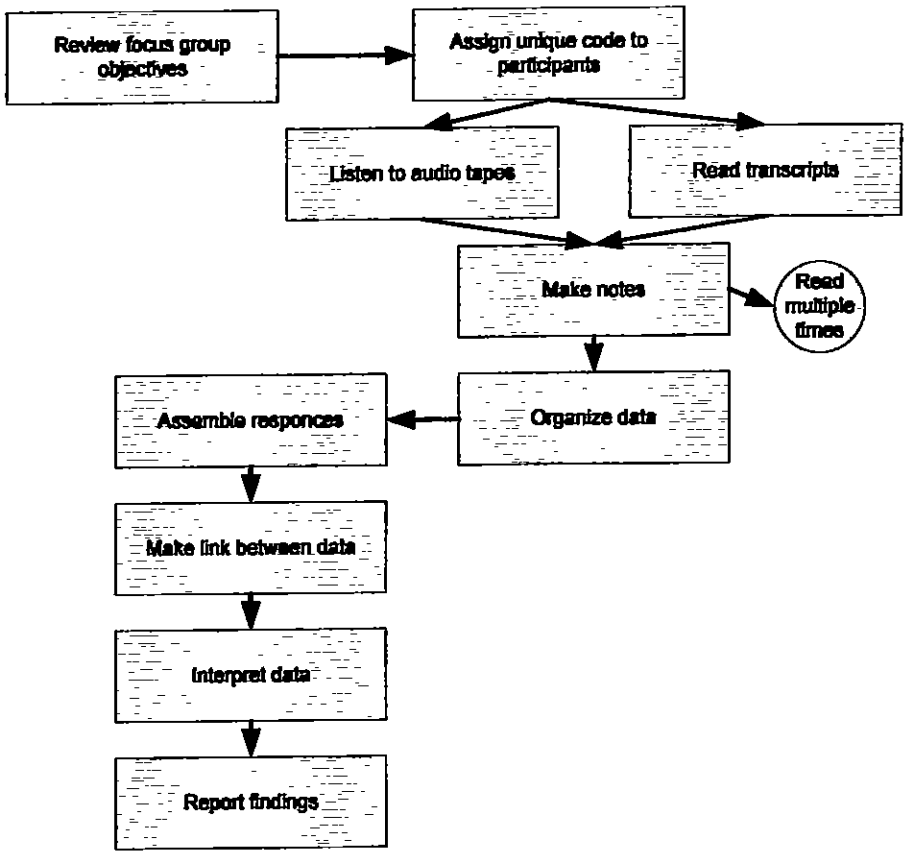


Figure 15: Focus group analysis steps

They helped in comparing the data within the group and across different groups for a particular perspective. These were then assigned a unique code, categorized for the consent and dissent of the members of the group and across different groups. After this a link was developed among the data in order to interpret it. While analyzing the data a lot of care was given not to be biased. We tried to be open to the data that confirmed our assumptions and accepted those responses that discomfort our research intuition. And after that the findings were reported. The responses from each focus group are mentioned below.

Teachers

The usability in all the aspects was very poor according to the usability results for teachers department as shown in the graph. So it was needed to find out the failure factors for all the subscales The responses from the teachers group were very vast, as they had a lot of knowledge about the software and they were all willing to share their experiences.

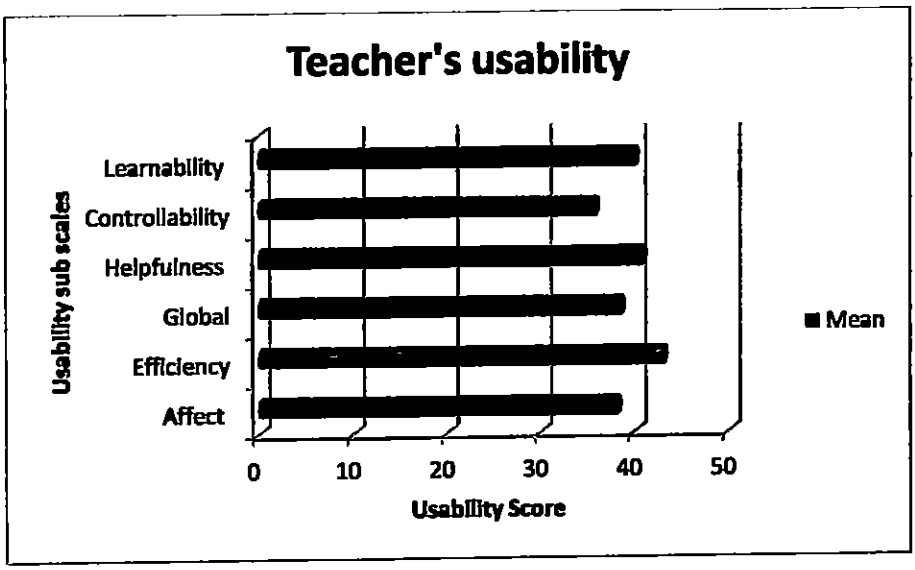


Figure 16: Teachers' usability

Reasons identified for low efficiency for teacher's group: When asked from them that if they found the software working for them, the answer was not very satisfactory, few of them were satisfied with it but majority claimed that the software was not working for them. As one of them stated, "it works fine but when you need it, it doesn't work at all, the task which system is supposed to perform it is not doing that, even the calculations are wrong'. According to teachers' group the software was very rigid. When asked about their training level, they all responded that there was no training, they tried to learn the software on just hit and trial. However, they thought they were competent enough for the tasks given. They didn't know about the installation requirements. The speed of the software was reported to be very slow by all of

them. They added, "the software is not reliable, the data is often lost, we have to manage our work manually as well'.

Reasons identified for low affect for teacher's group: They all said that they didn't like the software at all; they felt frustrated while using it. One of them even said, "I don't open the software just because it's very frustrating, and due to this my attendance gets locked at times". They added that the graphic and layout of the software are "very colorless and absurd". The software is very inflexible and confused as well. There is no consistency in the software, at some pages you have to save data by yourself and at sometimes the data is saved automatically. No customization was done for the software; we can see from the previous usability results that the usability was very poor from teachers' perspective in the last two studies as well.

Reasons identified for low control for teacher's group: All of them said that they don't feel any command over the system. The captions of labels and their organization are not appropriate. No captions or error messages are given. It gives very technical messages which the users should not know or rather they can't understand.

Reasons identified for low learnability for teacher's group: According to majority of them it was not easy to get familiar to the software or learn it. A few said that they are only familiar with those modules which they use normally. No manuals were given so nothing can be said for the quality of documentation. However learnability of the software is not very bad, but only a few tasks can be learned, trying to learn anything different is very difficult.

Reasons identified for low helpfulness for teacher's group: there are no helping functions or captions. The software doesn't communicate very properly, and very technical error messages are given that are not understandable by the user.

Concluding statement: Conclusively they stated that what they expect from the software is that it should at least do what it is built for. Software is not fulfilling actually what was expected from it.They said the main purpose of software was to facilitate teachers and users to view their data, but students still can't view it and keep running after the teachers. Another purpose of it was to maintain attendance but the software does the wrong calculations and we have to do it manually as well, so it is not fulfilling the purpose for what it was built for. As it is showing incorrect and inconsistent data so one has to manage the work manually it doubles their workload. The identified failure factors for teachers can be shown in Figure 17.

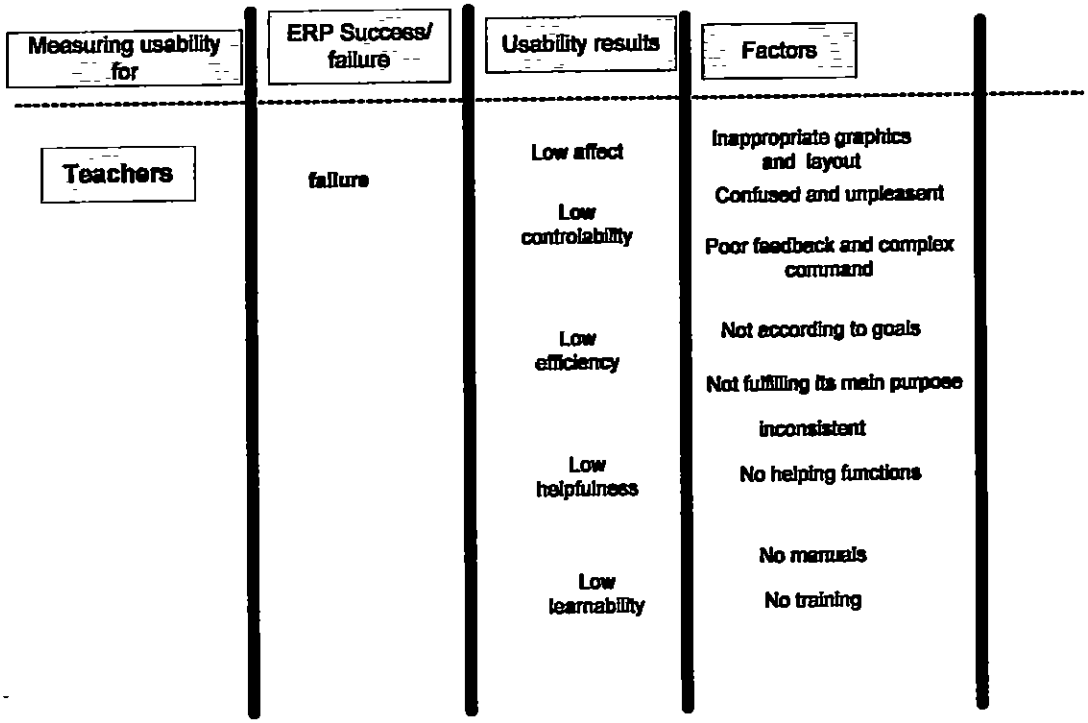


Figure 17: Focus group analysis for teachers

Administration:

In administration department the affect and controllability were reported to be fine, however helpfulness and efficiency were very poor and learnability needed remedial actions, as we can see from the graph.

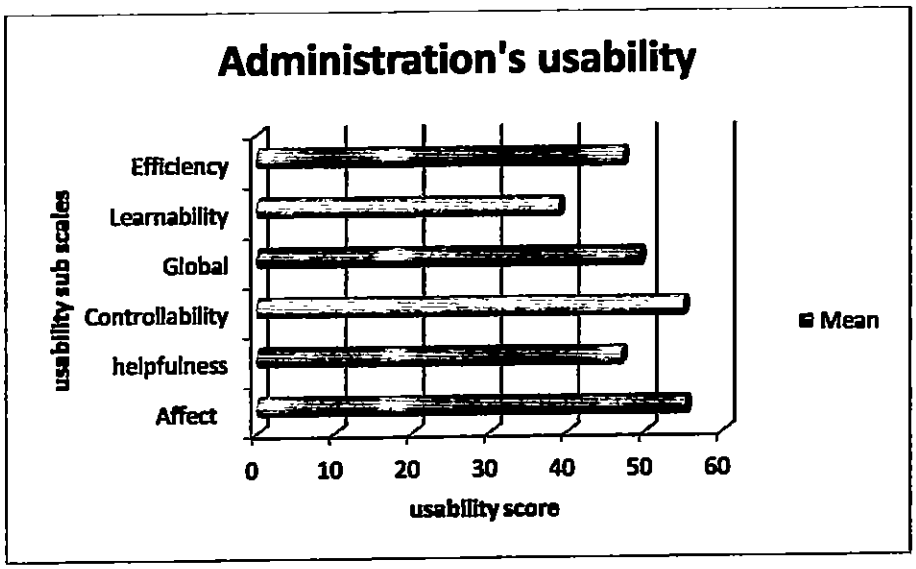


Figure 18: Administration's usability

Reasons identified for low efficiency for administrative group: When asked that if they found the product working for them, the response was 'its working is fine though not vey good'. They stated that they can't work on different modules in parallel. Reports take time and the software gets stuck if the number of users is increased. According to them the software was not efficient. The software should respond quickly as it is quiet slow. They stated that the software is not reliable; it is not fulfilling the expectations as a lot of work has to be done manually. They added that even it calculates the wrong percentage.

Reasons identified for low affect for administrative group: When asked, 'do you like the software' the answer was, 'its better than nothing'. They said that at times the software gives stress but normally it works fine. It's just that it is not easy to use. It is not pleasant in its

layout,forms are not easy as well. Color scheme of the software is not good. It is inflexible. At times, it is confusing as well, you don't know the command has been executed or not. There was no customization of the software.

However the users were not satisfied with the software but still they thought it was better than nothing. Moreover, they stated that they could learn the software and got used to of its commands with time. Its just the usage and time spent with the software that the affect was increased a little as compared to the previous affect usability.

Reasons identified for low control for administrative group: They feel that they have the control over the functions; they can easily work with them, although the organization of labels and forms is not appropriate, and the feedback is not much understandable but still it can work. They stated that itseasy controlling over the functions once you get to know how to use the commands. As they had been working on it for two years and were then familiar with many commands, so their control was increased as compared to the previous results of usability.

Reasons identified for low learnability for administrative group: The users were not trained for using the software and no manuals were given for their assistance. Manuals and dialogue box and instructions should be provided.

Reasons identified for low helpfulness for teacher's group: Users respond that, no help files are given for the software. No proper messages or error message are generated from the software. It does not communicate well.

Concluding statement: Concluding, they told that their actual goal from this software was automation. But the software is not reliable, a lot of things are still managed manually, students

don't have access. So it's not fulfilling the expectations fully. Identified failure factors for administrative department can be shown in Figure 19.

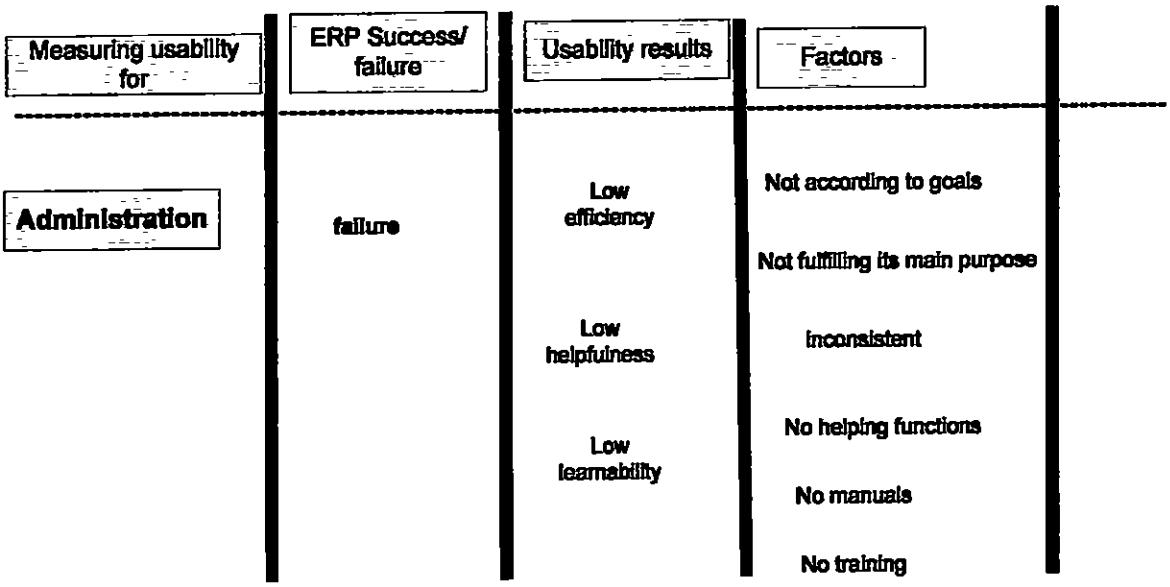


Figure 19: Focus group analysis for administration

Finance:

Overall the usability of finance department was good as we can see from the graph. The controllability and affect of the software are very good, efficiency and helpfulness was fine, but learnability needed remedial actions, as we can see from the graph. We intended to know the reasons for low usability but as it is the objective of focus-group interviews to let the users talk and share experience. We asked them about all the aspects. Later, it helped us a lot in analyzing and comparing the results. The data analysis from the finance group is as under.

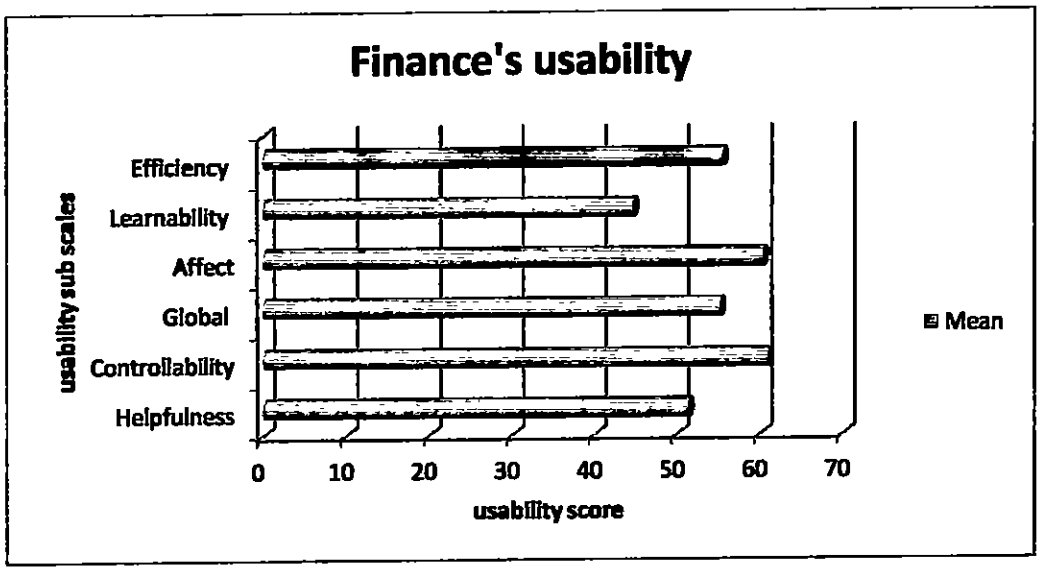


Figure 20: Finance usability

Reasons identified for low efficiency for finance group: when asked that if they found the software working for them, the response was, 'absolutely working'. They told that initially report generation was a problem and they had to do a lot of manual work with that but now it is fine and the software is fulfilling their basic requirements. Responding to the question about training level they received, we were told that they were just introduced with the software and were not trained for it. They said that competency level can't be measured as the scope is not vast in finance department; they had a little to do with the software. They deal only with the fee; the main work is basically done at faculty level. In their point of view the installation of the software was proper, it was working on proper machines and the server was dealing at the back end. They said that software is efficient but not the way it should be, it still needs improvements. Like a team for the software should be developed which looks after all the issues in the software and people don't have to depend or wait for others, to complete their work. When they were asked to elaborate how initially the reporting was not fine but now it is working for them, they told that customization took place and reporting module was added after that.

Reasons identified for low affect for finance group: Finance department liked the software; all the members of the group reported the same. For them software is easy, flexible, user friendly. However, the layout of the system is not very presentable. When asked about the customization of the software, they told that customization took place and it was only after that the software became acceptable. Before customization, the software wasn't doing anything for them and they had to manage all work manually despite having software. Customization is still going on, they added. They told that now they feel comfortable working with the software.

Reasons identified for low control for finance group: They said that no training is needed to control over the functions. And the layout of the software is good, but it is only after customization, before it the organization of labels and layout of the software was very "absurd".

Reasons identified for low learnability for finance group: They told that didn't get any training for the software neither did they get any manuals for help.

Reasons identified for low helpfulness for finance group: Not much help files are provided by the software, but overall it communicates well and gives error messages. And it is again after customization.

Concluding statement: Conclusively, they said that the main objective for getting the software was automation and to lessen manual work and the software is fulfilling their requirements. However, they added, before the purchasing of the software they had the same objective of automation and report generation but when the software was deployed, it lacked the functionality of reporting and other functions were also error prone, it was not meeting their objectives so they needed customization and now the software is fulfilling their needs. Even from the previous studies we can see that the usability study in University B and University A1

both showed poor usability for finance department. Now after customization, the usability of finance has increased. Focus group analysis for finance is shown in Figure 21.

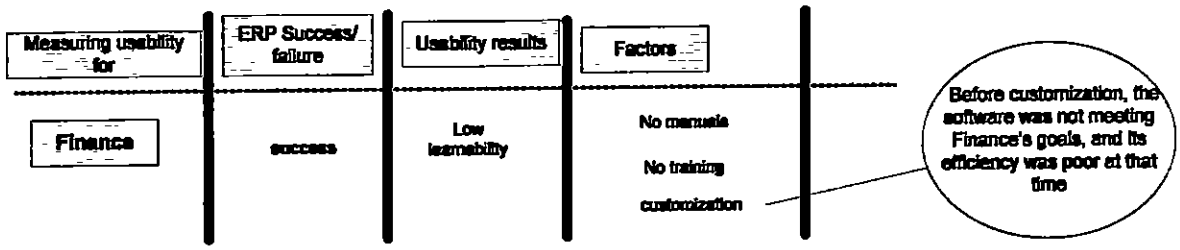


Figure 21: Focus group analysis for finance

4.7Overall analysis

As the usability of various sub scales was different among the three groups, still we could find some similarities in all the groups' findings. One thing that was noticed is that the learnabilty was very low among all the group members. Helpfulness and efficiency was rated low among the entire group. Efficiency was very poor among teachers and administrator however it was better for finance department. Controllability and affect were both very poor among teachers, on the other hand it was found better among administration and was rated as good in finance group.

However, there were a few similar responses from all the groups. As there was consent of opinion among the three groups and they were not given any training to run the software, no manuals and help files were provided for their assistance. Firstly, Administration and finance stated that they learned to manage the software on hit and trial basis. Secondly there was a lack of proper messaging and communication from software's end. We can see from the teachers' table that in previous two studies the learnabilty and helpfulness of the software from teachers' point of view remained very poor whereas from administration's table it depicts that

learnabiltyof the software was very poor in the previous studies as well, in fact it has improved a bit now. For finance, the learnabilty remained low throughout the three studies. Helpfulness in the first study was better for finance and administration, but is very poor now and in the previous study as well. From the focus group analysis, we craved that the reason for low learnabilty and helpfulness was lack of training, manuals and help files[8].

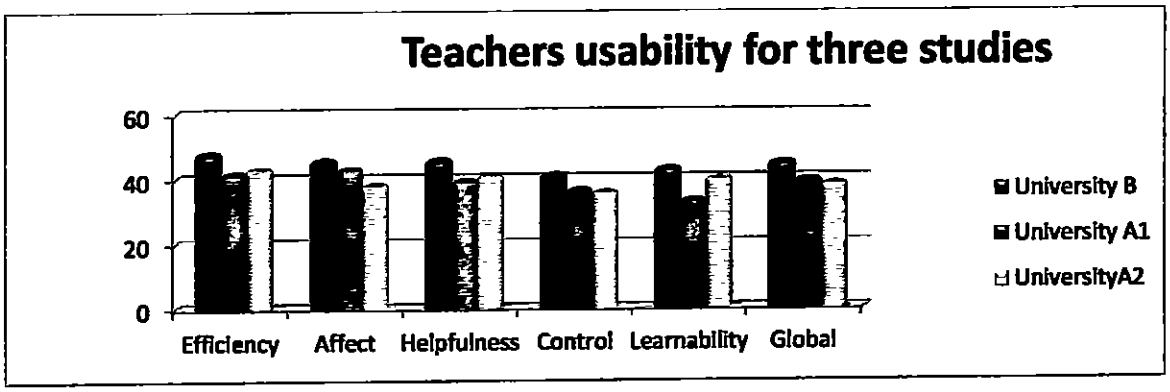


Figure 22: Teachers' usability for three studies

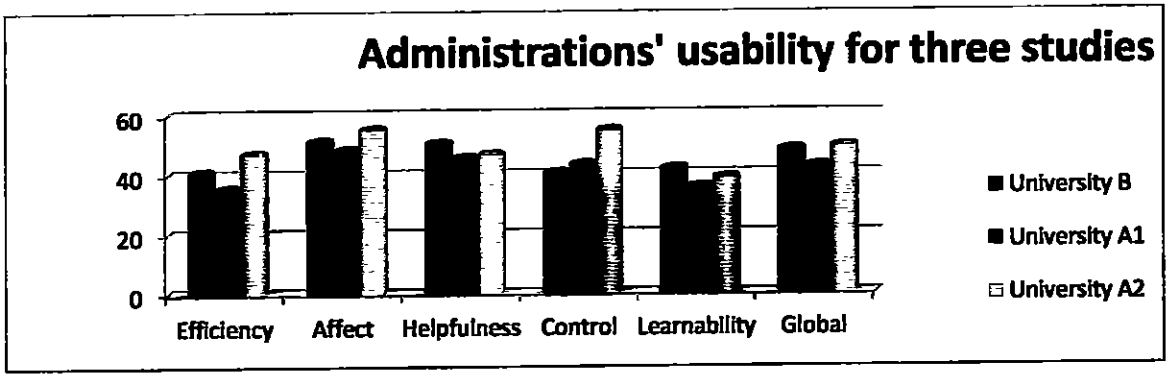


Figure 23: Administration's usability for three studies

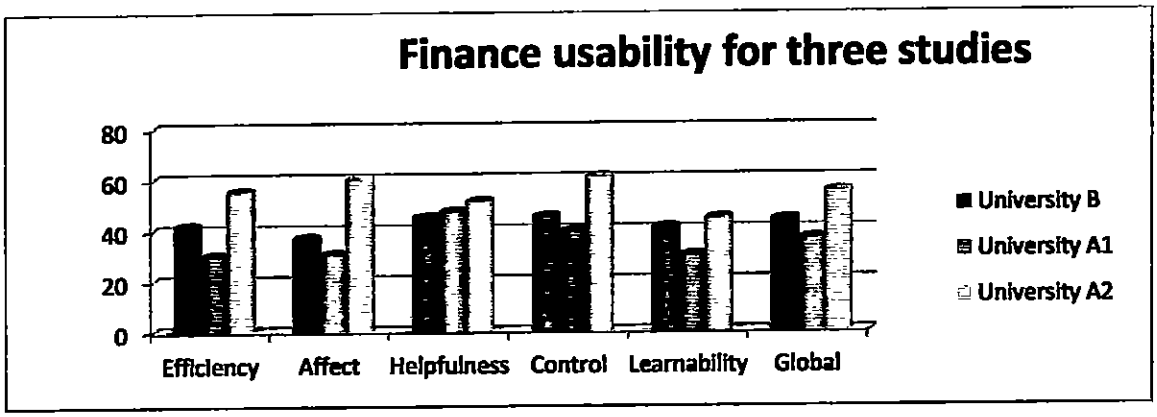


Figure 24: Finance's usability for three studies

Moreover, the results for affect and controllability also varied among three groups, teachers said that software is very confused and inflexible and they felt frustrated while using the software. For teachers it remained very poor throughout the three studies. It was low for finance and administration earlier but has improved in the latest study. From the teachers point of view factors for low affect and controllability were, Inappropriate graphics layout, Imprecise or confused software, poor feedback and complex commands [8]. Whereas these characteristics were scored high among finance and administration.

Whereas, Efficiency of the software is better in opinion of finance, but previously in the usability studies, even efficiency was very low. For the rest of the departments, efficiency is very poor and had been very poor in the previous studies as well. In order to carve out the reasons of being poor in efficiency, we got the similar answer from administration and teachers group stated that software was not reliable, it was inconsistent and the main problem was that it was not performing the functions for what it was built. On the other hand finance group voted the software is working for them now but earlier it was not functional. In pursuance to know the details they told that the basic purpose of the software was reporting,

but when they deployed it, it was not generating reports and they had to work manually. They had customized the software a lot and now it is working according to their requirements. so in the light of above detail we can say that the failure of usability among administration and teachers group is that the software is inconsistent and not achieving its main purpose and goals.

CHAPTER 5

DISCUSSION

5.1 Discussion:

From the literature, we have seen that one of the factors for software to be successful is that it should meet its main purpose [10]. However, in the literature, to the best of our knowledge, we could not find any study empirically validating this. The main thing about success/ failure of software is to know the criterion for which the software is to be evaluated for success or failure. Delone and Mcleen[23] analyzed a huge list of success criteria from literature and proposed a model by categorizing all the success criteria into six success dimensions i.e. system quality, information quality, information use, user satisfaction, individual impact and organizational impact. We then attempted to select the success criteria for our study by mapping these six success dimensions over the literature to see the strength of each success dimension. The analysis showed that quality and use were the most cited success dimensions of any project. It implies that in order to measure the success or failure of software, its usability and user satisfaction should be measured. Among many instruments, SUMI was selected for the evaluation of usability, as it claimed to measure the quality of software from user's perspective[8], hence, supporting the two most cited success dimensions simultaneously.

Therefore, we used SUMI to measure the usability of the software. Another reason for selecting SUMI was that the previous two usability studies for the project were also done using SUMI, so it could help us in comparing the results. According to[8], the user satisfaction can be further subdivided into five aspects; efficiency, affect, controllability, learn ability, helpfulness. The SUMI results showed that the usability of the software was overall low. It was very poor in two departments, particularly and was better in finance department. SUMI further provides a set

of probable factors for every aspect if the usability is low in that particular aspect, as shown in the Table 17.

Table 17: Probable factors for low usability

Low usability in a particular sub-scale	Probable factors.
Efficiency	• Software works in an inconsistent way • Software is not achieving the goals • No training for users • Improper software installation
Affect	• Inappropriate graphics and layout • Imprecise or confused software • customization
Learnability	• No training • No manuals
Controllability	• Poor feedback • Complex commands
Helpfulness	• Faulty helping functions • Improper communication or messages by software

Analyzing each aspect separately, we found that learnability and helpfulness were very poor among all three groups of users. Affect and controllability needed the remedial action, according to teachers' perception but was good in finance and administration department. Considering the efficiency of the software, it was revealed that the efficiency was very poor for teachers and administration departments; however, efficiency was better for finance department.

The actual factors affecting the usability of software were needed to be identified. But the results for all three groups differ to an extent. So, it was assumed that the failure factors for each group would be different. For this purpose, we needed to identify the failure factor for each group separately. We adapted focus group interviewing technique for identifying the failure factors from each group. Focus group interviews are focused in two ways, people for the interview and the purpose for the interview[34].The rationale behind selecting focus group was that they not only help in understanding the idea and feelings of people as well as finding the

difference of ideas among different groups of individuals [31, 32]. Hence, focus groups represent diverse opinions and ideas[36]. It was appropriate for our study as we were dealing with three different kinds of groups, each group having its own objective towards the software, and the usability results of these departments also differed, implying that the factors would be different as well.

A vast range of opinions came forward after conducting the focus groups. A combination of similar and diverse opinions was seen after the focus groups. When considered the learnability and helpfulness of the system, we received consent on response from all the three groups that they didn't receive any training or user manuals for the software. One group said that there should be trainings and user manuals; another claimed that however the software can be learnt through hit and trial and they had done so. Third group gave a very interesting statement, for them software was easy and they even didn't need the user manuals.

For affect and control, it was low from teachers' point of view only, and the reason carved out for it was the graphics and layout of the software. As far as efficiency is concerned, the results showed very poor efficiency from teachers and administration department. From both groups similar response was received that the system didn't work for what it was built for. It was not achieving its main purpose. One of the factors for poor efficiency was that system didn't achieve its main purpose. The incorrect results were produced because of incorrect data entry for formula formation at the time of development. From the two departments we got to know that the common reason for dissatisfaction was that software was not fulfilling users' goals. Here, another interesting fact revealed just because of using focused group interviews. The efficiency for finance was not low, but as we were using focus groups, we asked their opinion about the working of the software. The reply was,

"It is achieving its main purpose, our main goal was report generation, initially it didn't generate reports, we had to do our work manually, but now it is fulfilling our goals".

When asked, how it changed to work properly, we were told that customization took place and then it was according to users' goals. It was confirmed by reviewing the usability study for finance when the software was deployed initially, and it showed very poor efficiency. But now, when the software is according to the goals efficiency is improved. In the subsequent interviews it was revealed that the Director Finance was also the manager for CMS implementation and maintenance. So the customization for the finance department was done with the participation and involvement of users and according to their goals. However, for Teachers and Administration, minimal customization took place, that too, without their participation.

Weighing the opinions of all the group members we came to know that the basic problem that all the groups are having with the software is that it is not working for which it is built for. It is not fulfilling their requirements. Attendance calculation is one of the main purposes of the system, but it even calculates it wrong and the purpose of automation is not met, as the users still have to work manually. Anyhow, the further interviews revealed that wrong calculations were a result of wrong data entry for formula formation at the time of software development. Even the finance department stated that the software was not fulfilling their goals when initially deployed, and at that time the usability of the software was very low. But now the software is customized according to their requirements, and thus fulfilling their goals and we can see the efficiency of the software has improved a lot in finance group. **This is very clear evidence that for software to be successful it must meet its main purpose.** As [42]says, the software project success can be measured in terms of the degree to which it meets its main purpose

Other aspects of the usability were excluded from the results because the usability result and factors were not consistent for them. As usability was low but still the administration said that they could learn the software on hit and trial, and they could learn it on using. Finance had almost the same answers. Affect and controllability was different among different groups, the only thing that was very much emphasized by the users was the performance of software according to their goals. The results of usability and the perception of the users vary among all the aspects. Only this aspect was consistent and proved to us with the failures cases of efficiency where users state that software does not meet the requirements and one success case, where after customization, software works according to the requirements.

Hence we developed a relationship between user's goals, as one of the failure factors and ERP failures. If the software is not achieving its main purpose and goals of users it lowers the efficiency of the software. Low efficiency refers to the user's dissatisfaction with the software[8]. If the users are not satisfied with the software it is a failure[8]. This can be shown diagrammatically in the Figure25, below

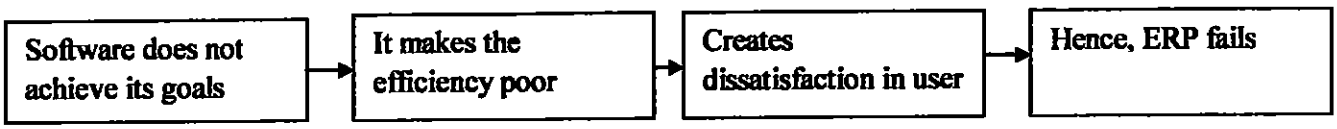


Figure 25: relationship between stakeholders' goal and ERP failures

CHAPTER 6

CONCLUSION

6.1 Conclusion

In our research we have done the usability study of a software, that was in use by an organization. We compared the usability results carried out by us, with the previous usability results of the same software. We had a list of probable factors that could cause the poor usability. We then identified the actual factors out of those probable factors by conducting focus group interviews.

There are many reasons for ERP failures, one of the major reasons is that the softwares are not fulfilling users' requirements or are not performing what they were expected to do. We then took a case study that was reported to be a failure. We conducted its usability study. The results showed that the usability was very poor in two departments and was better in one department. For this we conducted focus group interviews, to get an insight of the department wise views on the software relating the usability failure factors. Focus group interviews, not only provided us with the actual reasons of failures, but also validated the usability survey results. As the aspects of user satisfaction having low usability according to SUMI results, were aligned to the problems highlighted during focus group interviews regarding software.

The focus group results revealed that one of the major reasons that the users were not satisfied with the software was that it was not doing what it was expected to do. On investigation, it was established that this was due to the misconfiguration of software rather than the inherent software flaws. Furthermore, it was also established that misconfiguration was a direct result of low user involvement during customization and implementation. Ultimately, the usability of the CMS was very low in those departments where users' involvement was not assured during customization. For them, the software was not according to their expectations.

When contacted that group where usability was high, we came to know that they were satisfied with the software only after the customization; earlier the software was not achieving its main purpose. It can be seen from the previous usability results that usability was very poor initially for this department. Furthermore, it was realized in the subsequent interviews, that the Manager CMS Implementation and Maintenance was also the director of the department, where usability was high. His personal interest ensured the participation and involvement of users and the customization for that department was carried out according to their goals, resulting in high usability of the software.So we concluded that if the software is not fulfilling the goals of the users, it will create dissatisfaction among the users. For a software, to achieve users' goals, proper user involvement and participation during the customization is necessary. User satisfaction is used as success criteria for the information systems. The results of the study are summarized as follow:

- For two departments, users' involvement and participation during the customization and implementation was not ensured. Therefore, software was not configured according to the requirements of some users. Due to this misconfiguration, the results produced by the software were not fulfilling the expectations of users. Therefore, the users did not find the software working according to their goals.
- However, for one department only, the users' involvement and participation was ensured at the time of customization, to make the software according to users' goals. This was made possible because of the personal interest of Manager CMS implementation and maintenance who was also the Finance Director.

- As the software was customized according to the needs of that department, the usability of the software was high in that particular department and the users were satisfied with it.
- The study concludes that in order to make the software according to the needs of users, their involvement and participation is very important.

Our contribution is to identify a relationship showing how an ERP that is not fulfilling users' requirements is a failure as shown in Figure 25. Through our study, we have filled in the gap in literature by empirically finding that if software is not customized and implemented according to users' goals then it is a failure. In order to customize the software according to users' perspective, their involvement is necessary during the customization and implementation process. We have done this by studying the same software at three different departments.

6.2 Answering the Research Question

The research question that our research intended to answer was

What are the factors that cause low satisfaction among users?

We have got to know the answer through a case study and a detailed literature review. As it was discussed in the second chapter that if the users are not satisfied with the software, no matter how effective the software is, it is problematic [8] Moreover, literature emphasizes that the software is said to be successful if it achieves the main purpose [10].

From the case study, we have seen that software was reported to be a failure, we measured its usability, and among other factors efficiency was very poor in all groups. And the

main reason reported by the users for their dissatisfaction with the software was that it was not achieving its main purpose and their goals were not fulfilled by it. This is the top-down approach. But, if we see it from bottom up view we can find a very clear relationship between users' goals, as one of the failure factors and ERP failures. If the software is not working properly according to the requirements of users, it lowers the efficiency. If the efficiency is low then the user satisfaction is low, if users are not satisfied then the software is a failure [13].

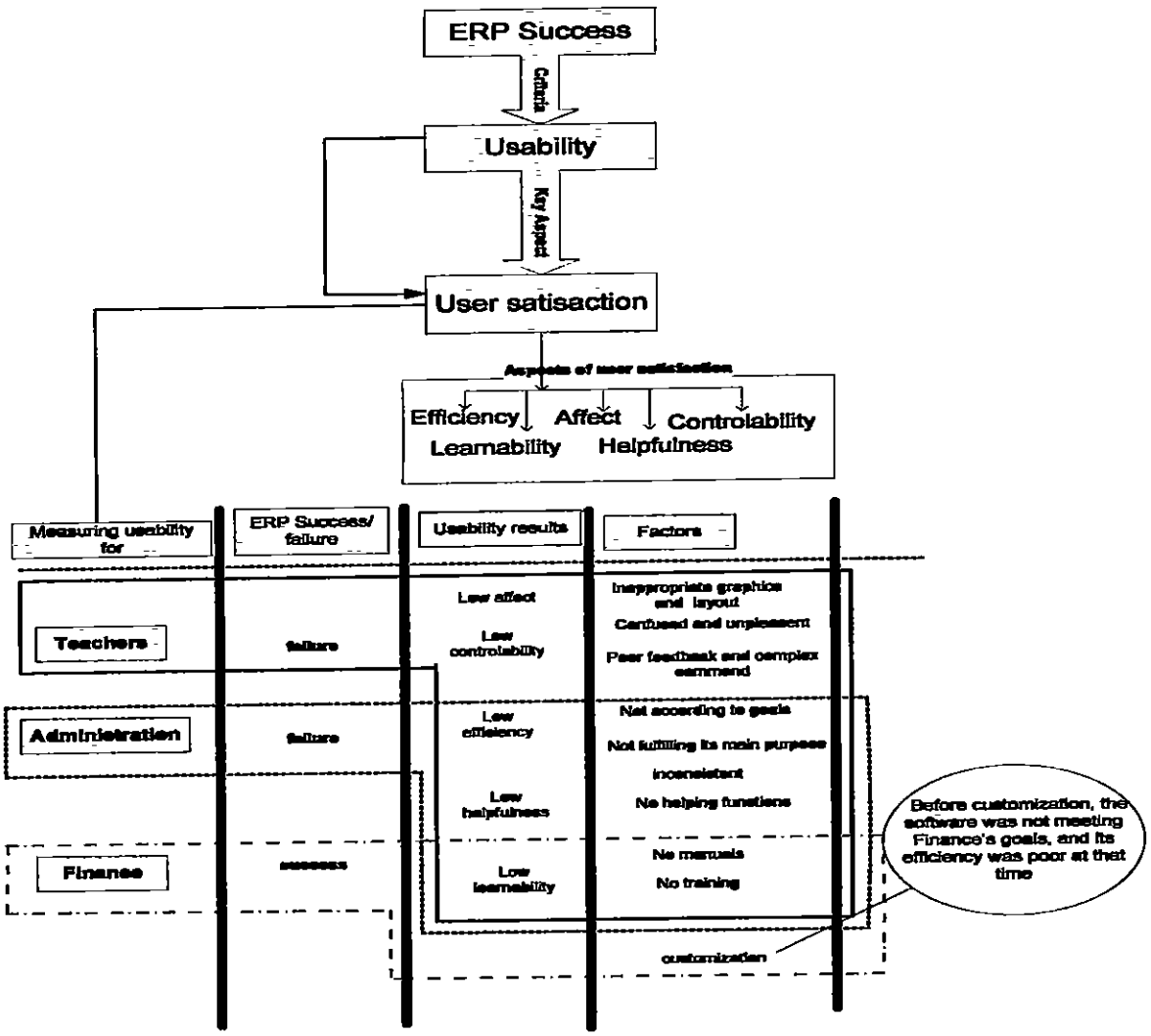


Figure 26: Research overview

6.3Future Work Recommendations

In future a gap analysis study can be carried out to further validate this relationship. The study can be conducted by identifying stakeholder's goal at first. The reported problems for low usability can be aligned with user goals and then again measuring the usability.

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APPENDIX

SUMI data file for comprehensive group

SUMI data for CMS with many fields per record for all staff created 27/03/2012
1231123211 3212312123 1231231233 2321231231 2332121212,for lectures uploading,2,3,assignment submission,interface
1231113111 1331313131 2131331331 3133111132 2313111311,0,2,3,hiding contents with a click,navigation
1321113112 2222322221 2132231333 3322111122 2313112222,"uploading lectures, solutions, attendance",2,4,uploading files and assignment submission,forums
3111111113 3111113113 3133131111 3111133133 1213231311,saving records and seeing results and biodata of the students,1,4,"preserving records in proper way, this software is very helpful for me",0
3111111113 3111113113 3133131111 3111133133 1213231323,saving records and seeing results and biodata of the students,1,4,saving record in proper way ,0
3111331033 3211233231 3112321323 1313201131 3221312123,data entry,3,4,result compilation,"software is good enough for the purpose weuse it, the problem is with net speed as well as the system"
3112331233 2112132313 2212313223 2311233213 2221123123,attendence and assesments,3,4,it is easy to use,speed
3112331323 3111233311 3213213112 3213233212 3132323133,"lectures,assignment upload,assigning roles",1,2,activity on/off,nothing
1331113111 1331313131 1331031330 3131111131 3130001011,attendene,1,4,reports,all
1111131131 3131311311 3111111113 1131113113 1311111133,assessments and attendence,1,4,accessibility,HCI
1133113311 3331313311 3111131331 3133311133 3313311111,uploading files,1,4,online submission of files,interface,
1113232133 3132332221 3222113331 3131331113 3313322321,0,1,4,0,GUI
2111331213 3111221113 2211313132 1311332223 2121132221,"attendence,result",3,4,result compilation,attendence
2113333313 3211223121 0112311233 1312333333 1232332123,"data entry, students attendence and marking",3,4,user friendly,speed
3112321333 3131123332 3113112113 1211322313 2111323321,"roll assignment, assignment uploading",1,4,"telling assignments,uploading lectures, blogs for discussion","look and feel, version upgradation"
3111111113 3111011311 3313313111 1311113313 3121323131,saving record and see the result and biodata of the student,1,4,preserving record in the proper way,0
1111132121 1232211123 2323231231 3132111121 1323312113,admininstration,1,4,all,"student information, exam system"
3111331233 3113332111 1033313313 0311333121 1321333133,for related issues,1,3,decreased workload,report features
3111331233 3113332313 3313313313 2311333121 1321333133,review reports,1,4,it has minimmised the work load,a lot of improvement is required on report features
3233131231 3122332111 3313123321 1111111311 1111133131,financial module,1,4,financial module,in reporting module

3112321333 3131123332 3113112113 1211322313 2111323321,"roll assignment, assignment uploading",1,4,"telling assignments,uploading lectures, blogs for discussion","look and feel, version upgradation"
3111111113 3111011311 3313313111 1311113313 3121323131,saving record and see the result and biodata of the student,1,4,preserving record in the proper way,0
3111331233 3113332111 1033313313 0311333121 1321333133,for related issues,1,3,decreased workload,report features
3233131231 3122332111 3313123321 1111111311 1111133131,administration,1,4,0,reporting module

Sub- scale scores for comprehensive group

44.21081	46.44529	46.24903	44.2417	44.96077	40.7031	(Mean)
14.64914	14.3781	16.78648	14.9456	16.39634	16.17929	(Standard Dev)
72.92312	74.62636	79.15054	73.53507	77.0976	72.41452	(Upper Fence)
15.4985	18.26422	13.34753	14.94833	12.82394	8.991687	(Lower Fence)

Appendix A

Individual user scores for comprehensive group

Global	Eff	Aff	Helpf	Contr	Learna
27	36	28	37	26	32
12	17	14	11	11	20
20	23	25	28	30	30
36	42	39	38	37	34
37	42	39	38	40	41
42	58	39	52	32	56
56	55	63	60	57	61
65	62	61	69	53	51
21	21	22	18	20	21
44	42	42	43	55	29
33	30	17	36	22	29
41	57	43	24	46	39
54	60	62	54	37	53
50	57	37	62	32	64
58	56	52	54	55	56
62	50	71	63	58	37
28	20	38	33	33	34
49	55	60	43	63	57
57	62	63	55	63	62
49	55	55	42	66	11
58	56	52	54	55	56
62	50	71	63	58	37
49	55	60	43	63	57
49	55	55	42	66	11

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