PSYCHOLOGICAL PROBLEMS WHEN IMPLEMENTING AN INFORMATION SYSTEM

— USER ACCEPTANCE

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Abstract

Many problems related to information systems implementation are psychological rather than technical. It is necessary to adapt good enough to the current situation in the business to avoid bad user reactions. One of the most important quality factors of an information system is user acceptance. Information system implementation projects have been historically bothered by failures for which user resistance has been identified as an important reason. A poor adaptation of old data may cause user frustration. But the most important problem perhaps is how to deal with the people and know their psychological constraints involved in the system change, their lack of competence And also their reluctance to accept the new system. A poorly designed system interface also becomes an obstacle for the users and they would become more unwilling to tolerate it. This study presents a theoretical and empirical understanding of user acceptance during the implementation of an information system and provides suggestions to an individual and also organizations for tackling such resistance and enhances user satisfaction.

Keywords: User acceptance, cognitive psychology, Interaction design, usability, Psychological constraints, Implementation.
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PSYCHOLOGICAL PROBLEMS WHEN IMPLEMENTING AN INFORMATION SYSTEM

1 Introduction

1.1 Background

Informatics is a business enclave for ideas, concepts, regulations, business methodologies and lastly calibration of people and their techniques. Each activity stated above involves an individual or group of people and organizations at various places. This is exactly the point where people constitute the underlying psychological problems, which is the focus point of our thesis. The reason for us to take up this pivotal point is that psychology plays an important role when it comes to people and organization. For example, one survey (Gladden 1982) estimates that 80% of information system development and implementations determined are never completed, or the resulting end user system is never used. According to the Standish Group (1996) only 18% of all projects are delivered on time and within their calculated budget. Since our field of study is adhered to information technology and the issues placed in the field, we have chosen this topic.

To implement a system can cause a number of problems. At first the new system has probably been developed to introduce new functionality that requires additional data in the database. The old system does not contain such data, but other valuable data that must be secured by the new system (A. Dillon, 1996). Therefore, it is necessary to transfer data from the old to the new system and decide how to handle missing values for old data in the new system (Markus, 1983). A poor adaptation of the old data may cause user frustration. But the most important problem may be how to deal with the people involved in the system change, their (lack of) competence and their reluctance to accept the new system (Morris, 1996). Some of them may have had an important role connected to the old system and may fear that their importance for the business can change. Other employees may be hesitant because they are afraid that they will not be able to handle the new system with increased functionality (Agarwal, 2000; Venkatesh et al, 2003). The work tasks and roles for individuals may change and that may create a resistance towards the system implementation.

There are many studies going on in the field of information technology for implementing information system. Still no one has identified a clear solution, especially to reduce the bad feelings from the users and enhance the user acceptance of the system (Hirschheim and Newman 1988). In Russia, a research has been carried out by focusing on psychological and ethical aspects during the process of implementation in order to enhance user acceptance and reduce user resistance. (cf. Brooks, 1975; Boehm and Papaccio, 1988; Jeffrey, 1987). This study is to explain user acceptance to system related change prior to implementation of the system from the theoretical perspective with empirical validation.
1.2 Statement of problem

Many problems related to information systems implementation are psychological rather than technical. It is necessary to adapt good enough to the current situation in the business to avoid bad user reactions. One of the most important quality factors of an information system is user acceptance.

In our thesis, we aim to minimize the known psychological aspects involved within the organization while implementing an information system and also focusing the psychological and ethical constraints faced during the entire life cycle of the information system and providing guidelines to minimize the complexity of the issues faced.

The reason for us to study each personnel’s work from different views is that various factors influence as well as bind together the works of the others in order to give a single intended information system.

This thesis deals mainly on the user acceptance of an information system. The Factors like psychology, ethics, nature of work, resource management, etc are involved. So, it is highly essential to probe into the above said regions to achieve a greater goal and provide the necessary solutions or guidelines. Quite a few numbers of previous researches have been done in this field by looking from different perspectives.

1.3 Purpose of study

Implementation of new functionality against the old functionality has always been the basis of development of information systems since their inception. Owing to the current trends in the development of efficient and modern information systems, problems of various sources and types have surfaced and they prove to be quite formidable to tackle with. One such formidable challenge is the psychological factors involved when a new information system is implemented and the radius of the consideration is limited to the people, ethics involved in the entire span. To do so, we expect our thesis result to create an understanding the character of knowledge to produce effective suggestions and guidelines in order to help practitioners and users.

1.4 Research questions

Main research question

How is it possible to create an implementation process to reduce bad feelings from the users and enhance user acceptance of the system?

While answering the above question which is the axis of the research, one also needs to answer the following questions which answer the issues that arise at sub-tropic levels of the undertaken study. Some of the questions are as follows,
Sub-questions

Is the term ‘user’ only related to the end-user?

Why do users experience bad feelings during the implementation process?

What aspects are essential to minimize the resistance and enhance the acceptability of the system?

Why cognitive psychology and interaction design are needed in order to increase the user acceptance?

According to the above stated research questions, they clearly guide the researchers to proceed with further steps and to resolve the problems. The main motto of this research is to enhance user acceptance and also to reduce the bad feelings of users while implementing the information system. So this research question is congruent in relation to the stated research purpose.

1.5 Target groups

For any research, the appropriate theme is to help a certain person or an organization, they are known as target groups. An individual or any organization who is implementing an information system is to be a targeted group. The benefit of the thesis spreads wide apart from just being a scholarly article. Various entities like academics, students and researchers are also benefited by the paper.

Academics is a special concern as education of software development and informatics is quintessential to the field of Systems Development. The core purpose of the thesis is to find out the psychological problems and the measures to tackle them. The academic personnel can incorporate these ideas into the conventional study of issues that are related to software development and informatics. This action gives a basic knowledge or awareness of issues of such nature.

The direct benefactors of academics are the students who are educated or trained by academics. The reap what the academics have cultivated through their education, the students at a very basic level get to know what the people involved in informatics and software development face while implementing information system.

So once they develop into professional software developers they will consider these issues as integral parts of the development cycle.

Researchers can easily enhance what has been done already in order to achieve better results and sophistication. The field of informatics and those who are benefited by it grow mutually. Only a researcher can throw light on this field and its related issues by continually refining the previous works and provide better results. Thus we hope that our results will give better suggestions to the developers as well as the users.
1.6 Delimitations

Many problems related to information systems implementation are psychological rather than technical. The main thing left out in our research is the technical aspect and their subsequent fields of interest and studies.

1.7 Expected outcome

Implementing an information system is an emerging concept and it will become progressively essential for an organization. The purpose of this survey is to understand the problems that are faced in the field of informatics. To do so, our expected results are suggestions to tackle the bad feelings of the user and to enhance the user acceptability of an information system in a psychological manner. We also intend to give guidelines based on the surveys that keep the system with better understanding and knowledgeable without any problem.

1.8 The authors’ own experience and background

We have experienced a similar situation of sorting out the same kind of issues and providing solution for a scientific paper titled “Psychological Problems When Implementing Information system” on a diminutive scale. So, speaking of experience and pre-knowledge, the above titled paper has fostered our skills in analyzing data for the intended study. During our bachelors program we were taught various issues alongside conventional software development methodologies, but it lacked the Psychological problems which is our core theme. One way or the other it kindled the need to study such issues related our field of professional studies. None of us have had some sort of experience as professionals in the field of informatics. We solely depend on scholarly articles, scientific research papers and electronic media for research gathering.

1.9 Structure of the thesis

Introduction In this section, the background and purpose of the research is presented followed by the research question and the arguments for their relevance in connection with the informatics. We also report the own experiences and the result that we expect from the research.

Research Design In this chapter, we describe the strategies for choosing a method. Data analysis and collection procedures are presented in this section.
Theoretical Study

In this section, we present the key concept and subject area relevant to the research. Then in the theoretical framework, we analyze and discuss the subject areas such as system development, interaction design and cognitive psychology. Later the result for theoretical study is presented.

Empirical Survey

The purpose and selection of empirical survey method is presented. Interviews are conducted and the details of the interviews are discussed in this section.

Result

In this chapter, we compare the theoretical and empirical results. The comparison is analyzed accurately. Then a brief summary of result is presented which answers the research questions.

Conclusion

In this chapter, the whole study is discussed and the conclusions are presented. Then a section discusses the implication of the result for subject areas and evaluations of results are presented. Finally, this section gives the possibilities to generalize the research, ideas for continued research and speculation for the future.

Figure 1 Structure of the thesis (own)
2 Research Design

2.1 Research perspective

There is a couple of research perspectives used to design the scientific method. One is positivism and the other one is hermeneutics. The purpose of this research is to create an understanding the character of knowledge. We believe that hermeneutics is a most related perspective to our research because it focuses the knowledge understanding and interpretation of a meaningful approach (Gilje & Grimen, 1992).

Language, text and manmade things are coming under the hermeneutics view and moreover our knowledge is communicated through language (Nordin, 1995). The research outcome could be individual and it contains a subjective component that perhaps examined with the positivistic view where the subject components are an essential feature for validating the research outcomes. The pre-knowledge we have is more important for the research and it is unique and also part of our research.

Hermeneutics view existing today could be expressed in the thoughts of Emilio Betti. He argues that only text cannot be the foundation for knowledge interpretation. The potential thing is about ideas and thoughts that create and appear in the form of goal for the people to inspect (Benediktsson, 1989; Christensen, 1994).

As we are describing the efficiency, acceptability and such intrinsic qualities of the issues it comes under qualitative analysis i.e. hermeneutic perspective. The intrinsic appeal of the issues is the main aspect of the thesis. Factors like number of people, resources, quantity of product produced are not looked after. Each person’s role, capability and the organizational ethics that binds in with the work are analyzed and dealt with.

Qualitative research has qualitative data and it has intrinsically created interviews, observation data (field work), understand and explain the phenomenon, texts and documents and the researcher’s impression and reactions. Qualitative research methods are designed to help researchers to understand the people and the social and cultural contexts within which they live. (Kaplan and Maxwell 1994) argues that the goal of understanding a phenomenon from the point of view of the participants and its particular social and institutional context is largely lost textual data are quantified.

Hermeneutics could be handled as both an underlying philosophy and a separate mode of analysis (Bleicher, 1980). This approach is a way in which expressing analysis by means of textual data. Qualitative perspective is needed in order to look into the problems faced as more than one person and systems are involved to give obvious solution. Therefore, more than one ideology and each person’s point of view and usability is involved. If we try to study it from a single point of view, we would be missing the views of the others either in technical or psychological aspect. So we resort to qualitative approach to analysis.
Likewise it has different forms of hermeneutic analysis from critical hermeneutics to pure hermeneutics. (Bleicher, 1980; Palmer, 1969; Thompson, 1981). In information systems hermeneutic approach is used and then the object of interpretive effort becomes one of attempts to make sense of the organization as a text analogue. For example, in a company, people may have confused incomplete, cloudy and contradictory views on many issues. Therefore the hermeneutic analysis is trying to make the sense of the whole and bring relationship between the people. (Boland, 1991) research article in an information system is a perfect example. In this, Boland exploits hermeneutics to make analytical readings of the four experienced managers and give meaning to the output by a personal evaluation information system. Hence, for our research explains in the form of text.

2.2 Research strategy

Researchers have carried out to serve different purposes and the important one is research purpose perhaps influence the research strategy. In this section, there is a need to describe some kind of study, explorative study and evolutionary study.

The evolutionary study results are based on the previous results of research regarding the study and it makes a chain between the results and develop the previous results into an efficient one and finally give a solution (Babbie, 1995).

An explorative study deals with new interest of a research in an unexplored area. This study will provide a better understanding of the new research area and test the feasibility of the future research or design a new method for further research (Anderson, 1997).

The character of our study mainly explorative and it fits our research objective that is to identify and understand psychological constraints of the users. The study is said to be the beginning of an evolution since it is a part of currently going research which focuses to identify the problems and provide suggestions to identified issues. From the above discussion, our study falls under the explorative study. Because problems when implementing information system is a highly discussed and researched one for the last couple of decades and it is also an ongoing research, which aims to provide a better and obvious solution.

In order to verify the research design strategies, it is essential for the researchers to explain the role of theoretical and empirical study. The implementation process can be explained in different ways of theoretical and empirical structures. The theoretical materials could influence the researcher when choosing data and it can also be consumed for analysis. (Bryman, 2002) The research performed in this thesis includes inductive as well as deductive components but the research could neither be distinguished as inductive nor deductive. The user acceptance when implementation process is a difficult task for the organizations and companies who are implementing or using information systems. The initial stage of the research views the issue areas from a number of authors and research point of view. These researches have different views representing different research areas.

Outcomes from the theoretical part are then verified through the empirical survey that appropriates the view of organization as perceived by its member. Empirical study however also aims at identifying new concepts, thus to create and understanding a new knowledge
from the experience. Previous researches and researchers have identified some problems regarding psychological as well as technical. To reach a deeper understanding of research questions a structure is created based on the views from the theoretical and empirical study. These results perhaps provide further implications and give suggestions to tackle the psychological problems that are faced by the organization.

2.3 Data collection procedures

Reference to scientific articles and previous researches are the standard way of collecting data but qualitative method has some aspects to collect the data and it is used in our research, text analysis, interviews, questioners and observations are some aspects to be considered. Problems may occur in this section so we have to strictly follow the procedures of qualitative methods. Analyzing is not an easy task to perform. Because it involves numerous procedures and it is also described as a technique.

Questions must arise when analyzing something related to research. For example, while analyzing an article for a research, the primary step is to check whether the author is trustworthy or not and then go through the article thoroughly.

**Text analysis**- It is one of the important aspects in the qualitative method and it prescribes to read number of materials for getting a perfect data. Different opinions of the authors are summarized here. Books, journals and articles create new ideas for the research area by reading these materials, (Repstad, 1998) researchers also get new concepts for their further work and it is a tool for investigation because these materials were written with strong evidences and references. Materials expose different perspectives of the peoples involved in the field of study. We include text analysis as one of the methods for collecting data and fully depend on books, scientific article and journals. So, it would be better to analyze in textual form for our thesis.

**The interview**- It is one of a tools in the qualitative method to improve the research. Information system life cycle can have a number of people and they are involved internally or externally. So, for this reason it is necessary to interview people to get a clear idea about the research. The main motto of our interview is to find out how the person feels and thinks about an information system (Trost, 2001). A conversation between two people of an information system is observed in this section. Hence, we believe this method would be best for our research and we have chosen this method for our empirical survey.

**Questionnaire**- It is an important research instrument. It has a large number of series of questions and also it is a procedure to collect opinions or information from the respondents. The advantage of the questionnaire is that it is like a survey and it does not require much effort. The major disadvantage is questionnaire construction and it requires perfection else it
will go wrong. It perhaps increases the risk in research (Kylen, 1997). So, for this reason we exclude this questionnaire method.

Observation- It is a procedure of receiving knowledge, recording of dates and collected data. If a problem occurs, (Repstad, 2000) it will be observed and eradicated in a clear cut manner with reference in future.

Theoretical study: Text analysis

Literature sampling

Textbooks, scientific articles and relates journals contains the results of identified researches and previously accepted examples of scientific practice and it is the basis for the research. So, it is important that we find outcomes and examples as knowledge in our research area. To be able to bring up an errorless environment in an organization it is important to the research more in the subject and knowledge field. Each and every field of study may have many sources in textual content and therefore it is difficult to make a text analysis that is everything within the subject area. So, it is important for us to sample the literature.

One such sampling method is to identify some criteria and use them for selecting literature sources for the text analysis (Patton, 2002). We have identified some criteria that we have exploited when selecting the literature. The main subject area for us is cognitive psychology and user acceptance of the system and these issues play the substantial role of the text exploited for the analysis. User acceptability may be stated by exploiting different sources and which kind of authors involved in the subject area and those who are referred by the other authors and researchers frequently.

We collected literature and looked up or some relevant materials in library. For cognitive psychology, we have referred the book cognitive psychology and its implications and also we have used the Google search engine to find many articles and E-books that are relevant to our research.

Empirical study: Interview

Sampling

It is essential to sample the empirical study i.e. in our case interviews that is typical for the group of people that the issue is related to. People or professionals who have knowledge in information system are selected in our case. There are two types of sampling we should address before selecting the interviews. One is probability sampling and the other one is non-probability sampling.

Probability sampling is one which it is based on the unstructured and random processes whereas non-probability sampling has a structure before proceeding with any action. (Alliger & Williams, 1993). We have structured a format for interview and performed in non-probability method. We hope this method would help us to finish the study within the time period.
**Interview**

Interview is an effective way to gather information. A qualitative research interview seeks to explain the meaning of central theme in the world of subjects (Sekaran, 1992). Interviews are finished by interviewer based on what the respondent says. Moreover, interviews are time consuming and they are resource intensive. Open-ended interviews are asked to all interviewees and this type of approach facilitates faster and better interviews that could be more easily analyzed and compared.

There are two main types of interview questions. One is open type and the other one is closed (kvale, 1996). An open type question will give greater response from the respondent and can get the answers in a detailed manner whereas the closed type would be of options and yes or no type questions (McNamara, 1999). So, we don’t think it is effective to proceed in this way. Thus, open type method will have great verbal flow and can get the answers in a very clean manner.

Before the interview starts, we have structured a list of questions in an interview structure. All the questions are a mixture of open and closed type and the interviews were conducted through E-mails and telephone calls. We skimmed some articles about how to conduct and perform an interview and structured the questions in order and built.

### 2.4 Data analysis procedures

Analysis plays a vital role in the field of research. In our case, there is a need to understand the various problems which arise during implementation of information system.

Text analysis helps the researchers to understand the problem and give suggestions to their research (Hansson, 1998). The problem may occur in any stage of an implementation system life cycle. In this research, the first phase analyzes each and every module of the information system.

By using the text analysis and observation procedures we could be identified the problems easily and more effectively.

To solve the stated problems, our research is subdivided into four important phases. They are analyzing the information system life cycle, identify the roles of people who are involved in the information system, find out the psychological constraints and finally minimize those identified constraints. To provide in a meaningful basis, the first phase and the second phase is done only by text analysis.

The text analysis terms should be followed by the researcher in order to get a better understanding and obvious result in a hermeneutics perspective. But the third and fourth phase deals with identification of psychological problem and how to minimize those problems, which needs clear observation strategies.
In this section, the comparison of empirical survey with the collected theoretical study is processed. After that the observations are analyzed by the theoretical findings and it’s a basis to provide the empirical results. Eventually our method of analysis is a comparative qualitative analysis.

2.5 Strategies for validating findings

It is essential to formalize the quality of the research. One of the common problems in qualitative research is validation. There are numerous ways to step up the validation that includes negative case analysis, conformability and balance. Many of the methods were stated and described already by (Lincoln and Guba, 1985). Validation nevertheless is constitutional and depends on a philosophy of positivism or positivistic approach or view. Non positivistic views that include the field looking don’t want to be reproducible and verifiable. The evaluation methods we have used for our validation are as follows:

Qualities in the text: Internal logic and ethical value.

Evaluation method: Discourse, consistency and empirical criteria.

Result qualities: Richness of meaning and structure.

Ethical Inquiry- It is a creative approach used to validate the qualitative research to find the psychological problems. It includes the study of rights, obligations, choice etc. We believe this ethical inquiry method would definitely use to evaluate our both theoretical and empirical findings.

All these methods may not be appropriate for the research. We will discuss in our research validation in the chapter (see chapter 6.4) exploit these methods when appropriate.

Hermeneutics approach clearly represents a validity constraint. Because in this approach the problems are sub divided into many types to give a solution for the sub problems in order to get answer for the main question.

So, it’s a qualitative way of analysis to evaluate the method. The main focus of the study is to identify the constraints and user acceptance of an information system. In this chapter, we have described the research method i.e. Ethical inquiry method for validation and in later chapters we will explain the subject areas that relevant for this research.

2.6 Result presentation method

The basic forms of presenting information i.e. Diagrams and texts are used. The end result is nothing but guidelines and solutions, hence plain texts are used. But in certain instances, diagrams and graphs are used in order to pictorially describe certain things like surveys, comparison charts etc. ‘suggestions’: this is what the entire thesis revolves around and we deliver the results the form of the same suggestions.
3 Theoretical Studies

3.1 key concepts

In this section, we have described briefly some important concepts of this thesis. The detailed explanation of these concepts will be written in later chapters. They are as follows:

**Implementation**

In general, the implementation is an execution of plan, policy or idea. But in terms of information system, it is an execution of the project and it involves several professionals. This includes several phases like analysis, integration of systems, customization, user policies and delivery of the project.

**Information system life cycle**

Before entering into a field of research, it is essential to know the entire field. This concept provides the basis of information system. The Life cycle of the information system can have planning, development, quality testing, implementing, deployment, maintenance and support.

**Psychological problem**

It deals with the psychological constraints of the individuals who are involved either internally or externally.

**Usability**

Usability of an information system is a typical concept of user acceptability that derives from using functions of the system. The main aim of usability is to make the users to understand and bring a better quality of outcome.

**Interaction Design**

In our thesis, Interaction design concept is used in relation to the design phase of information system to bring the user-satisfaction. The designing process of information system has a lot of responsibilities. The interaction design mainly defines the relationship/interaction between the user and the system. The main aim of the interaction design is to develop new concepts and suggestions for improving the design process of product or information system.

**Cognitive psychology**

In our thesis, cognitive psychology is used to suggest the importance of training and to improve the learning strategy for the users who are involved in an information system. Cognitive psychology is a system of theories which states that human mental and physical activities. Cognitive psychology gives a structure for learning and environment for developing the learned strategies. Moreover, obtaining knowledge is not a complete one which also includes the creation of knowledge by learners too.

**User acceptance**
Implementing information system in an organization is to develop their business. It is achieved, when the system has good user acceptability. The main goal of the thesis is to improve the user acceptability of an information system.

**End-user**

The end user is the individual who uses the application after it has been fully developed and marketed by a user. Generally end-user refers to the customers.

**Training and support**

Effectiveness in training and support is critical when users are introduced in the newly implemented information system. Insufficiency in end-user training is the reason behind the failure of IS and is a main concern why innovatively implemented system fails. Bad training and support will affect it and it could lead to low productivity and dissatisfied users.

**Functionality**

Different type of users will have to do different kind of tasks, for that the system should have up-to-date scope in order to carry out various jobs that are allocated by the user. If the system does not address the work in an organization it would create a user frustration and this may lead to use of the system to user resistance. Once the functionality of the system has been fixed there is no residue in user satisfaction and hence it is a reliable one.

**Interface**

Interface is a tool to enhance the communication between the user and the computer. An interface could process the user with simple and flexible communication with the system. The software usability is too strict without definition; empirical outcomes would prove that there are numerous elements to a successful interface. It is an integral part of information system.

**Reliability**

A reliable information system should support the user’s needs in a simple and consistent way. Reliability requires the system to be able to input and record the information of the system when needed.

**3.2 Subject areas relevant to the research**

This chapter deals with the reader to give an introduction to the subject area that are explained in the study and in addition, it describes our view on the relevance between subject areas and their relationships to the research questions.

Some possible subject areas that are relevant for our research could be:

1. System development
2. Interaction design
3. Cognitive psychology
4. Psychological constraints in implementation
A comparison of research questions with subject areas

Main question

How is it possible to create an implementation process to reduce bad feelings from the users and enhance user acceptance of the system?

Question 1

Is the term ‘user’ only related to the end-user?

Question 2

Why do users experience bad feelings during the implementation process?

Question 3

What aspects are essential to minimize the resistance and enhance the acceptability of the system?

Question 4

Why cognitive psychology and interaction design are needed in order to increase the user acceptance?

Figure 4 shows different subject areas and their relationship with each other. Our research is based on some complex subject areas that co-operate to create an understanding of the problem area. To be able to satisfy the purpose of this survey this is to create an understanding of knowledge in the problem areas. We will use research from the system development, this knowledge will be used to answer the question one and it will also create a base to answer the questions two, three and four. First research question deals with the relationship between user and end-user by using system development. The relationship between the user and end-user will be regarded from the system development life cycle by Preece.

The end user is the individual who uses the application after it has been fully developed and marketed by a user. Generally end-user refers to the customers. The concept of stakeholders is used to refer the individual or any organizations that are using information systems or who would be affected by the system and who have a direct interaction between the influences of functionality. A stakeholder comprises of system development, manager, direct and indirect users of an information system (Preece et al, 2002) He offers an obvious structure for explaining and categorizing the users. User refers to end-user in the implementation as well as in development life cycle.
The second and third research questions aim at identifying why user experiences bad feelings during implementation process and how to enhance the acceptability of the system. Lack of user acceptance is a significant and difficult constraint that needs to be rectified in an information system. Researchers have a strong interest in understanding the reason for why people in the information system have faced difficulties. For better and improved methods for designing, developing and implementing an information system, one needs to predict the users view and to develop the new technology based on the deep analysis, observation and opinion in a qualitative manner (Swanson, 1987).

We have used innovation diffusion theory to suggest our study. Innovation diffusion theory has been explained by (Rogers, 1983). This has been employed for both the organization and individuals for their level of analysis. The main purpose of this theory is to offer the framework for the user acceptance of an information system.

The final research question aims at identifying the acceptance by cognitive psychology and interaction design. The interaction design mainly defines the relationship/interaction between the user and the system. Main aim of the interaction design develops new concepts and suggestions for improving the design process of product or information system.

Interaction design focuses the theories of cognitive psychology to know the human interaction with devices, information system and products by Norman (1988). Cognitive psychology also has various human related discussions. The user centred design and use oriented designing are described in interaction design. It will guide our study to minimize the psychological constraints and its catastrophes.

Cognitive psychology is a system of theories which talks about human mental and physical activities. It integrates ideas from the same fields such as artificial intelligence, epistemology, Neuroscience, mathematics and philosophy. Analyzing the mentality of human is a complicated process and it influences the modern technology by William R.Sanders (2001). Artificial Intelligence Researches are aiming to bring the human behaviour in computer or in technology. The malfunction occurs often in the implementation of information system.

Understanding how humans think is important to why certain malfunction occurs, how people behave with other individuals and how decisions are made. Cognitive psychology gives a structure for learning and its environment for developing the learning strategies.

Moreover, obtaining knowledge is not a complete one which also includes the creation of knowledge by learners too.
Figure-2 Theoretical perspectives of the research
3.3 Previous researches

Early researches in this field started in late 70’s. In 1977, parker invited a lot of professionals from various fields to observe the psychological constraints. After that many researches have been taking place to minimize the catastrophic effects. By exploring those researches, we got some solutions and ideas for further steps in our thesis. This research is complicated due to relating it with psychological aspects but it is quite interesting.

The purpose of this research is to evaluate the ethical constraint that has been addressed during the research. The content of some hypothetical case that is created by the parker, based on his expert knowledge of computer. So, each and every action of the professionals is observed keenly. Eventually, parker found that, there is a flake disagreement between the professional.

A case study for user satisfaction was described by Newman and Noble (1990). Another remarkable research was done by (Delone and McLean, 1992). They proposed a new mode for information system success and their model proposed six interested variables to measure the screws. Including individual impact, organizational impact, user satisfaction, system use, information quality, system quality and another related model has also proposed by Seddon (1997).

The role of user participation is also researched in discussion Markus (1983) Markus and Benjamin (1996), Cairns and Beech (1999), Mumford (2003). A hierarchical framework is also introduced by Leveson (2001), and it is considered as a new approach in this field. Likewise, a lot of researches are going on to overcome the constraint in information systems and achieve the user acceptance.

3.4 Relevant literature sources

According to this research, we chose some literature sources that are relevant to our research area. Literatures should be more reliable and more authoritative than other sources. For the text analysis, literature helps each and every module of the analysis. In the field of information system remarkable researches and models were proposed after 1970’s.

System Development

The project management life cycle by Jason Westland is a textbook which reveals the standardized approach to the life cycle of project. This book skilfully covers the main areas of project life cycle such as initiation, planning, execution and implementation of a project.

Most of the organizations are purchasing the computer-based system for their improvement and to help them in performing day to day activities. But there are many problems in purchasing a good product (Information system). “Buying an information system” a book written by David James gives a blue print for purchasing a perfect information system and the book also contains advices and suggestions.
“New perspectives- computer concepts-10th edition” by June Jamrich person provides the most in depth information on both computer concept and the content in which they fit for today’s technical world. Conflict literature Bodtker and Tameson (2001) figure out the conflicts and conditions for managing those among the project people. These literatures guide us to know the disagreement of the employees and their psychological constraints.

**Interaction design**

“Human – Computer Interaction, Interaction Design and Usability” is published in the 12th international conference, Beijing (2007) has valuable suggestions and descriptions about interaction design concepts such as user experience, user oriented design. “Thoughtful interaction Design is another textbook written by Jonas Lowgren, Erik Stolterman gives the design perspective, technical concerns of usability, the interaction design and some collection of tools about interaction design. Text book labelled “Future Interaction Design II” by Prett Saariluoma, Hannakaisa isomaki deals with humans and their interaction with technology, need of interaction design and develop some innovative ideas. Another article “User Centred Design” by Chadia Abras, Diane Maloney-Krichmar and Jenny Preece describes the need for development in designing phase of information system and principles.

**Cognitive psychology**

An influential book written by Donald Norman named “The Design of Everyday Thing” describes about the mental model, interface metaphor and mapping. “Cognitive psychology and its implication-5th edition” by John R, Anderson effectively deals with the cognitive psychology and skillfully covers all the aspects of cognitive psychology. Another text book is “cognitive psychology written by R.Lachman, E.C Butterfield and J.L.Lachman which covers the main areas of cognitive psychology in the view of information processing such as attention, search behaviour, comprehensions, learning and memory.

An article written by William R.Sanders “Cognitive psychology principles for digital system training” to U.S. Army Research Institute (ARI, 2001). This article argues and suggests exact principles of cognitive psychology for the system and need for training to users of an information system. Another article of Jesse M. Berings “The Cognitive Psychology of Belief in the supernatural” argues the important aspects in cognitive Psychology. Cognitive psychology and its implication by John R. Anderson deal with the psychological aspects and its goal is to understand the nature of human intelligence and how it works. This gives a specific and notable approach to our field of study.

**User Acceptance**

Research in information system is a hand book written by D.E.Arison, Jan Pries- Heje which helps the supervisors and research students to improve their research strategies. The text book “User Acceptance of Information system “written by Fred D.Davis, University of Mochigen (1987) argues the importance of user acceptability in the field of information system.
3.5 Theoretical Framework

The purpose of the chapter is to present the important chapters or areas that are relevant to the research and also describe the important characteristics of the areas related to research questions. Before entering into the study of different subject areas, descriptions of the research questions are needed.

Hyberman and Miles (1994) argue that the theoretical framework should be used to explain the main issues to be studied. The aim of this research is to bring up the user satisfaction of an information system by reducing or minimizing the psychological problems. So, our further action needs a clear study about the information system related areas. They are as follows:

3.6 System Development
   1. Factors for implementing information system.
   2. Information system development life cycle (both pre-implementation and post-implementation process).
   3. Roles in information systems.

3.7 Interaction design
   1. Use Oriented Design.
   2. User-Centred Design
   3. User-Experience Based design

3.8 Cognitive psychology
   1. Information Processing
   2. Visual information Processing
   3. Object Recognition
   4. Attention and Performance
   5. Problem Solving
   6. Development of Expertise

3.9 Psychological Constraints in implementation.

3.10 Usability of Information System.

3.11 User acceptance

From the above stated analyzing areas factors for implementing IS and system development life cycle shows the entire activity of an information system. Roles in information systems explains the main roles in IS and the cognitive psychology will explain the concept of how to minimize the psychological constraints during implementation. Usability explains the method for evaluating the qualitative research.
3.6 System Development

System Development covers three major events and this includes implementation, going live and post-implementation process.

3.6.1 Factors for implementing information system

Information system has more responsibilities and it is a critical task in terms of profitability for many companies and organizations (Clifton & Sutcliffe, 1994). Why huge investments in information systems and their main intentions:

1. To reduce costs
2. To enable the business changes and growth
3. To improve efficiency
4. To develop business
5. To increase profits
6. To gain competitive advantage
7. To improve productivity and performance
8. To enable the ways of managing and organizing
9. To improve customer service

Information system’s success can be achieved only when the above conditions are satisfied the user. For these factors or conditions, researchers and developers of various concerns are viewed by a lot of angles. Probably, system usability gets increasing attention. The international standard organization defines that a product can be used by a specific user to achieve a specified goal with some special criteria’s are effectiveness, efficiency and satisfaction. It is important to study every person’s thoughts about information system in an organization.

3.6.2 Information System Development Life Cycle

The development process of an information system involves huge work in practice. There are two main stages involved in the development of information system.

1. Pre-Implementation stage
2. Post-Implementation stage
1. **Pre-Implementation**

Pre-implementation period of an information system, generally involves three major project phases.

1. Defining and Planning
2. Development
Defining and Planning the Project

![Diagram of project planning process]

Figure-4 A sample layout for designing & planning the IS project (Ameson, 2001)

**Initiation**

This phase is the foundation for the entire project. The purchaser (or) beneficiary of the Information system initiates the project and his requirements. Then a co-ordinator is selected for some investigations. Possibilities of the project are investigated and result of the investigation may suggest needs for additional characteristics required for the project. After getting positive signs about the project later, a project manager is assigned as well as project management team is committed.

**Analyzing**

Project manager plays a vital role in the project development and its completion. The design and implementing of an information system project is hard rather than technical.

Project Manager analyzes the entire mode of the project and makes a report regarding the features of information system project and sends it to the board which contains investors, management higher officials and advisors of the organization. Fund requirement is also stated
by the project manager and along with this requirement, project manager must submit the gross schedule of the whole project.

Reports and suggestions given by project manager are keenly observed by the board members and then approve the project. After funds are allotted, project management plan (PMP) is designed by project manager.

**Phase Review**

The phase review is the final stage of the planning section of a project. A phase review form is prepared by the project manager and it requires formal approval. Some strategies must follow in this phase review section and it is also known as checkpoint of project development.

1. Overall project status.
2. Planning schedule based on the project plan.
3. Expense of the project depends on the financial plan.
4. Employee allotment depends on the resource plan.
5. Delivery of the project is based on the quality plan.
6. Risks are based on the risk register.
7. Issues are also considered.

Once Phase review is completed, it is sent to project consideration board (PCB) for approval. Project consideration board is chaired by the project sponsor and it has full rights to cancel the project or modify the project.

After the careful planning phase, Project manager is ready to start the project and enter into development phase. Normally this phase is a long process and also has a lot of physical constraints while building the project. Development phase has two major areas which are system design and system construction.

System design is based on the system requirements analysis and result in a translation of the functional requirements into complete technical solution. Design area follows the standards, specifications and it is also known as technical architecture designing. Project manager should be able to plan for all future phases. System construction is the building area of a system life cycle. So, the team members must work in an efficient way to provide a better result. System acceptance, implementation success and usability of the system are also considered. System Development methodologies provides a good structure for development process. Team members typically choose one or more methodologies under the guidance of project manager. Time and expense are also noticed in this process.

A large percent of Information system projects fail due to lack of formalization. The success of an information system project depends on delivering the project on time and within budget. So, project development team follow some criteria to validate the work and those criteria are described below.
Time Management

Document Timesheet

Document timesheet process is related to the time spent for each and every task performed. The time recorded in a form called timesheet form and there are different forms, for example, software based, paper based and spread-sheet. Team members are responsible to fill the timesheet regularly.

Timesheet Approval

Recorded timesheets should be submitted to project manager by team members and this submission is takes place in a periodical basis (may be weekly, daily or monthly). After the submission project manager checks the timesheet by:

1. Time spent by a team member is reasonable or not
2. Validating the task performed by team members
3. Ability of team member is also considered

Based on this, project manager approves the timesheet or declines the timesheet or investigate any issues that arise in the timesheet if such things occur.

Timesheet Registration

The approved timesheets by the project manager are recorded periodically .this process is registration of Timesheets. It helps to monitor the expense calculation, identification of overtime and updating of project is validated by summarizing the timesheet registration.

Project administrator verifies the recorded timesheet and after analyzing, the project administrator may provide some updated plan when there is a need. Finally the completed project marks are registered as the project is 100 percent complete.

Time Management Roles

Managing the time is not an easy task while, major responsibilities are vested on team members, Project managers, and project administrator. Team members have responsibility to do their work best, complete the task in estimated time, submitting the time sheets and able to provide the information. But in the case of project manager, entire responsibility falls under him. Responsibilities of a project manager are resource allocation, supports, understand and approve the timesheets, create action plans and resolving all time sheet issues.

Moreover Project administrator is responsible to manage the day to day timesheets, providing basic templates, checking the timesheets, obtaining and registering the information, identify the slippages and summarizing the timesheet.

Cost Management Process

This process is a method used for identification of expense, approval and providing funds for the project.
Important expenses in a system development project are equipment cost, labour cost, administration cost and material cost. This cost management can have the recordings of cost in documents.

**Document Expense**

This is the initial step of the cost management process. It guides to calculate the expenses of the overall project by recording expenses of each task. Expense form is maintained in this process.

**Expense Approval**

This expense form is verified by Project Manager periodically and he verifies whether the expenses that have occurred are valid or not, originally budgeted expenditures and finally check if there is any unbudgeted expense. Only after this, project manager approves the form or declines the form if there are any issues. Note that project manager has the right to approve or decline the expense sheet.

**Expense Register**

The expense form and its process are registered in the expense register. Then the register provides a complete and accurate data of expenses to the project manager.

Project administrator oversees the management process by providing template for expense form, forwarding all forms systematically to project manager, maintaining, summarizing the forms and arranging the payments. Likewise project manager has all responsibilities such as reviewing, approving and deal with the issues related to the expenses.

**Quality testing**

**Quality management process**

After the construction of information system, quality testing is needed. Quality management process is used to test the system and perform the changes when required. The main motto of the quality management process is improving the quality of an information system. The process involves analyzing the information system project by undertaking a variety of reviews, testing the quality and improving the quality.

**Define quality targets**

Normally documents for the quality of a project were already recorded in the quality plan section. Before entering into the quality testing, responsible team revisits and analyze those records. There are some criteria’s and standards followed by them for checking functionality and its performance are the main focus of the quality targets.
Quality achievement measure

Once quality targets are achieved, the next step is quality assurance and quality control techniques. In this task, quality testing team must be aware of the occurrence of flaws and performance success.

Quality assurance

Quality assurance is defined as preventive steps taken to eliminate any variances from the target set. Thus, quality assurance is used to assure the quality of an information system.

Quality control techniques are also summarized and are performed in the testing phase for a better result. Quality manager is responsible for the testing and improving the system. Quality manages some important measures. They are as follows:

1. Implement the quality assurance methods
2. Use the quality control techniques
3. Ensure the quality targets are achieved
4. Record the level of quality
5. Identify the issues and need for improvement
6. Regularly report the status of quality testing to project managers.

Quality reviewer

The quality reviewer is allotted in order to identify the issues and it engages some tasks. They are as follows:

1. Reviewing the quality of design system
2. Identify the problems and issues
3. Reporting the status of work to quality manager.

Documents

Documenting quality testing process is required for this task. A form named quality review form is recorded. This form provides the confidence to the customer about the quality. The review form used in the process is process review form deliverable review form. Quality review forms are recorded in the quality register which record all the progress about quality testing. Finally, it has been designed and constructed to facilitate the implementation phase.

Implementation

Generally implementation is defined as realization of an application or execution of a plan, model and design. In our case, an information system is constructed or designed than the execution part is known as implementation.

In this phase, the designed system is transferred from project team (designing organization) to performing organization and also referred as the installation process.
2. Post-Implementation

The successful implementation process involves the maintenance and support of an information system. User of the information system needs a proper training to use the newly implemented information. Supplier or producer of the information system is responsible to educate the user for better performance. Education of user is done by conducting training and proving user guides.

The steps taken up for training must of good efficiency, responsibility etc. According to the purchaser of information system, maintaining and supporting is must. Purchaser literature also states that maintenance and supporting of the information system will satisfy the purchaser and lead to the success of the system. Supplier literature also suggests the importance of maintenance and support.

In the maintenance section, we also deal with new updates with the information system when a new requirement is needed. For the reason, the deployment of the system includes changes and enhancements.

3.6.3 Roles in information system

The role is a general term and everyone can easily understand and give examples for the role. Each and every organization or a company may have a certain kind of role. In our study, we are focusing mainly on the actors or what are the roles involved in an information system. Though there is general acceptance that role involves in the information system. The different kinds of roles are researched and expressed at different levels or viewpoints.

Most of the early information system researches have not clearly stated the concept of roles in a social psychology and it has been investigated systematically. Hence, there is a need to address the actors who are all involve in the organization to support better information system.

We are mainly focused on human related roles or actors i.e. Roles performed by the human and not considered the other roles like objects, agents, group etc. Different understandings of roles at different layers in Information system have been expressed diagrammatically. See figure 6
Various models describe the important roles in an organization. A few such roles are the manager and followed by the assistant manager, working professionals and team leaders, etc. Among these roles, the manager is considered to be in a higher position in an organization and he/she is the decision maker and head of the company. The manager’s job could be described in terms of several roles. Some of the roles are as follows:

1. Informational role
2. Decisional role
3. Interpersonal role

**1. Informational Role**

Informational role deals with the subordinates and network. The manager emerges as the focal point in an organization. A manager’s key job is to process the information in a hierarchical manner so that monitoring and questioning can be done easily by the manager.

**2. Decisional Role**

Information is the fundamental input for the decision making in an organization. The higher authority plays a vital role in decision making and of course he/she is the manager. In the case of an entrepreneur, the manager should improve the standard and unit to avoid the challenging and worst condition.
3. Interpersonal role

The interpersonal role seems to be responsible for the people in the unit and as a leader the manager should the duties in a right way.

![The Managerial Roles](source- Benjamin Fung, 2007)

3.7 Interaction design

The purpose of this chapter is to describe the interaction design and its usage in information system. This chapter also presents the important concepts of the interaction design which are useful for this research.

3.7.1 Introduction

The designing process of information system has a lot of responsibilities. The interaction design mainly defines the relationship/interaction between the user and the system. Main aim of the interaction design develops new concepts and suggestions for improving the design process of product or information system. Interaction design plays a vital role in the development of information system and its success. In the technical world, humans have a lot of interaction with the machines; devices and information system and also the problems in interaction are rising rapidly due to changes in technology. Moreover, the changes may occur quickly in technology but the change of people behaviour and nature occurs slowly (Normann, 1988). Designers are also involved with researches by analyzing the user’s requirement, experiences and the environment. The designing process is a sensitive process and it is a combination of decisions, feedbacks, actions and choices.
3.7.2 Use-Oriented Interaction Design

Change of business, technology and systems suggest the need to use-oriented interaction design and this approach is differing from user-oriented interaction design. Use-oriented design mainly considers the usability of the system and the user-oriented interaction design focusing on the user of the system. Use-oriented design aims to define and design the system by means of use. The Scandinavian tradition of information system development strongly recommends the use-oriented interaction design (Beyers and Holtzblatt, 1997) describes that analysis and design activities are combined with the perspectives of user and designer of the system, with the main goal being to create the system with the user satisfaction. Caroll(2000) argues that we are in the need of developing strong use-oriented methodology which is based on the usage of the system . A remarkable approach was suggested by Holmid(2002) to develop the skill for judgement and provide structure for creating the models of the use quality.

3.7.3 User Centred Interaction Design

The designing process of a system requires high range of discussions and it may cause user frustration and also there is a chance for incompleation in a simple task too. In our day-to-day life we are facing numerous problems while using a technical object or system. UCD (User centred Design) is a term used to describe the end-user influence in designing process of a system.

If the involvement of user in designing takes place indirectly then it is known as indirect involvement. When the user of the system officially appointed in designing process as part-time or full-time basis then it is known as direct involvement. If the user involved in specific time, typically during requirement gathering and usability testing then it is known as indirect involvement.

In 1980’s, UCD(User centred design ) originated from the Research laboratory of Donald Norman at the University of California, San Diego and other notable one is “New perspective on human- computer interaction was published by two authors Norman & Draper(1986). After this Norman (1988) published the book labelled “Psychology for everyday things”.

Norman (1988) proposed seven basic principles for designer

1. While designing or building the conceptual model and writing the manuals must concentrate for reliability and readability. These preparations can have the knowledge about the world and also with designer’s own knowledge.
2. Structuring a task is considered important. The structured task must consistent and used for easy retrieval of information.
3. Understand the law and mapping rights.
4. Try to produce a good feeling to user
5. Planning for possible errors and related prevention measures are prepared here.
6. Visibility of the design and every steps is concentrated
7. Create standardization.
Involvement of the User in Designing process

Involvement of the user in the design process also describes the different types of user. They are primary user, secondary user and tertiary user identified by Eason(1987) (see chapter 3.5). The feedback collection and installing or using those suggestions in the development process of information system will lead a better success.

The below table shows the user involvement in designing process (Preece, 2002)

Table- 1 Involving users in the design process (from Preece et, 2002)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Purpose</th>
<th>Stage Of Design Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background Interviews and Questionnaires</td>
<td>Collecting data related to the needs and expectations of users; evaluation of design alternatives, prototypes and the final artifact.</td>
<td>At the beginning of the design project</td>
</tr>
<tr>
<td>Sequence of work interviews and questionnaires</td>
<td>Collecting data related to the sequence of work to be performed with the artifact.</td>
<td>Early in the design cycle</td>
</tr>
<tr>
<td>Focus groups</td>
<td>Include a wide range of stakeholders to discuss issues and requirement.</td>
<td>Early in the design cycle</td>
</tr>
<tr>
<td>On-site observation</td>
<td>Collecting information concerning the environment in which the artifact will be used.</td>
<td>Early in the design cycle</td>
</tr>
<tr>
<td>Role Playing, walkthroughs, and simulations</td>
<td>Evaluation of alternative designs and gain additional information about user needs and expectations; prototype evaluation.</td>
<td>Early and midpoint in the design cycle</td>
</tr>
<tr>
<td>Usability testing</td>
<td>Collecting quantitative data related to measurable usability Criteria.</td>
<td>Final stage of the design cycle</td>
</tr>
<tr>
<td>Interviews and questionnaires</td>
<td>Collecting qualitative data related to user satisfaction with the artifact.</td>
<td>Final stage of the design cycle</td>
</tr>
</tbody>
</table>

If the user of the system participates in the design process then the user is known as co-designer of the system. This kind of participation emerges in Scandinavian countries.

Advantages and Disadvantages of User Centred Design

The major advantage of using UCD is the delivery of the product, which is efficient and safe. Now, satisfaction of user is increased and after the design process the user gets a sense of ownership and other important aspect is less need for redesigning.
The disadvantages of using UCD are costly process, need more time and difficulties may arise in translating the data.

### 3.7.3 Design Process Using User’s Experience

To achieve the success in information system design user centred design approach is focused by the designers. Collecting and recording the user’s experience is a complicated process but it is valuable in the designing process. For clear understanding user experiences are calculated from various perspectives. Those views are categorized into three main areas, they are life cycle perspective, environmental perspective, and various user perspectives.

**Analyze the User’s Experience from Life Cycle Perspective**

This perspective involves the user's view on the system, which involves the aspects of ordering, delivering, installation, services, support and upgrades as well as end of the process. An example is giving a presentation at a conference. The presenter must be aware of the title of presentation, preparation of slides and attend the conference with notebook/PC and also be aware of all the process involved in the presentation. After the presentation the presenter gets feedback and he will consider those feedbacks in the next presentation.

**Analyze the User Experience from an Environmental Perspective**

This perspective involves the materials with which they are used by the user of the system in the way of vision, feel and touch. Some materials are software, hardware, objects, place and also people interacting with the user. Example, at a presentation in a conference, the environmental requirements are chairs, desk, projector and its screen, cables and accessory.

**Analyze the User Experience from Various User Perspectives**

This perspective involves different human characters. Generally the user of the system has various feelings, personalities, imaginations and emotions. Example, in a presentation, Presenter style may vary from one another. One presenter may take a lot of slides another presenter may not.

**Method Designing**

Creating a method in a process is the best way to complete the process. In our case, the user experiences are based on method creation is applicable and an efficient one. The design team works on the basis of user centred design. Some steps involved in user experience design are:

**Planning** - Before entering into the design process a proper plan is a must. The project manager and leader are responsible for creating a plan for this process.

**Background** - This analysis involves business, market needs, user expectations, maintenance and support of the system.

**Understanding User Experience** - This is used to understand the goal of user, feedback and various viewpoints regarding their experience.
Design for User Experience - Detailed descriptions for specifications, documenting process are held in this section and design process also proposed.

Validating - This process is used for validating the user experience and also the feedbacks are discussed.

3.8. Cognitive psychology

The purpose of this chapter is to present cognitive psychology’s basic concepts as well as to discuss the importance of cognitive psychology in our research in order to obtain the user acceptance.

3.8.1 Introduction

Cognitive psychology is a system of theories which states that human mental and physical activities. It integrates ideas from the same fields such as artificial intelligence, epistemology, Neuroscience, mathematics and philosophy. Analyzing the mentality of human is a complicated process and it influences the modern technology. Artificial Intelligence researches are aimed at bringing the human behaviour closer to that of computer’s or in technology. Malfunctions occur during the implementation phase of information system. Understanding how humans think is important to why certain malfunctions occur, how people behave with other individuals and how decisions are made. Cognitive psychology gives a structure for learning and its environment for developing the learning strategies. Moreover, obtaining knowledge is not a complete one which also includes the creation of knowledge by learners too.

Cognitive psychology also focuses on how to understand the type of behaviour of the human. For example, understanding how humans think is important to know why certain malfunction occur, how people behave with other individuals and how decisions are made. (William R. Sanders, 2001) US army research institute made a report “cognitive psychology principles for digital system training “to develop the training techniques using cognitive psychology.

The US army research institute (ARI) which studies various aspects of retention of knowledge and skills. After this study, they concluded that the techniques for training require changes (Wisher, sahol&Ellis, 1999) learning theory of the cognitive psychology believe the human natural learning, knowledge constructed due to social situations and include constructivism, behaviourism and cognitivism. Constructivism is constructed by learners’ view on his own experience and schema (Will helmsmen, Asmul & meistad, 1998) behaviourism is the learning reflection due to the behaviour of the learner. Cognitivism is a tough process behind behaviour.

The great contribution made by cognitive psychology has been providing typology of different knowledge and it is used in the intelligent activity (Samara pangavan, Beishuizen, Braizer & sanders, 1993). Technology and its needs are increasing with a competition in the business world. All the organisations want to improve their system to meet the strong competitions. The information system users are not able to do their work easily without
training. In scientific researches, paradigms have a significant place. Paradigm helps the researchers to form the producers because science procedure should be meaningful and interpretable. Learning the paradigm is necessary and it paves the way to become an expert in the research field.

A procedural paradigm treatment was first introduced by Thomas kuhen (1962) and he explains the difference between “Nartural” and revolutionary science. The analysis of kuhen was developed for natural science, advanced and primary objectives for the science but it needs some modifications and adaptations when it is applied to the psychology. The concept of paradigms, normal science and the revolutions are taken in account for cognitive psychology (segal & lachman , 1972 , weimer & Palermo , 1973 )

Analysis from the researchers and various psychologists suggests that the psychologists conduct normal scientific research into learning and the researchers use the paradigm concepts and their assumptions. They also suggest the result of learning is same for various species but the revolutionary researchers suggest that different species have a different way of learning. This new approach provides a new challenge to the learning theorists. (Segal & lechman, 1972) advices, the humans are influenced by the outside science by the laws, societies, educational system and politics etc.

Generally the researchers study different fields related to his research for better understanding the analogy is used to know the concept and to develop the psychological. The paradigm also allows the using analogies influence in research questions. Cognitive psychology goes in a wide range of area but regarding our study, analyzing the needed area is enough. Those areas are as follows:

1. Information processing
2. Visual information processing
3. Object Recognition
4. Attention and performance
5. Problem solving
6. Development of Expertise

3.8.2 Information processing

Information processing has basic processes such as reading, encoding, recognizing and storing. Stage theory is widely accepted theory in information processing and it is developed by the basic work of Atkinson and Shiffrin (1968). Three important models are accepted in the field of study.

The level of processing of the model and its development (Racik and lockhart, 1972). The learners utilize different knowledge by processing the learned information. This ability helps to access and retrieve the memory. Brandford(1979) suggests that approaches concentrate not only in information processing but also accessing the information.
Parallel distributed models propose that information is processed by different parts of the memory simultaneously. The connections model is another model and it is proposed by Rumelhart and Mc Cleaveland (1986) the information is stored in multiple locations of the brain in the form of a network. Another model in information processing is stage model. This stage model proposes that information is stored in three stages after the processing of information.

**Sensory Memory**

This memory is about the environmental sources such as light, sound, smell, heat and cold etc, but this sensory part of the brain. The human body has sensory receptor cells that help the brain for understanding the changes in environment.

**Short-Term Memory**

This memory is also known as working memory. Another term describes this memory is conscious memory. Hypothalamus is a part of the brain and in this memory, the process of information is shallow. The organizing and repetition in retrieving information in short term memory has two major concepts, they are organization and repetition.

The organization has four major types and it is mostly used in instrumental design.

*Component* - It is a classification process by concept or category.

*Relevance* - Central unifying criteria or idea.

*Sequential* - It is a cause / effect which results in building the climax.

*Transitional* - Qualitative changes in indicated by using phrase or relational world.

*Organization* – It is the concept of growing the pieces of data into units.

*Repetition* - The technique of repetition is the learning something. After learning, the person has to remember the learning for six months or a year.

**Long-Term Memory**

This memory is also called as unconscious memory and pre-conscious memory. The unconscious memory recollects the data easily. The long term memories have elaboration and distribution practice some example for elaboration (used in teaching / learning process).

*Imaging* - This process is creating a visual mental picture.

*Method of Location* - Ideas or things which are remembered by thinking of a certain object in a location.

*Peg word method* - Ideas or things which are remembered by connecting with specific words.

*Rhyming* - Remembrance by rhyme.
Initial letter - Initial letter of a word which is used for making the sentence.

Long term memory information’s are the stored information of long term memory and is organized by same structures are declarative, imagery and procedural.

Procedural Memory - Knowing the procedure for example driving or car or ride a bike.

Declarative Memory - The information’s used to normal talk.

Schema – Relationship of various interconnected ideas.

Proposition – Network of connected relationships and the concepts.

Script – capture the general information and use it in normal action Eg: eating in the hotel, watching movie in theatre.

Program – Rules used in some situations.

Schema – Principles concepts and rules used for present actions.

Paradigm – It gives the basics for thinking, valuing and perceiving (Harman, 1970). Model – Set of equations which are made by experience.

3.8.3 Human Visual Information Processing

Normally, Light passes through the lens and to vitreous humour and finally falls onto the retina which is in the back of the eye. The Light sensitive cells of the retina will respond to the light. Passing of light through the vitreous humour is scattered and falling into the retina is not sharp. Visual processing function has responsibilities to sharpen the image.

Neural energy is obtained by converting the light by a photochemical process. Photoreceptors are in the eye. They are rods and cones. Cone has the function of colour vision, acuity and the high resolution. But less light energy needs to get a response in the rods. Fovea is a small area of the retina which is specially concentrated.

The vision of fovea is concerned with the detection of the fine details when comparing with rest of the visual fields.

Information Coding in Visual Cells

The information encoding by the ganglion cells is clearly described by the research of Kufflers(1953). The ganglion cells will fire with some average rate when there is no light. Firing is automatically increased when the light falls on the small region of the retina. After the study of Huble and Wiesel (1962) in primary visual cortex suggest that visual cells are responding more than ganglion cells. Then the study of Hubel (1988) proposed the various aspects such as form, movement and colour are processed separately by the visual system. Representation of various features regarding the visual system of the eye is described as feature maps (Wolfe, 1994).
3.8.4 Object Recognition

The recognition of an object involves recognition and complexity of recognition. Theory in this area is Recognition-by-component theory was proposed by Biederman(1987) has three stages in our recognition of an object.

(1). Segmentation of objects into a set of sub-objects. (2) After the segmentation, categorizing of sub-objects is needed. Thirty-six categories are in the object categorization and it is known as geons (geometricians). (3) The pieces are out from the object in composed and the recognizing the objects like to recognize the world.

3.8.5 Attention of human

Good attention from the user when he/she using the newly implemented information system is not an easy task. So, designer of the information system must concentrate in this section.

Cognitive psychology guides and explains about the attention of human. Usually, most of us can perform two separate works at the same time such as walking and chewing. But hard task rotate two hands opposite to one another at the same time. So, for this reason the psychologist proposed exists of serial bottle neck in human information processing. There are two types of attentions that are involved in this human attention. They are as follows:

1. Auditory attention
2. Visual attention

Auditory attention

The research of auditory attention has centred the dichotic listening task. This type of listening deals with the person hear two messages, at the same time most of the members will be able to receive messages and turn out the others. Psychologists Chervy (1953), Meray (1959) have discovered that the unattended messages are processed in shadowing task.

Broadhent (1958) proposed a particularly early selection theory known as filter theory basic according this theory, a person chooses a message to process on the basis of some physical characteristics. After this Deutch (1963) offered the late selection theory. They claimed that people can perceive multiple messages but they can shadow only one message at a time.

Summarizing these discussions, one message is easily observed from two messages at a time but the alternative messages are not totally blocked out and so have the ability to grab attention if they are physical striking.

Visual Attention

The bottle neck in visual attention or visual information processing is more auditory than information processing. Actually our eyes register a large part of the visual field. However, our fovea only registers small part of the visual field.
Posner, Snyder and Davidson (1980) found that, visual attention can be moved without accompanying eye movements. Usually, when humans move their eyes, the fovea will do the process of visual attention and change into the other focus.

**Object-based attention**

After valid experiments and researches on object based attention psychologist/ researchers suggest that attention on a certain region of space will change when the object is interrupted. This suggestion makes a lot of sense in this field of study. The object may move or the human will move from the object. But focusing an object is higher than focusing on region of space.

Behrmann, zemel and Mozer (1998) have made an experiment (following the original experiment, Duncan, 1984) and suggests that human can easily indentify the object than a location. Other evidence for object-centred design is Tipper, Driver and Weaver (1991) performed one demonstration of the inhabitants of return that also provides evidence for object-based attention. Then studies of visual neglect also suggest the object-based attention.

**Central bottleneck**

There are a lot of evidences proving that humans focus their attention in one stimulus and neglect others when two responses are required. This issue has been explored in various dual-task studies. A remarkable one is Karlin and Kestenbaum (1968) asked someone to perform two tasks.

**Task 1**

In visual they display a digit. If the digit is 1 then the person responds by pressing the key with the small finger of his left hand, if the digit displays the number 2, he responds by pressing the key with his ring finger.

**Task 2**

In this task, they are allowed to hear a tone. If the tone is 3000 Hz, then it is a high tone and it responds from the right hand index finger. If it was a low tone (600 Hz), he responds with the middle finger of right hand.

After that they analyzed their delay between the first and another task. The reaction times are calculated in milliseconds. They suggest that tasks are performed one after the other and noted that there is no clash in the response. If those tasks performed in parallel, there might be some delay in response.

Cognitive psychology deals with the issues of attention. A famous quote from William Tames (1890):

“Everyone knows what attention is. It is the taking of possession by the mind, in a clear and vivid form of one out of what several simultaneously possible objects such as localization,
concentration of consciousness are of its essence. It implies withdrawal from something in order to deal effectively with others”.

In the business world, the main focus is getting attention from the customer. It is also applicable in information system design. Realization plays a vital role in the attention studies. Designers involved in the information system must study the attention of human cognitive psychology studies which helps them to understand the human psychology.

### 3.8.6 Problem solving

Problem-solving studies will give a clear understanding about procedural knowledge. The basic arguments about human cognition were done by Anderson (1983), Newell (1980), Tolman (1932). The argument states that human cognition is always purpose-oriented and they always eradicate the obstacles to their goals and direct to achieve the goals. Problem solving behaviour is useful to understand the human cognitions.

#### Problem space and search

Problem solving is researched in the way of searching the problem space. This process involves finding the problem states. The state represents the problem degree known as initial or end state. This method of problem solving was developed by Allen Newell and Herbert Simson of Carnegie Mellan University which is useful in the cognitive psychology and artificial Intelligence. A remarkable problem illustrates the solving characterization of eight tile puzzle. It contains eight numbered movable 3*3 frame and one cell is empty state always. The main goal is to achieve the proper arrangement of numbers. The movement of each number into another state is noticed. Finally, find out shorter sequence of moves. Another strategy involves in problem solving is search graphs or search trees.

#### Problem representation

The problem state search and finding the operators to solve also suggest that problem representation. The famous example illustrates the importance of representation is mutilated-check board problem (kaplen & Simon, 1990). In this case, students are trying to solve a problem in their academic work. Inappropriate representation of problem causes students to fail to solve the problem. So, the researchers in cognitive psychology suggest the importance and effectiveness of problem representation in a correct manner.

### 3.8.7 Development of expertise

William G.Chase( Carnegie Mallon University) is an expert in the area of expertise. He had two mottos according to expertise. (1) No pain, no gain and (2) when the going got tough, the tough get going. The first motto explains that no one can develop expertise without the hard work. No one reached the level of a genius without ten years of experience is suggested by John R.Hayes(1985). This chapter deals with the development of expertise in problem-solving.
General Character of Skill Acquisition

The development of skills is typically differentiated into three stages (Anderson, 1983; Fitts & Posner, 1967). The first two stages are known as cognitive stages (Fitts & Posner). Developing of declarative encoding skills to a human is done at this stage.

The best example is driving a car. The learned and heared information are used by the person who is driving the car. This kind of knowledge has no procedures as well as actions are changing due to the situations.

The second stage is associative stage. Changing the gear of a car is known as procedural knowledge. Changing of gear from one to second gear is taken as a proper flow of action. It is like the remembrance of grammar when speaking the known foreign language frequently. The autonomous stage is the third stage of skill acquisition. The procedures are perfectly automated in this stage and achievement is made by gaining complex skills. Example is people become experienced in driving have the knowledge and skills.

Power-Law Learning

This chapter describes the performance of the complex skills. The experienced worker can do a work easily, efficiently, perfectly and so on. The effect of practices are studied in the way of involving complex problem solving (Neves and Anderson, 1981). The benefits of practices result in the development of product (koler, 1979) involved in an investigation regarding the reading skills of text and his suggestions are considered in the power law learning.

Nature of Expertise

In the mid 1970’s, understanding of expertise through various researches have held the expert from numerous field such as mathematics, chess, computer programming and physics are involved in the research. These findings mainly evaluate the problem-solving behaviour is achieved by the experience, they also suggest some concepts in their research, they are procedure learning, Tactical learning and strategic learning. Individual difference in cognition is studied and it explains that humans are special species; some people perform a better cognitive task others may not. This is known as intelligence. Analysing young children to young adult to old adult is necessary in finding the cognition level of human.

After reviewing, all the research results suggest that expertise only came with the investment of a great deal of time for learning. John Hayes is a researcher also suggests that genius in a field produce his best work after 10 years of apprenticeship in the field. Likewise (Ericsson, Krampe and Tesch-Romer, 1993) compared the best violinists and found the same opinion. This kind of getting knowledge is made by deliberate practice. The learners are motivated to learn and allowed to tell their feedback about performance then motivated to monitor the feedbacks.
Intelligent tutoring system

This type of tutoring system is computer based systems which interacts with students for tutoring them. (One remarkable example is LISP tutor developed by Anderson, Conrad & Corbett 1989; Corbett & Anderson, 1990; Anderson & Reiser, 1985) which teaches the main programming languages in the artificial intelligent. It continuously taught LIPS to students at Carnegie Mellan University since the fall of 1984. This type of tutoring is used to improve the student skills.

3.9 Psychological constraints in implementation

The action in system development is explained usually from the planning of project to the final delivery followed by the intermediate phases such as requirement analysis, design system, development, coding, implementation, testing and finally maintenance. Reliability is the important aspect we need to take concern in the system development process. The reason for Information system to come down in the minds of the public is due to the negative outcome from unreliable system. Thus, these kinds of negative effects for the professional in an organization will create unfaith and unsecured environment and results in the consequence of psychological constraints in the information system.

In this section, we consider and look at the issues that exist during the analysis, design and implementation of an information system. We also look at the ethical issues during the development and implementation process. We accept that the problems in information systems could be treated with computer professionals if they are well equipped with accurate psychological guidelines and accept their responsibilities in a social manner. The developers are liable to their design if it fails. Moreover, they must accept the total responsibility for their failure design. Any unreliable function should be intimated to the customer when the system fails to deliver something needed for the users such as functions. Basili and Musa (1991) consider an event reliable and it should be the reason for the failure.

Emerging psychological issues and its responsibilities

In many ways the psychological factors and importance of knowledge demonstrates in system implementation, particularly, insufficiency of knowledge sharing, transfer of knowledge and disconnected psychological constraints can issue system implementation. The process of system implementation is much more difficult than issues of sharing knowledge and enhancement. The process changes the real knowledge and a psychological issue during the project in an organization is a difficult task to proceed on an individual.

For example, frequent change of personnel in an organization perhaps creates a conflict and misunderstanding between people who are assigned already in the project and results in low productivity. Transfer of knowledge and the system development are lagging because of less user involvement, lack of external professionals declining the management and finally limited user training (Will cocks et al, 2002; Walton, 1989). This insufficiency or lack of system results in negative outcome during implementation. The outcome issues can be diagrammatically expressed, see figure 4 for the summary of the analysis.
3.10 Usability of an information system

Usability is a common method in qualitative research to evaluate the system. International standard organization builds a standard for usability that could be defined as ‘the extent to which a product can be exploited by specific users to achieve specified goals with effectiveness, efficiency and ease of use’ (ISO-9241, 1998). It is further divided into three broad categories.

Effectiveness- Complete and accurate

Satisfaction- Right attitudes towards the product

Efficiency- User achieve goals
The illustration of usability related to the information system positively or explicitly takes the essential consideration of specific users, their mottos and surrounding situations in usability. Acceptability comes from the usability of the system. The implemented system does not rely on usability of its integrity. The system must attach or set the physical, organizational and social context (Bevan and Macuod, 1994).

Usability of an information system is a typical concept of user acceptability that derives from using functions of the system. The main aim of usability is to make the users to understand and bring a better quality of outcome (John, 1996). It is necessary to explain the two types of features that are involved in an organization.

1. Features of high usability
2. Features of low usability

**High usability**

Systems having high usability are combined with more positive results. If the system is in high usability it can reduce errors or flaws and can increase the system use. A clear outcome and a positive result lead to greater productivity of an organization or any company.

It will also increase the user satisfaction for the employee who is working in an organization (Cranny et al, 1997). A system with high end of usability reduces the user frustration and increases the efficiency of an organization (Calisir & Keirnan, 2002).

**Low usability**

If the usability is low in large scale information systems that are fully loaded with the data and performance will lack if there are errors or bugs in the system.

The poor design of IS can lead to incomprehensive and unidentifiable for the users who are implementing information system. Low usability of IS often leads to adjust the system by 30-40 percent, and it outcomes to a huge loss for the organization (Mahadevan, 2001).

A working example of an organization can illustrate this issue or errors more easily and in an understandable manner. Let us assume that an error that takes 15 seconds to rectify each time it happens and this occurs 30 times in a day to more than 40 persons in an organization. This small usability issue could waste up to 500 hours a year.

The main challenge in the implementation process is not related to the application or technological content but the people constraints. Many of the companies and organizations are in a position to address and overcome this people issue before implementation. It will affect the time, cost and money in the organization. So, the organizations are giving more importance to interface and training in order to reduce the low usability (Deloitte & Touché, 2003). By improving the communication between the user and the system should hide the ambiguity of interface. As far as we concerned, the interface is nothing but the product. The data that are displayed in the interface must be obvious and concise (Ehlert, 2003).
3.11 User acceptance

Implementing information system in an organization is to develop their business. It is achieved, when the system has good user acceptability. The main goal of the thesis is to bring the user acceptability of an information system.

User influence of the system

Information system failures are mainly caused by mistakes and misunderstandings. Some of the mistakes are listed below (Humphrey, 1995):

1. Poor validation of information system
2. Insufficient cost
3. No proper user’s considerations, suggestions and discussions.
4. Lack of calibration of information system and its management strategies.

These are the main factors that are influencing the system while implementation process. This has to be addressed and have a clear look in a proper and consolidated way to reduce the bad feelings and enhance the acceptability of an information system.

User (End-user)

A user is either an engineer or a programmer who develop the information system. The end user is the individual who uses the application after it has been fully developed and marketed by a user. Generally end-user refers to the customers. The concept of stakeholders is used to refer the individual or any organizations that are using information systems or who would be affected by the system and who have a direct interaction between the influences of functionality. A stakeholder comprises system development, manager, direct and indirect users of an information system (Preece et al, 2002) He offers an obvious structure for explaining and categorizing the users.

User refers to end-user in the implementation as well as in development life cycle. In this study, preece have split up the users into three distinct types. They are as follows:

1. **Primary user**- Primary users are the user who uses the system frequently.
2. **Secondary user**- Secondary users are the one who uses the system occasionally.
3. **Tertiary user**- Tertiary users are the users those will influence the system or rare users.

Many categories of user could uncover issues, thus it is essential to exploit a large sample of user when validating the system. Addressing the issues and constraints in an earlier stage is the best way and important for the system to be victorious. This could be done by comprising end-users during the whole of system usability and validation process (Kujala & Kauppinen, 2004), often systems are implemented with very few users. This has to be balanced in a right way to avoid the problems.
User experience during the implementation process

The user experiences are the key to our process and this need to be addressed very keenly in order to reduce the psychological constraints during the implementation process. The following components are required to reduce the bad feelings of the users and enhance the user satisfaction.

1. Reliability
2. Interface
3. Environment
4. Functionality
5. Training & support.

Figure-8 User experience Framework (Raskin, 2000)
If you look at the above diagram six components are divided into three subcategories. One is user satisfaction, Second is the user and the last one is system. The system includes five subcategories named reliability, interface, environment, functionality and finally training and support. To ensure the user acceptability towards the system it is acute that all the constraints should be presented clearly in the system. The system category could have the correct functionality for the user to do his work efficiently. The system reliability should be in peak and the training is essential and the interface must be apparent. The user is the main key to ensure user satisfaction.

Lack of user acceptance is a significant and difficult constraint that needs to be rectified in an information system. Researchers have a strong interest in understanding the reason for why people in the information system have faced difficulties. For better and improved methods for designing, developing and implementing an information system, one needs to predict the users view and to develop the new technology based on the deep analysis, observation and opinion in a qualitative manner (Swanson, 1987).

We have used innovation diffusion theory to suggest our study. Innovation diffusion theory was explained by (Rogers, 1983). This has been employed for both the organization and individuals for their level of analysis. The main purpose of this theory offers the framework for the user acceptance of an information system.

Researchers desire to find the factors that find out user acceptance of an information system and indistinct, factors that influence by design and implement the question of user acceptance has come to be undertaken more efficiently by the researchers in innovation diffusion. Researchers in this field have noticed mainly on the theoretical basis and cognitive psychology in understanding user acceptance. A psychological and social constraint of user acceptance at any individual level needs to be designed more efficiently in the implementation process.

The main purpose of this study is how to increase the user satisfaction when implementing information system and it also helps the organization to notice their issues during any stage of project. User satisfaction is the final output of the information system and it judges the work that has been done by any organization or company.

The research is sub-divided into various chapters to solve the main constraint. Based on the previous research and literature, this research involves different serious functionality, reliability, interface, training and support. The framework has a sufficient role in a research and it highlights mainly in user satisfaction.

Many problems arise in the information system life cycle and its influence mainly on user acceptance. A small flow may disturb the final output of the information system. Finding various problems is a difficult one in this field. Literature reviews helps us to deal with these issues.
Information system have two distinct areas that needs to be considered (Haplin 2003)

1. A social system involves with the people with distinct biological, social and psychological needs.
2. A technical system includes machines, methods and the knowledge that are being embedded.

Furthermore, these two areas are inter-dependant with each other.

3.12 Summary of theoretical finding

In this chapter, we have summarized the outcomes from various subject areas that are related to our research during the theoretical study and these results are structured with the research questions. In our research, we have been identified some important aspects to consider for the better user satisfaction and reduce the bad feelings of the users during the implementation process. Also, we have found some psychological constraints and the minimizing methods. These findings are related with research questions are as follows:

Sub-question 1:

Is the ‘term’ user only related to end-user?

A user is either a professional or worker who develops the information system. End-user in the sense a user who is getting benefited by the information system is referred as end-user. They are simply users and they are not technically strong. (See chapter 3.5.2)

End-users are who unhappy in learning innovative things and they always feel to be sad and their roles are becoming the technology and they are adhering to be dissatisfied. When the implementation gets fail, the technology itself is good but the end-users not to use it.

If the professionals in an organization are not satisfied with the technology that is implemented, the reason for anxiety perhaps not related to technology that has created already. Anxiety may come from insufficient training, innovative procedures involved or loss of communication with the group of professionals. Reduced rates of information system effectiveness could be expected with anxiety end-users. (See chapter 3.5.3)

There are many bounds why the individual professionals might not be ready to accept the modifications created by the new technology projects in an organization.

Concerning to reduce the resistance to change and hence enhance the value of new technology, end-user participation in the implementation process is capitious. The psychological constraint that comes with the whole process minimizes the scare and uncertainty consorted with modifies and maximize the users readiness to satisfy the change. Major technology implementations have a number of stakeholders that leads to the higher level of acceptance and thereby leaving the observation of processes to further research.
Frequently systems are implemented with very few users; this has to be balanced in a right way to avoid the problem.

**Sub-question 2:**

*Why do users experience bad feelings during the implementation process?*

The user experience is the key factor in our study. There are four types of components are required to reduce the bad feelings and enhance the user satisfaction during the implementation process.

**Reliability**

A reliable information system should support the user’s needs in a simple and consistent way. Reliability needs to require that the system to be able to input and record the information of the system when needed. A reliable system should have to prevent against the unauthorized and malicious access to its components. (See chapter 3.5.4)

**Interface**

Interface is a means to enhance the communication between the user and the computer. An interface could process the user with simple and flexible communication with the system. The software usability is too strict without defining; empirical outcomes would provide that there are numerous elements to a successful interface. It is an integral part of information system. Regarding on the user experience with the interface an information system perhaps gets success or fail.

**Functionality**

Different type of users will have to do different kind of tasks, for that the system should have up to date scope in order to carry out various jobs that are allocated by the user. If the system does not address the work in an organization it would create a user frustration and this may lead to use of the system to user resistance. Once the functionality of the system has fixed there is no remaining in user satisfaction and hence it is a reliable one.

**Training and support**

Effectiveness in training and support is critical when users are introduced in the newly implemented information system. Insufficiency in end-user training and the reason behind the failure to comprehend IS works is a main concern why innovative implemented system fails. Bad training and support will affect and it could lead low productivity and dissatisfied users.

Hence, the training should be provided in an apparent way in order to reduce the low productivity and the user with own knowledge is needed for their work. If the training is not adequate for the user, definitely they would not be able to do their work correctly.
Sub-question 3:

What aspects are essential to minimize the resistance and enhance the acceptability of the system?

User acceptance or user satisfaction is the key to our process and this experience due to misunderstandings and poor usability of the system. The main concepts in the usability are effectiveness, satisfaction and efficiency. If we correct and look closely and give more preferences to the three main factors one can increase the productivity and enhance the acceptability of the information system (See chapter 3.5.5)

Acceptance has been looked as a function of user involvement in the information system development or it’s a kind of political climate in the company or an organization. At the top level, acceptability has classified below the theoretical analysis of innovation diffusion theory. However, an exact analysis of user satisfaction had become now a core concern of regimens studying information system in a very particular way rather than general technical way. This study highly concentrates and more directly on the importance of user satisfaction.

More than one type of approaches are needed to look into the problems involved, and to rectify, approaches are appraised independently at the beginning.

The interrogation of user satisfaction is the main concern for all researchers and professional who want to predict which technologies will give more reliable for an organization. The problem conveys on multiple theoretical views and on research in organizations, system analysis, user design and interface and technology. (See chapter 3.5.1)

On looking to influence the design of technologies to increase their satisfaction, company’s analysis approaches such as socio-technical terms provides the planning of work in all activities over the technology that reduces bad feeling and increases the importance for user acceptance and development. (See chapter 3.5)

Eventually, usability allows the acceptance into the design of the interface between the technology and the user. By expressing the concept of usability in dynamic form is to increase the chance of acceptability at the individual user. Thus, the user acceptance of the system perhaps influence the implementation process and it might create a problem at the end of the project. On reducing these constraints and maximize the usability of the system, one can easily avoid the implementation issues and hence they can enhance the user satisfaction.

Sub-question 4:

Why cognitive psychology and interaction design are needed to increase the user acceptance?

In the present business world, all the organizations want to improve their business by implementing information system in an efficient way. Further study about information system states that it bridges the multi-disciplinary business field and the interdisciplinary
computer science to evolve a new computation. But the greatest obstacle is psychological problems when implementing information system. Basically, the ultimate motto of information system is successive implementation. Reducing the obstacles will penetrate the success. Cognitive psychology studies provide basic and strong knowledge about human intelligence. So for this reason we adopted cognitive psychology to reduce the psychological constraints of users.

The attention of human clearly describes a different kind of attentions of human. By exploring this area, we found some valuable suggestions which are useful to getting good attention from the user of an information system. (See chapter 3.5.1)

Problem solving nature of human gives suggestion to improve the problem solving strategies for human. Why this study is needed now? Information system design is complicated processes which has lots of problems and may create problems in implementation. So this kind of study is needed here. (See chapter 3.5.4)

Development and expertise describe about intelligent tutoring. User must have a Proper knowledge to access an information system. So, trainings and tutoring are conducted to the user by exploring this chapter we can get some knowledge about tutoring. (See chapter 3.5.3)

3.12 Arguments for an Empirical study

The outcome of the theoretical study has answered for most of the questions that we were stated. Beyond these identified answers still we need to verify our theoretical results to our empirical survey. For this reason, we have taken up three interviews to the professionals who are working currently in information systems. Empirical data were collected through three different types of interviews to three different professionals.

4. empirical survey

4.1 purposes

Sometimes our theoretical findings perhaps not give exact results for the research that we are doing. For this reason, we need to verify our theoretical findings with the empirical outcomes. Empirical surveys could example be interviews, observations, questionnaire etc. In our study, we have chosen the interview method to find the results. However, our theoretical outcomes are not sufficient enough to provide an obvious result.

4.2 Sampling

It is essential to sample the empirical study i.e. in our case interviews that is typical for the group of people that the issue is related to. People or a professional who have knowledge in an information system is being selected in our case. There are two types of sampling we need to address before selecting the interviews. One is probability sampling and the other one is non- probability sampling.
Probability sampling is one in which it is based on the unstructured and random processes whereas in non-probability sampling have a structure before proceeding any action. (Alliger & Williams, 1993). Since, we don’t have enough time to do in the probability way of sampling and it may take more days to finish. Because of this reason we have structured a format for interview and performed in non-probability method. One such criterion will select the interviewees that are most available during the time period for the research. In an alternative non-probability sampling method the researcher decides from the beginning how many objects with specific properties that should be included in the study.

Another kind of non-probability sampling is a subjective sampling. It can be used if the researcher has a good knowledge that he can make the sampling after his own head. A purposive sampling is a non-probability sampling method. It starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not fit the purpose.

Before the interview starts we have revealed the purpose with our research. We also have used some experts to find interviews which are related to our study in the field of information system to perform. Thus, using a kind of purposive sampling method where we gave the options to the experts.

4.3 The interviews

An interview is an effective way to gather information. A qualitative research interview seeks to explain and the meaning of central theme in the life world of subjects (Sekaran, 1992). Interviews are finished by interviewer based on what the respondent says. Moreover, interviews are time consuming and they are resource intensive. Open-ended interviews are asked to all interviewees and this type of approach facilitates faster and better interviews that could be more easily analyzed and compared.

The following interviews are based on theoretical studies. Each question is framed in such a way that the interviewers can get into the aroma of research by letting us know how they view the problems in their organisations. Not all the interviewees get the same questions. Some questions are unique to each interviewee, so that we can obtain information from them which can only be given by personnel of certain portfolios.

Telephone interviews enable a research to get information quickly and efficiently. It allows some personal contact between the respondent and the interviewer. (Denzin & Lincoln, 2000) It is essential to organize in elaborate and depict the interviewing process before starting the formal study. Interviewer should explain his background and purpose of study to the interview before starting. Apart from this, there are some qualification criteria’s which needs to be addressed or look upon for the interview. Such interview criteria’s are knowledgeable i.e. Familiar with the topic, structuring i.e. should explain the outline of the interview.

The roles and procedures are well defined in a research interview. It’s not like a communication between two equal parties. The interviewer should explain the situation, introduce topics and control the development of the interview. The outcome of the interview
is highly dependent on the interviewer’s preparation that has made before the interview takes place. The interviewer must have a pre-knowledge of the target area for the interview and he/she should consider different interview techniques and decide which is suitable. It is also essential that the interviewee should be informed about the purpose, how the result will be used.

There are two main types of interview questions. One is open type and the other one is closed (Kvale, 1996). An open type question will give greater response from the respondent and can get the answers are in detail whereas the closed type would be option and yes or no type question (Mc Namara, 1999). So, we don’t think it is effective to proceed in this way. Thus, open type method will have great verbal flow and can get the answers in very clean and clear manner.

Before the interview starts, we have structured a list of questions in an interview structure (See appendix) for the list of questions. All the questions were a mixture of open and closed type and the interviews were conducted through E-mails and telephone calls. We skimmed some articles about how to conduct and perform an interview and structured the questions in order and built.

However, some of the concepts needs to be addressed more effectively for that we have taken up some additional concepts that were used in the research and the question structure. The purpose of this interview is that it could take part in the final outcome of our thesis which constructs the interview. we have just noted down the information and important keywords for the answers. Afterwards we have reconstructed the information’s and important keywords into full and meaningful sentences.

4.4 First interview

Tata consultancy services was established in 1968 and it has grown to its current position as the largest IT services firm in Asia on the basis of its outstanding service records. The company offers a wide range of services including consulting, IT, business process outsourcing, banking and financial services, IT infrastructure, engineering and industrial services.

Currently TCS has a presence in 35 countries all over the globe. Its offices are grouped and spread geographically in North America, Latin America, UK, continental Europe, Middle East and Asia pacific. At the end of the financial year 2008-09 it was a EUR 2.78 billion revenue company with 91,000 employees.

Earlier to the introduction system each and every division of TCS have across all over the world and that are carried under their own terms and conditions. It was one of the top 10 large scale organizations (TCS, 2009). The first interviewee is IT analyst with 12 years of experience in the information system. The interviewee has been involved in the developing and implementing information system since 1998 when he was a developer in application development of IS. Presently he is working under the management field as a system administrator in India.
Thus a general interest in the management since all of his members should develop and implement a system by his guidelines. The first interviewee told that the business functionality is an important thing to be addressed before implementing an information system in order to ensure better results.

The system interface could process the user with simple and flexible communication with the system and also it is an integral part of the information. When looking into the user experience compared with the system interface, information will get succeed if the users are well experienced and knowledgeable.

The interviewee addressed about the system reliability that a reliable system should support the user’s needs in a precise and consistent way, the psychological problems can be reduced for the users. Training and support is difficult when users introduced to a newly information system. It is an effective task that needs to be identified very keenly. Hence, the training should be provided in an apparent way in order to reduce the low productivity. Lack of end-users training is also one of the concern and reason why IS fails.

The interviewee told that the psychological constraints are knowledge sharing, transfer of knowledge and disconnected psychological views can cause the system implementation. He told an illustration with one example that has been happening in his organization. Frequent change in personnel in an organization may be imposes a problem and miscommunication between people and eventually outcomes the low productivity.

The first interviewee thought that the user acceptance comes from the term usability. So, he told that the usability of an information system is a typical concept of user acceptability that derives from the function of the system. The implemented system does not rely on usability. Hence, he concluded that if increases the usability one can easily enhance the user satisfaction and could easily avoid issues and constraints.

**4.5 Second interview**

Shriram value services are a leading IT solutions company with a strong technology and domain expertise in finance with a proven record of high quality solutions and the Company’s head office is located in Chennai, India. It was established in 1970’s and currently it is one of the largest IT solution services in India.

The company has more than 25,000 employees who are working all over India and his main and important business objective is to provide a better user satisfaction and maintain high standards of technical competence (Shriram, 2009). Company has a profit track record of 5.6 billion dollars annually. The interviewee is a developer in the group as well as having a product a product responsibility with 5 plus years of experience and he has been involved in developing an information system since 2005 he was a programmer analyst.

Currently the interviewee works under the information technology development field. The key functionality is the important criteria should look and develop the information system. The second interviewee told that functionality and interface of the system can effectively be
improved in order to gain high success rate. His company’s main aim is to deliver user satisfaction and reduce the poor usability of the system. The main key concepts of the usability are effectiveness, satisfaction and efficiency.

The interviewee clearly told that if increase the effectiveness and efficiency of the work can easily ensure the satisfaction of the user and also the constraints of design and implementation and validation of systems to enhance the usability of an information system. Acceptance was perceived as a function of user involvement in systems development and implementation.

Understanding the psychology of user acceptance emphasis worked on the design of system interfaces. Most of the problems are coming from management information system where the developers are trying to predict the user’s reaction to new technologies in an organization.

The second interviewee told that for an instance one individual is unhappy with reliability and thousands are having problem with the interface, the system interface takes position and it will be analysed by the company’s head office to trace out the difficulties. Otherwise nothing will happen.

Usability allows the acceptance into the design of the system interface between the technology and the user, thus, the user acceptability will definitely influence in the implementation process and it might create an issue at anywhere in the project schedule. The interviewee suggested that increase the usability on reducing constraints could easily avoid the issues while implementation and hence they can improve the user satisfaction.

4.6 Third interview

Wipro limited is one of the largest product engineering and support service providers worldwide. Wipro provides comprehensive research and development services, IT solutions and services that include information system outsourcing, design and development and implementation services to corporations globally. The company has recorded revenue of US$ 2.81 in the financial year 2008-09 and the company has more than 70,000 employees worldwide in USA, Europe, Middle-east and Asia Pacific.

The third interviewee is an associate server engineer with more than 4 years of experience in the field information system. The interviewee has been involved in developing and setting up the new technologies. Right now he is in a position mainly on server related problems. The size of a company is much important because people views vary from small size to large scale organizations. Small size organizations have few technical employees whereas in large scales they are working under the corporate offices.

The third interviewee said that the user experience is the key factor in the organization. Functionality may create user frustration and this may lead to use of the system of resistance. Once the functionality of the system has fixed then no remains in acceptability and hence it is reliable.
He told that user’s feedback is an important thing in order to look into different kinds of issues because one user may feel one kind and other things in alternate way. The variation of suggestions will definitely give solutions and can enhance the acceptability of the system.

Adequate training and support is needed in order to create high productivity. Thus training should be provided in an apparent way to reduce the low productivity and enhance the usability of an information system. End-user participation in the implementation process is captious.

Low usability of an IS often leads to adjust the system by 40 percent and in result massive loss for the organization. The main challenge in the implementation process is not related to the technological content but the people constraint. Hence, the third interviewee concluded that by giving more preference to the interface and training to the organization will reduce the low usability and maximizes the acceptance.

5. ANALYSIS AND RESULT

5.1 Analysis

The result of both theoretical and empirical parts of our research are analyzed and differentiated and compared with each other. Both the similarities and differences are identified and provided in the results.

As we have stated in chapter 2 our method of analysis for theoretical study was done by text analysis and for the empirical part, we have used interviews to find the problems in real time environment by skilled professionals in order to get better results. To provide in a meaningful basis, our method of analysis had been split into four phases. The first phase dealt with analyzing the information system life cycle, second phase dealt with identifying the roles in information systems, the third phase dealt with the analyzing the psychological constraints faced in the organization and the final phase dealt with the procedures and suggestions to minimize the identified constraints. The comparison of empirical survey with collected theoretical study is processed. So, our method of analysis is a comparative qualitative analysis. The answers to the research questions are presented by comparing both the theoretical and empirical outcomes.

5.2 Summary of the Results

Sub question: 1

*Is the term ‘user’ only related to end-user?*

A user is nothing but a person who develops an information system. The end-user is an individual who uses the system or application after it has been developed by the user. From the theoretical outcomes we have found something that is related issues regarding to end-user. The stakeholders are used to refer the individual or any organizations that are using
information systems or who would be affected by the system and who have a direct interaction between the influences of functionality, stakeholders comprises of system development, direct and indirect users of information system.

From the theoretical findings we have found some similarities and differences between the user and the end-user. Many categories of users are involved in the information system from primary to tertiary. Primary users are the one who uses the system frequently; secondary users are the users who are occasional users and tertiary users are the users who are in very rare in usage. When implementation gets fail, the technology itself is good but the end-users are not using it.

The first interviewee thought that the end-users who are unhappy in learning new technologies and their roles are becoming the technology and they are adhering to be not satisfied. The second interviewee told that major technology implementation has a number of stakeholders they lead to higher level of acceptance and thereby leaving the observation of processes to further research.

Frequently systems are implemented with very few users. This has to be balanced in a right way to avoid most of the problems. The third interviewee thought that concerning to reduce the resistance to change and hence enhance the value of new technology, end-user participation in the implementation process is captious. The psychological constraint that comes with the whole process minimizes the fear and maximizes the user readiness to satisfy the change.

From the theoretical findings and empirical results the users are not related to the end-users and hence end-users may vary from users in all actions and the major problem are coming from the users point of view, end-users are the only users of the system that has been developed by the skilled users.

**Sub-question: 2**

*Why do users experience bad feelings during the implementation process?*

The user experience is the key factor for the organization. There are some factors that should be addressed to avoid the bad feelings of the user. One such factor is reliability of the system. From the theoretical outcomes the reliability of the information system should support the user’s needs in a simple and consistent way (see chapter 3.5.4). The second factor needs to consider are an interface that is a means to enhance the communication between the users and the system. The interface of an information system perhaps gets failing if the users experience the bad feelings. So, it is important that the interface should be in an understanding way for the users.

We have found one more experience that is functionality of the system should have up to date in the knowledge that is allocated by the user. Once the functionality of the system is fixed then there is no remaining user frustration and it is a reliable one.
The main result of theoretical findings is training and support is needed to reduce the constraints. Bad training and support will lead to low productivity and not dissatisfied users.

The first interviewee from Tata consultancy services thinks lack of end-user training and the reason behind the failure to comprehend IS works is a core concern why newly implemented systems get fail in the initial stage. Since his current organization mainly focusing the training and it is adequate for the successful information system implementation.

The second interviewee from Shriram value services told that the training should be provided in an obvious way in order to reduce the low productivity and enhance the usability and the users with some familiar knowledge is needed for the organization for the organization to avoid the misunderstandings and constraints.

The third interviewee from Wipro technologies thought that acceptability comes from the usability and the feedback to the users is needed in order to look into different kind of constraints or issues that were faced already in previously implemented information system. So, he suggested that feedback of the system is essential in order to validate the entire system before implementing a new one.

**Sub question: 3**

*What aspects are essential to minimize the resistance and enhance the acceptability of the system?*

Implementing information system is developing their business. The main question of user satisfaction is of responsibility to the researchers who need to predict which technologies are likely to be received by the user and it will prove more suitable for an organization.

User acceptance is the key to our process and this experience due to misunderstandings and poor usability of the system. The problem conveyed on multiple theoretical views and on research in organization, system analysis, user design and interface. From the theoretical findings usability allows the acceptance between the technology and the user.

Expressing the concept of usability in dynamic form is to increase the chance of acceptability to the individual user level. The first interviewee from Tata consultancy services suggested for improving the acceptability that the user acceptance comes from the term usability. The implemented system does not rely on usability he says. The second interviewee from the Shriram value services suggested that if increase in the effectiveness and efficiency of the work can easily ensure the satisfaction of the user and also the constraints of design and implementation and validation of systems to enhance the usability of an information system. Understanding the psychology of user emphasis is the design and interface of the system.

The third interviewee from Wipro technologies suggested that it is important to look the user’s feedback for the previously implemented system, because user’s views may vary from small size organizations to large-scale organizations. So that the professionals and researchers can come to the clear point and avoid such constraints. Hence, understanding both empirical
as well as theoretical findings associated with the acceptability and should remain important for all the researchers in this field.

**Sub question: 4**

*Why cognitive psychology and interaction design are needed in order to increase the user acceptance?*

The conventional notion of problems encountered while implementing an information system is viewed to be technical. But the ironically, the problems lead to the contrasting idea of psychology. This proves to be the quintessential sphere of the problems that ought to be solved. The reason is that when users experience psychological problems, the entire information system renders unusable. In our work, theoretical findings and empirical studies were consulted. All the findings and suggestions are oriented psychological factors. These findings can be categorized into theoretical findings and empirical studies.

We have employed text analysis in our thesis. We have looked up the life cycle of an information system and interaction design. A deep study of these two subjects has helped us to move forward into with the suggestions and guidelines. Critical study human psychology is essential for this sort of work and cognitive technology has helped us a lot. Interaction design and empirical study have been our point of concern in order to guide us. The following are the brief account of the works carried out:

Interaction design deals with the interaction between the user and the information system. It encompasses concepts of varied depth and discipline concerning psychology. We have chosen the ones concerning user involvement in the design process. It is quite evident from the study that users and employees of the organization can be blended; in the sense their views can be gotten in the design process in order to achieve better results. The following are the observations that we have made during the course of study,

A user can be made to involve into the information system development either in part-time or full-time mode. This improves their involvement in the information system.

He can be at least being called in when the design process is in the process. This can effectively increase, productivity, reduce redesign and it will create ownership sense to the user of the product.

Use oriented design mentioned methodology emphasis on the purpose for which the system is designed for. This effectively increases the system’s usability. This approach drastically cuts the constraints while implanting the planed information system. The entire information system is designed based on what purpose it is intended to be built.

User oriented design method proposes the user is the centre of the focus. The design of the information system is carried out based on the basis on the experiences of the users involved and cognitive psychology is the last part of the theoretical study. Cognitive psychology deals with the study of human mental and psychological activities against information systems.
Training of the employees is important as according to the information system being designed. It helps us to improve the strategy to improve problem solving technique. Training is an important aspect of information system which needs much attention than the others before actual implementation. Training should be done on the basis of 1. human capability, memory and attention which in turn are classified into visual and auditory. It also deals with learning capacity. Without proper training, the information system cannot be designed and also utilized properly.

As regarding empirical study we have interviewed three distinct personals from three different organizations in India. The first interviewee was quite co-operative and clear about the answers he gave us regarding the questions we asked him about. His feedback was the following,

Information system in the corporate he is working on is being changed frequently changed from time to time. This has resulted in the following; productivity was affected in the negative pattern, System usability was tempered to quite considerable level. It was a bit of concern to him with respect to his position in the concern and productivity of the organization.

The second interviewee was of a medium level software organisation and his view was of that the decrease in the concern was that their employees were undertrained and it leads to a lot of expensive training sessions during their implementation.

The third interviewee was the only one of the persons belonging to an MNC who was almost satisfied with the information system which was implemented in their corporate. But even he did reveal his concern about the psychological factors affecting this domain in the organization. His position in his information technology company has made him to comment on various factors,

As a sharp contradiction to his satisfaction, the information system he has been working on has in fact has been changed three times in this year alone. But he was able to cope up with the change as he is relatively new to the field of information technology when compared to the others. His seniors as a sharp contrast have experienced constraints when it comes down to information systems being updated.

As far as we have enquired, we have received information that feedbacks from various personals have been neglected during implementation or design phase. Suggestions from persons like associate server engineer and software developer and tester have to be recognised regardless of seniority in order to achieve efficiency in software development prior to implementation and planning. If that’s not the case, they ought to be considered at least during implementation.

Therefore, we state that empirical study and theoretical study on human behaviour in informatics is essential and need to be addressed while considering the implementation of a information system as one of the other entities bring forward the real perils lurking behind information system and informatics.
Hence from the theoretical outcomes and empirical results the user experiences are more in
the training and support. The organizations give more importance to the system interface and
providing proper training for their employees in order to increase the usability and minimize
the low productivity.

As far as we have concerned, researchers in this field have noticed mainly on cognitive
psychology in order to understand the user’s mental view and how to provide user
satisfaction. Psychological and social constraints of user acceptance at any individual level
need to be designed more efficiently in the implementation process.

6 DISCUSSIONS

6.1 Conclusion

The study has discovered some solutions that are relevant to the psychological problems in an
organization and also found some methods to reduce the bad feelings of the system and
enhance the user satisfaction of the information system. The aspects discovered in the
theoretical part as well as in the empirical part have been verified.

This research study has resolved to give new theoretical and empirical views on user
acceptability in the implementation process in any kind of the organization. The theoretical
findings that emerged from this study point out that usability comprised of a number of
factors that work together to create user resistance. Most of the users working in an
organization need and want an easy system to use, simple and easy to learn and reliable
system that support them to do their jobs. Success and failure in an organization is the
deciding factor, identified literature says.

Coming to the psychological point of view, users depends on six types of elements and it
includes functionality, reliability, user interface, support and training, working environment
and the end-users. Each and every element has taken part as individual in order to get the
success of an information system and also the combination of these elements leads a way to
user satisfaction and it varies depending upon the users’ point of view.

While addressing the origin of problems that may arise for the users, involve three types. As
we have discussed in the theoretical and empirical parts, users can be split up into three types
in the organization. Based on the findings most of the problem persists for primary users and
major problems were based on the functionality of the system.

One interviewee stated that the working environment for the primary users is one of the
causes for employees. The user that is primary users needs a ventilated room and a silent
environment to carry out his work without any disturbances. The research has found the users
who felt that training and support are not sufficient to carry out their work practices correctly,
were dissatisfied with the overall system.

In the empirical part of the research, we have found one aspect that was not identified in the
theoretical research or study. It is important to conduct a feedback session in order to find the
problems that already existed in the related field, So that the current organizations can easily rectify their errors.

Frequent change of users in an organization may lead to misunderstanding and finally results in low productivity. If organizations avoid the change in users, they may get better productivity and hence can enhance the user satisfaction by reducing the bad feelings of the system, results in high usability and success.

The main question of this study is “How is it possible to create an implementation process to reduce bad feelings from the users and enhance user acceptance of the system?” has been presented and answered by the aspects described in this conclusion.

### 6.2 Implications for Informatics

“Informatics, as we understand, is a discipline tracking (leading) the development of information technology with the ambition to put that technology to good use, acting both on the technology and on the organization of its use” is written by (Dahlborn, 1997). Informatics deals with the development and use of information system. According to our result, the main possible implication to user practice, is minimizing their psychological constraints will bring happiness in their mind while working and it will form a basic for increasing their work. Third interviewee of our empirical study was mainly worried about feedbacks. They are not properly recorded and used in the information system. Our study can use to enhance the problems of user.

The implication of the result for developer practice argues the need for changes in designing, developing and implementing of information system for bringing success. The result also initiates the improvement and gives some suggestions about the training for the user. Developers must have the responsibilities for providing successful information system. Otherwise the productivity will become low.

### 6.3 Method evaluation

The purpose of the method evaluation i.e. In our case, text analysis has been used to find some related properties in various subject areas and to compare them to the information system environment or organizations.

This type of text analysis method has used for us to relate our research questions to the existing theories and previous research findings. The only problem we have faced in this method was to sample the literature primarily in order to get the solutions.

To provide a meaningful basis and better understanding of the problem area we have exploited some theories and concepts. Sometimes it is very difficult to get an obvious solution for our problem while looking through a lot of concepts and theories. Because most of the concepts and theories the same phenomenon may repeat and thus results in overlaps with one another. Different concepts perhaps have to be separated and adapted before use it.
In the theoretical study, the studied documents are entirely new and also from the part of our field that has the same view on concepts and theories related to the subject area of the study. In the empirical study, the evaluation method that influences the user acceptance in the implementation process was studied.

To validate the aspects that were found in the theoretical study, we have performed interviews to professionally experienced people of my subject. We believed that, they had a pre-knowledge that is related to the target area before the interview starts and we have started the interview through telephone with simple questions that is related to the background and nature of role in the organization. It was an open question, introductory question: “Describe the type of information system that you are using within your organization and what is your role in the organization?”

These questions lead to the description of an information system and it turned out that the already prepared questions were answered one by one. Afterwards we asked the closed and direct type questions and we were engaged with the interviewees several minutes for one answer.

From the interviews we have gained some knowledge, like the flow of questions should be ordered and clear cut to the interviewees so that we can reduce misunderstandings. The problem with interviews is that it gives an answer that the interviewer wants. Another problem we faced during the interviews is that sometimes miscommunication problems arose between interviewer and interviewee. We believe that this can be reduced in face to face interview. Since we did not have enough time to conduct face to face interview, we did them over phone and e-mail.

Hence, our point of view is that interview is an excellent method to gather the information we need and verify the aspects found in the theoretical research.

6.4 Result Evaluation

The validation starts with discussing the criteria that were presented in the (chapter 2.5) qualities of texts are validated by the criteria’s internal logic and ethical value.

The presentation of internal logic is concise and consistent with the research question, data collection and data analysis. We have taken up research question as a basis and accurately explained the methods and analysis we have used.

It is essential that the research is guided by ethics (Larsson.1994). The researchers must be careful in the same concepts at different labels. Each and every research area perhaps creates new ideas, concepts and theories that all together create the method. It is also essentials that the conclusions given in the research are dependent on collected data and analysis. We have explicitly given our conclusions from the earlier parts of our research.

The interviewers should be treated in an ethical way. All the information we have explained in this thesis is true information and the interview result is used. Moreover it is potential to be honest in all aspects.
The quality of the result is evaluated through the criteria *richness of meaning*. It purely relates the hermeneutical perspective that is combining different parts of the text to a whole. Looking at our research from a higher level, it is likely to have interpreted several views, for example cognitive psychology, interaction design and usability of a system, to create a view on the character of knowledge and increase the user satisfaction in the information system. However, we have tried to combine or interpret the meanings that we have presented with various concepts into a whole that will brighten the research questions.

*Structure* could be appraised as a contrast to the richness of meaning. A better structure will create obviousness and a reduced degree of complexity. If the complexity is reduced, definitely it will give a good structure.

*Discourse* method deals with how well the argumentation of the researcher holds good when analyzed with the other arguments. Our study uses various views from different subject areas, which perhaps advances to different conclusions, and they might unfeasible from another view.

If the research contains theoretical study as well as an empirical study, it is essential that there is a consistency between the studies. Through the empirical survey we got evidence that the combination accompany with reality. The method *consistency* could be seen as important for the hermeneutics research.

### 6.5 Possibilities to generalize

The topics chosen for our thesis are theoretical studies and empirical studies which encompass facts on how to improve user acceptability and developing user friendly information system.

So the findings intend to improve the overall acceptability and usage of the system. Thus, in a broader sense our studies and suggestions will prove its workability on any environment that has users who can be made to involve in the design of the product he wishes to obtain. This holds true for any field apart from information systems and informatics.

For example, take the case of ‘training’ that we have stated about. In our informatics field, it is suggested to train the employees or designers on how to use the designing tools and software in order to produce the information system desired.

Now, think of an automobile designer while making the initial designs for a new model of the automobile in a relatively new designing platform. According to our findings, he must be trained in the new design platform and its features that are in sharp contrast with the older one he is used to.

This surely would reduce the possibilities of design errors and increase the quality of the design that he makes through the platform. It also makes the designers to get accustomed to the newly installed working environment with a better understanding of the features that are included in the new environment.
Our result completes the circle only if we mention about the ‘users’ part. That is to say that any field of application changes dramatically when a user is getting incorporated into its designing or planning phases. Let us say, we take the same automobile industry and try to brief the above said guideline. Now, if a potential customer or potential class of customers is into the designing phase, they will bring forward their views and ideas of what they want exactly on their automobile and cut out the other features that are not so important and virtually needless installments on their vehicle. From this point on, the automobile manufacturer can focus on the list of what are needed or expected by their class of customers or customers and move on to the final stages of prototyping and actual production of the automobile. This effectively increases the time of production and reduces the cost of production as unwanted features are literally excluded from the automobile model. And finally, the most important player in the field, the customer appreciates the quality of the work as it is tailor-made to their needs and comfort.

From the above illustrated example we can draw a conclusion that our works are indeed applicable and trustworthy outside the research area and study.

6.6 Ideas for continued research

For the purpose of continued analysis and research, ‘time and cost issues’ that arise when a user is made to involve in the information system prior to installation and usage can be taken into account. This is a very wide topic to ensue and too large for us to incorporate into our work. The second one would be on ‘methods used in empirical studies’.

In our theoretical analysis part, we have suggested how a user can be made to involve into the life cycle of the information system and increase efficiency and reduce acceptance constraints. Now, an innovative research could be done in different ways of implementing a user into life cycle can be done. The consequent factors like production cost, time taken, etc are to be addressed too. A user can easily change the flow of design as the original design changes according to the user’s taste. When it is redesigned, the cost of redesigning could be high and they come up as an extra to targeted production budget.

It is quite interesting to see how these can be analyzed by researchers to reduce the productivity cost. If such results can alter the productivity cost, it would be more efficient for users to move into the sphere of design without disturbing the budget by a considerable margin.

Time taken to finish the project is also influenced by our proposal. Iterative design blog the rate at which the information system is designed. This factor is of key concern to any organization during production and delivery of the software. Refined methods to reduce time taken to complete the system would prove to be a vital asset in order to establish efficiency and credibility of the organization for developing information systems.
Coming down the aspect of empirical studies, all the interviews undertaken by us were over the phone. A chance of face to face interview was quite difficult to carry out with the given amount of time to complete the thesis.

The interviews went good but still it lacked the punch of a face to face interview. Hence, it would rather interest to know how psychological factors would come into play during such direct conversations.

One can visualize the impact of the above stated alternatives or possible research fields on an information system in real life.

**6.7 Speculations for the future**

A method such as ‘user inspection methods’ is on the rise in the field of informatics. More specifically, the method of ‘cognitive walkthrough’ is considered as a future standard. In accordance with the methodology, various task analysis procedures are carried to collect problem data and related findings. After that, based on the collected data the initial design is altered or redesigned.

Cognitive walkthrough is being appreciated for its efficiency in reducing cost of production of an information system. Despite its reputation, the entity has a few drawbacks when implemented on a large size information system development. But future enhancements might subdue the ill-effects.

The methodology could be substituted for the present techniques in order to find out how effective it would be for a mass usage across the globe as it contains some promising factors that could be decisive for any information technology based concern while producing an information system. They also have plenty of key areas that could help researchers to magnify its impact in the field of informatics.
REFERENCES


APPENDIX

INTERVIEW STRUCTURE

1. How many years are you working with information system?
2. Could you describe about your organization and background?
3. Describe the information system within your organization?
4. Could you explain your role in the organization?
5. Are you a key user in your company?
6. Does the information system do what it is extended to do?
7. Do you think the business functionality is essential to the system success?
8. Is there any particular thing of the IS you could change it to do better?
9. How potential is the system interface in an organization?
10. How much important is system reliability?
11. Does proper training and support leads to information system to get success?
12. What are the key elements that create user disappointment?
13. How does your company or organization ensure the information system success while implementation?
14. Does your organization carry out implementation reviews on the IS to get user satisfaction?
15. What extent your organization carried out the implementation?
16. How did this implementation process works?
17. Who are all involved in the process of implementation?
18. Does end-user will take part in the implementation process?
19. What role does en end-user play?
20. What are all the problems you have faced during implementation?
21. What kind of psychological constraints are you faced while implementing a new information system?
22. Do you have any bad feelings in information system implementation?
23. How is information system used in an organization?
24. Describe the usability of the information system?
25. Could you suggest some training strategies to lead a better IS?
26. Does training and support will efficiently work and enhance the user acceptance?
27. How usability influence the system?
28. How to improve the efficiency and enhance the user resistance?
University of Borås is a modern university in the city center. We give courses in business administration and informatics, library and information science, fashion and textiles, behavioral sciences and teacher education, engineering and health sciences.

In the School of Business and Informatics (IDA), we have focused on the students' future needs. Therefore we have created programs in which employability is a key word. Subject integration and contextualization are other important concepts. The department has closeness, both between students and teachers as well as between industry and education.

Our courses in business administration give students the opportunity to learn more about different businesses and governments and how governance and organization of these activities take place. They may also learn about society development and organizations' adaptation to the outside world. They have the opportunity to improve their ability to analyze, develop and control activities, whether they want to engage in auditing, management or marketing.

Among our IT courses, there's always something for those who want to design the future of IT-based communications, analyze the needs and demands on organizations' information to design their content structures, integrating IT and business development, developing their ability to analyze and design business processes or focus on programming and development of good use of IT in enterprises and organizations.

The research in the school is well recognized and oriented towards professionalism as well as design and development. The overall research profile is Business-IT-Services which combine knowledge and skills in informatics as well as in business administration. The research is profession-oriented, which is reflected in the research, in many cases conducted on action research-based grounds, with businesses and government organizations at local, national and international arenas. The research design and professional orientation is manifested also in Innovation Lab, which is the department's and university's unit for research-supporting system development.