Problems when implementing Information Systems

– Proposing Check List & Strategies to increase user satisfaction and user acceptance
Title:
Problems when Implementing Information Systems

- Proposing checklist & strategies to improve user satisfaction and user acceptance

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Abstract

In this age of technology, people or the companies all over the world have started using the easy way to find information or to process a particular task selected or given. In this path, Information systems have gone a long way with day to day improvements and upgrades with everything about what it can be done to give the right access and right task to the users.

The developers have gone to such an extent that nothing can be compromised in the development or in the implementation of Information systems, however in the practical scenario there are many issues that are to be taken into consideration to develop an Information System and also in the implementation of the same.

Here, in this thesis we will try to bring out those factors where in the implementation of Information Systems can go wrong and what are to be considered in order for the IS to be useful than it has to be emphasising on user satisfaction and user acceptance.

Keywords: Information Systems, User Acceptance, User Satisfaction, Effective Communication Checklist, Strategies, Traceability, Continuous process Improvements.
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Directly or indirectly every friend of us, be it here in Borås or anywhere in the world has helped us for some or the other feedback about our report and the way that we conducted the research.

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Pradeep Kumar Bokka
Thangabalu Thirugnanasambandan
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1 Introduction

1.1 Background

In the society of technology advancements, everyone is in need of moving to information systems or updating their information systems. Even though they have the desire to go with the new information systems, they have some doubts and fear. They fear whether the new information system would make a negative impact on the key aspects of the functionalities. If they already have an information system, they fear whether the new system would be compatible enough to take the data from the database of the current system effectively without any trouble or mistake. The reason for us to take up this pivotal point is that psychology plays an important role when it comes to people and organization.

Communication is the key factor between people who interact from the information systems company and the customer company. This starts right from the agreement signature. There should not be any miscommunication in any phase of the work. If there is any, it would be the major reason for the user dissatisfaction and the user non-acceptance.

Customers fear whether they can handle the new system effectively and whether the new system would satisfy the end users. The negative effect of any of these things would ultimately lead to the frustration of the customer and that is the thing which makes the customers to think for a long time before they move on to the information systems.

When implementing Information systems, User acceptance and User satisfaction are the important criteria which determines the success of the implemented systems. User acceptance is often the pivotal factor determining the success or failure of an information system project (Fred 1991, pp 475-487). Lack of user acceptance has long been an
impediment to the success of new information systems (Gould 1991, pp 74-85.). Likewise, User satisfaction also have key role when implementing information systems.

1.2 Statement of Problem

This is the age of computerization. Companies who are doing their work manually with pen and papers want to computerize to finish their works quickly and effectively. And some companies want to update their computerized works which they are using already. But there arises some problems when implementing Information Systems. Users fear whether the new computerized system would decrease the importance of his/her role in the work and whether they can handle the new system effectively. Lack of perfect communication between the customer and the company which implements the information systems leads to create defects in the outcome.

Customers are sometimes reluctant when they are moving to information systems. They create doubt in themselves in each and every line of the requirement and they doubt whether the information systems company would implement it successfully. So, they are not flexible and friendly with the working team. This creates lots of chaos and confusions. Customers hears about the user dissatisfaction and user non acceptance when a company implementing information systems from the internet and from the friends and other sources. So, they are very much reluctant to even think about moving to information systems.

These things ultimately increase the user dissatisfaction and user non acceptance which leads to the failure in the newly implemented information systems.

1.3 Purpose of the study
In this age of computerization, it’s not good to stay away from computerization and hence companies started to implement information systems, but the factors like user satisfaction and user acceptance plays a key role in implementing information systems. The purpose of this research is to study the problems from user point of view when implementing information systems and come up with implementing strategies which would increase user satisfaction and acceptance.

1) Learn customer behaviour so that we can facilitate the better communication between the customer and the company which implements the information systems.

2) Learn about how to increase the user satisfaction and the user acceptance when implementing information systems and propose an efficient way to handle these parameters.

1.4 Research questions

For any research, the aim of the research is very important and to approach to this aim, one needs to question the existing product or existing research for the betterment of the same. For our thesis we have framed one main question and two sub-questions (which lead to the main question eventually).

**Main Question**

How can the implementation of an information systems be performed in order to increase user satisfaction and acceptance?

**Sub Questions**

a) What aspects or concepts or factors are to be considered for user satisfaction and acceptance when implementing an Information System?

Every research topic has a few key concepts that are to be included to get to the aim of the research. Here in this question we will try to frame those concepts which are important to the Implementation of Information Systems that leads to User Satisfaction and User Acceptance.
b) What implementation strategies should be used when implementing an Information system to increase user satisfaction and user acceptance?
These questions bring out those strategies to be implemented to reach the goal, taking the inputs from people and previous researches into consideration.

1.5 Target group

Research is mainly focused on the users who are implementing information systems and the researchers within the informatics field. The implemented strategies will be useful for the companies who are implementing the information systems. Customer would be indirectly benefited even though he won’t do anything with the research outcome. It would be very useful for the researchers in the informatics field to see the research outcome as an initiative to do further researches in the various directions to maximize the user satisfaction and the user acceptance.

1) Users of Information Systems (Any kind of User at any level of Hierarchy) ex: Students, Employees, Clients, Software Companies, or any Organization.
2) Software companies which serves its customers by implementing Information Systems

1.6 Delimitations

This research mainly concentrates about how to improve the user acceptance and user satisfaction when implementing information systems. The main thing left out in our research is the technical aspect and their subsequent fields of interest and studies.

1.7 Expected outcome
We will try to get the clear picture about user satisfaction and user acceptance as to what do they expect from the Implementation of Information Systems. The research outcome would clearly tell how to deal with the critical areas and how to interact with user without creating a bit of doubt or hesitation in his mind. And after comparing and validating both theoretical and empirical study, we will create a check list which would have clear solutions and strategies that can be followed by the companies as a check list to make sure that they are doing everything correctly while implementing the information systems to improve the user satisfaction and the user acceptance.

The prepared check list from the outcome of the research will be given at the end of the thesis which can be used by the stakeholders when implementing the Information Systems in an organization, so that they can avoid the problems that occur during or after the implementation.

1.8 The authors’ own experience and background

We have a Bachelor of technology in Information Technology from Anna University and Jawaharlal Nehru Technological University in India. Currently, we are Master students in Informatics from University of Borås, Sweden. We have worked for around 2 and half years in the software industry. However, we are limited to general information and we can therefore not trust our own experiences but we will have to get support from theoretical and empirical material written in this field. We have through earlier studies gained knowledge within informatics, philosophy and the consumer behaviour. This background will be useful when for example evaluating influencing factors.

1.9 Structure of the thesis
Research mainly focuses on user satisfaction when implementing information systems. And hence we will research and come up with the major problems which cause user dissatisfaction and user non acceptance. User behaviour plays a crucial role and hence we will be learning about the user behaviour. And then we will be taking surveys from different kinds of users from different parts of the world. And then finally, we will design the implementation strategies to get increase user satisfaction when implementing the information systems.
2 Research Design

2.1 Research Perspective

The aim of this research is to create an implementation strategy which increases user satisfaction and user acceptance when implementing information systems. It is important for us to give a detailed explanation and get a kind of approach for the readers of this thesis to understand what exactly we are going to do to get to the better implementation of Information systems.

As stated by Diana & Maria (2005), there are two kinds of research perspectives, which are Positivistic and Hermeneutic Perspective.

Positivistic Perspective explains the proportions between two things and is expressed in numeric terms whereas Hermeneutic Perspective is a kind of explanation of the theory of understanding. As the Hermeneutic Perspective gives a deeper understanding of the different aspects to give a bigger picture on the whole, this perspective is a stand for interpretation and comprehension than prediction and this is what is needed when a thesis is presented with the ideas of Implementing the Information Systems.

And when coming to the research designs there are two designs that we can talk about and they are Qualitative and Quantitative.

Qualitative Design gathers the data from different respondents but it is not analysed statistically. Quantitative gives the systematic empirical investigation of the quantitative properties. Here in our thesis we are using the knowledge of understanding as our knowledge is related to ‘Problems in Implementation of Information Systems’. In this thesis we are taking a reader through few topics like ‘information systems, its background and history’, key concepts, main areas of the Implementation of Information Systems.
In this thesis we will use Qualitative approach as we are here considering different aspect and scenarios to get a bigger picture and also this particular approach connects to our idea of data collecting from different respondents.

Different ideas have been taken during the data collecting process which are discussed in the coming sections after which is combined to get a single data on a larger picture for us to understand the research better to lead the thesis work for the topic chosen.

A comparison between Qualitative and Quantitative research\(^1\):

<table>
<thead>
<tr>
<th></th>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective/Purpose</strong></td>
<td>To gain an understanding of reasons and motivations.</td>
<td>To quantify data and generalize results from a sample to the population of interest.</td>
</tr>
<tr>
<td><strong>Sample</strong></td>
<td>Small no of non-representative cases.</td>
<td>Large number of cases representing the population of interest.</td>
</tr>
<tr>
<td><strong>Data Collection</strong></td>
<td>Unstructured or semi structured techniques, Individual depth interviews or group discussions.</td>
<td>Structured techniques.</td>
</tr>
<tr>
<td><strong>Data Analysis</strong></td>
<td>Non Statistical.</td>
<td>Statistical.</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td>Explanatory or investigative.</td>
<td>Used to recommend a final course of action.</td>
</tr>
</tbody>
</table>

\(^1\) [http://www.snapsurveys.com/techadvqualquant.shtml](http://www.snapsurveys.com/techadvqualquant.shtml)
2.2 Research Strategy

The purpose of a research is to solve any type of problems faced or to find the root cause of the problem. The research strategy we are following here to collect data is through a theoretical study and an empirical study.

Two types of research strategies are followed in a wide range which is Explanatory research and Descriptive research approaches.

Descriptive Research:
This type of research approach aims to describe the data, statistics that are studied.
Where as
Explanatory research:
This gives a better understanding of the information that is gathered and studied and also leaves a scope for us to develop on the topic in future.

Our thesis work is being done keeping in mind the future developments as the implementation of Information systems should be as user friendly and user acceptable as possible so we shall take up Explanatory research for a better understanding of the topic and in depth analysis. So we believe applying this research approach will give us a better understanding and a scope for the development and for a better implementation of Information Systems.

As said above, two stages of study is conducted which are ‘theoretical and empirical’. In the theoretical part we tried to collect the data pertaining to Information Systems, its key concepts, core areas of implementation. Based on this theoretical part we have a base to go ahead with the empirical study.

Empirical study is that part where in we try to take the topic in practice, meet people, take interviews, collect the data and compare that with the theoretical study data. Interviews are conducted with every kind of possible user of the information system at every stage. The empirical study data that is gathered is plays a vital role in our thesis to overcome
what is lagging in the implementation of information systems as the data theoretically differs from the practicality.

2.3 Data Collection Procedures

As said above in the previous section the data is collected through two ways,
- Theoretical Study
- Empirical Study

Each of the above has its own importance, adds information and plays a vital role in understanding the topic chosen and to drive towards the conclusion that we have thought of.

In the theoretical study we will take the help of previous articles like thesis submitted on the topic, at least related to the topic, journals, research papers, course books and books written on Information Systems. We planned to look on all the available sources with Information Systems and its implementation. We have gone through all the available literatures to collect the required and apt data for Implementation of Information Systems. It was a kind of hard for us to take the right data into consideration as there were many excellent articles and books written by few wonderful authors.

In the empirical study, we planned to interview the people who are the users of Information Systems. The information we gather from the empirical study can be a bit different from the theoretical study as we see that the practicality is always different. We have selected few people to interview because it gives a collective data with different ideas and it also matches with the Research approach we are using - Qualitative Approach.

We feel that the information or the ideas can be gathered only when we interview or question someone who is using Information Systems. So we have decided to go with a student from the university, an employee of an organization and a research assistant.
These three people use the information systems in their own way. This approach gives us a chance to see the variations from theoretical and practical way, which is very important for the thesis to find the differences and develop a strategy to work in a better user satisfied model.

How we collected the data or the knowledge of information for:

Theoretical Study:
- University library is used for course and other books, journals, catalogues, research papers.
- Now a day’s internet a part of Information systems is widely used to gather any source, so, we tried to find and gather some data through university linked journal websites.

Empirical Study
- Mails sent to the concerned authorities or to the person whom we wanted to interview to gather the information from their experience. For this a questionnaire has been prepared and sent to the interviewing people in prior for them to have a look and go through the questions and suggest us the limitations (if any) about the questionnaire.

2.4 Data Analysis Procedure

The data collected for the thesis work has to be analysed rather than just writing what we have gathered. The information that is gathered through theoretical and empirical study is analysed, sorted and written in the way so that the text can be understood easily. Implementation of information systems concepts and subject areas are analysed by comparing the data from theoretical and empirical study. With discussion and brainstorm sessions and idea taking procedures the data is analysed and presented.
2.5 Strategy for validating findings

There are many methods that are introduced by different researchers around the world to validate the findings. However, the most commonly used strategy to validate the Qualitative research findings is **Cross Validation also known as Triangulation**. The bottom line that is followed here in cross validation is to analyse the data collected from different sources and a final outcome is taken. This strategy supports much better to the qualitative research approach than any other because it takes the data collected from all the sources and analyses it for a single and better outcome. Below are the steps to follow when the cross validation strategy is used to validate the Qualitative Research approach findings:

1. Validate the methods used to collect the data.
2. Validate the consistency of data collected from time to time. This assures that the data collected is genuine from a source or individual.
3. Use different sources to analyse the data collected to minimise the bias on a particular topic.
4. Develop a final theoretical understanding of the findings both from the theoretical and empirical study so the final data empowered gives a strong base and understanding towards the implementation.

2.6 Result Presentation Method

We have considered 4 stages for this thesis work:

1. Introduction to Information Systems.
2. Implementation of Information Systems
3. Subject areas involved in the implementation of information systems which leads to the next stage
4. Theoretical and empirical studies to analyse the implementation of information Systems and problems involved in it.
3 Theoretical Study

Theoretical study, a chapter which gathers the information in and around Information Systems and it implementation in order to figure out those factors which play an important role eventually leading to User Satisfaction and User Acceptance.

3.1 Key concepts

The Key concepts that are to be considered in the implementation of Information systems around the world for any standard of use to the client or the customer or may be to self are as follows:

1. Information systems
2. Customer and End User
3. Real Time Planning
4. Traceability
5. User Satisfaction
6. User Acceptance
7. Continuous Process Improvement
8. Integration of Software Development tools
9. Effective Communication

3.1.1 Information systems

Information systems are objective reality which is known by human. In some sense, the feeling of human decides the information systems are in existence. In information systems, the hardware and software of computer which embody the efficiency of information systems is objective matter. The transparency of existence makes people hard to understand. The hardware is visible, while the software is appreciable as per Yan Dan, Yan Juan (2009)
3.1.2 Customer and End user

Customer or the end user, in some scenarios is the same who uses the product after its development and creates the barriers or the requirements to the Department of IT for an expected performance of a certain product. (http://pc.net/glossary/definition/enduser, as on 10 Dec 2011)

3.1.3 Real time planning

This technique is called an alternative method of techniques and processes that are theoretically observed with scripts and expectations, which gives a clear picture for any risk involved or any kind of real time performance of the product., (Jeff Orkin, 2005)

3.1.4 Traceability

Traceability can be called as the bridge between the requirements, design and the final implementations and techniques having all possible data that are to be provided for any reference. This technique gives you an idea of all the requirements, design and implementation across the product., (Bala Ramesh and Matthias Jarke, may, 1999)

3.1.5 User satisfaction

User satisfaction and user acceptance are the main targeted goals for any organization that develops or manufactures a product. Many issues and requirements are taken into consideration for the product to reach the user as ultimately it is the user who has to rate the product after their satisfaction. Doll and Torkzadeh (1988) developed and validated an End-User Computing Satisfaction (EUCS) instrument. It included five components: content, accuracy, format, ease of use, and timeliness., (Li Xiao & Subhasish Dasgupta, 2002)

3.1.6 User acceptance

User acceptance seems to reflect whether a system adequately fits the characteristics of the users (e.g. computer knowledge) and the characteristics of the task (e.g. report writing) which is to be
performed. Thus, user acceptance can be seen as an adequate indicator whether an information system really supports users in their clinical working processes. When this support is the aim of an information system, then user acceptance can even be seen as an adequate indicator for the overall system’s success. The evaluation of user acceptance is mostly conducted using standardized psychometric questionnaires in order to quantitatively measure the construct “user acceptance”. Psychometric analyses which deals with the measurement of human characteristics. To assure that these instruments fulfil required quality standards, they have to be rigorously developed and validated, comprising an iterative proceeding of design. (Elske Ammenwertha et al. 2003)

### 3.1.7 Continuous Process Improvements

A process can be considered as a synergic blend of man, machine and methods in working activities whose execution lead to the production of desired outputs, starting from the available inputs. Processes are essentially human intensive and characterized by complex factors such as developer’s experience and knowledge. This makes each process execution a creative and unique activity. Moreover, human activities are asymmetric and non-deterministic. The predominant human factor inevitably determines variations in process performances. This makes it complex to make previsions, monitor and improve the process itself. Nevertheless process improvement remains an activity of crucial importance. (Danilo Caivano, 2005)

### 3.1.8 Integration of software development tools

Building tool integration(s) between different tools is one way to enhance interoperability. Increased interoperability enables for example efficient reporting of project progress, smooth transfer between tasks, and availability of correct information for all. Integrated tool environments aim to minimize tool deployment time, standardize the process, and improve the efficiency of projects. Efficiency can thus be improved by rework and disruption avoidance, and by better integration of project functions. Integrated tool environments also enable tracking the consistency of work products and provide transparency in project progress. Moreover the development process becomes easier to understand when the user does not have to work with
3.1.9 Effective Communication

Each country on this planet earth has a different requirement in the product usage, whether it is a software product or any other. The requirements change from customer to customer or when it is on a standard platform i.e. from country to country.


- Cultural Barriers
- Psychological Barriers
- Language Barriers
- Communication b/w team members

The cultural barriers can be very clearly explained in a way of trying to install someone else’s product in our home, this takes many details into consideration of

- How well can we understand the product to take the maximum benefit of the product?
- Are we able to understand the manual given and its language according to the local requirements?
- Is everyone in the family able to communicate on the same platform so the usage gives maximum output or the expected output?
3.2 Subject areas

Going by the implementation of the Information Systems here are the subject areas that are taken into consideration for the research.

1. Implementation of Information Systems
2. Effective Communication
3. Continuous Process Improvements
4. Traceability
5. User satisfaction and acceptance

Going down the line we shall have a closer look at each one of the subject areas which tend to be very important in the implementation of Information Systems.

3.2.1 Implementation of Information Systems

Every organization has one simple formula to achieve goals.
Inputs $\rightarrow$ Processing $\rightarrow$ Output

A non profit organization doesn’t have to care about the difference in the financial measures of Output and Input whereas a profit organization does have to take these measurable differences into consideration while achieving goals. (Raid Moh’d Al-adaileh, 2009)

Between the transition from Inputs and the output, the important function that an Organization to follow is Decision Making. Management should be able to take the decision in each step of the transformation. Decide on Inputs and the process technology, and the kind of output needed before transforming them into environment. (Raid Moh’d Al-adaileh, 2009)

In this situation, an Information System is of a great use. Without an information system, it is close to impossible to take the decisions on the inputs, process and the output. The information taken for the process of decision making is given by the IS in an organization. (Raid Moh’d Al-adaileh, 2009)
At this age of technology and globalization, the importance and the usage of information system has increased rapidly, in each and every field of work and need. Thanks to the internet and communication technologies that made this available to everyone on the planet earth. It has become so vital in role for every task and project to start with, opportunities at international level, rise of information and knowledge economy and all the business ties and transactions are digitally bound together. (Laudon, K & Loudon, J, 2006)

The actual perspective of information system is a holistic and integrated support to all organizations’ processes and many times integrating with supply chain partners’ processes, although we have been assisting to the proposal of several technologies and methodologies. (Nuno Pina Gonçalves, 2006)

The usage of Information system in and for an organization not only helps its internal performance towards achieving goals but also gives the world a wide perspective about the values and principles and product commitment of the organization to the outer world. (Nuno Pina Gonçalves, 2006)

It also takes an edge on competitive advantage, shorter product cycle, increase productivity, fastness of the information accessibility to support the strategic planning and decision adding to the impact on organizational forms and management paradigms. (Nuno Pina Gonçalves, 2006)

However the IS\(^2\) is planned, the above said can be achieved and be an added benefit to the organization only when IS is perfectly implemented to the user satisfaction. (Nuno Pina Gonçalves, 2006)

Below is the Structure of an IS that is to be implemented by or in an Organization.

Delone & Mcleon proposed the common model for Information system success. In the model, he has proposed six variables to measure the IS success. Variables are interrelated to measure the

\(^2\) IS-information systems

![IS Success Model by DeLone & McLean (1992)](http://www.rsc-ne-scotland.ac.uk/e/Who%20Am%20I/Who%20Am%20I-590.htm)

3.2.2 Effective communication

The best product output is the aim of each and every project taken up by any organization, and how best and adaptive the Information System is, it increases the chance of user flexibility. Unfortunately the whole world doesn’t work in the same way and there are many barriers that come into picture of every communication system. It is the organization’s first priority to expand its product breaking all the barriers to reach each and every corner of this globe. There might be number of factors in the section of barriers and we can narrow down to three factors which are stated below:

1. Physical Barriers.
2. System Design Faults.
3. Additional Barriers.

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3 http://www.rsc-ne-scotland.ac.uk/e/Who%20Am%20I/Who%20Am%20I-590.htm
Physical Barriers
This kind of barrier occurs often due to the physical, environmental conditions of the organization. Team members situated at different locations or sites to work. Secondly, Infrastructure i.e. poor equipment and not enough resources for training of the employees to the new equipment or installation of the same.

Enough Staffing is required to perform a task in any organization. Shortage of this leads to delays and late submissions and service which in turn results in the communication difficulties in the organization.

Providing the suitable Working environment is the main responsibility of the management, failing which can result in the loss of concentration and distractions while at work. For example noise, poor lighting, temperature imbalanced cabins or floors.

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4 http://www.cartoonstock.com/directory/w/work_environment_gifts.asp as on 19 dec 2011
System Design Faults
This particular section refers to the organizational structure and system that runs the whole organization. Sometimes there are too many working on the same project and no one knows whom to get in touch with, the right person. Before any project or a task, briefing and training is very much required for the team to get acquainted with the new technology, requirements or any updates from the client failing which can yield poor results. Lack of supervision, training, inappropriate information systems, and lack of clarity in roles and responsibilities needed for the work can lead to ineffective communication and it affects the performance of the staff.

Additional Barriers
Apart from the barriers mentioned above there might be many that creep in the Information System’s way before, during or after implementation. That is the reason the organization performs cold and hot tests for the same above.

In this section, barriers can be included as poor management, staff indecisiveness, delays, not willing to co-operate. Some more can be stated as, psychological barriers, languages, access to information and requirements communication between the team members. The implementation of the best Information System has to go through all these barriers and rectify them in order to extract the best out from the organization’s staff. The effective communication can be termed as the Information system giving the right, accurate access and a flexible usage to what the end user expects. In the coming topics we shall discuss more about the User Satisfaction and Acceptance.
3.2.3 Continuous Process Improvements

Every organization has an objective of making good business either by selling the product or by service. Every product or service may not be the best in the first go. Client or customer feedback and lot of other inputs from the organizational side improve the overall performance before and after the production or the output (Fawaz Abdullah, 2003).

The roots of the process are to be stabilized and be good in order for the team to perform well and give the best of them for the process. Continual improvement of the overall performance should be the main objective of any organization to have a stand in the market. Continual improvement in an organization can be achieved by having periodic assessment, promote prevention based activities; provide training on continual improvement tools, measures should be established, goals guided and improvements tracked. (Fawaz Abdullah, 2003)

Continual process improvements are directly or indirectly linked to the quality aspects of the performance of the product. Quality management tools play a vital role in the continual process improvement. Following are the Continual Process Improvement tools that are used by any organization based on their requirements. (Kazo Ozeki, 1996)

- Quality Management Tools (The seven Basic tools)
  - Cause and Effect Diagram
  - Check Sheet
  - Control Charts
  - Histogram
  - Pareto Chart
  - Scatter Diagram
  - Stratification
- Lean Management Tools
  - Lean
  - Six Sigma
- 5S
- Value Stream Mapping
- Total Quality Management
- Poka Yoke
- Kanban Pull System

Nowadays, the organizations are completely moving towards Lean & Six Sigma to achieve higher quality based performance and to reduce the variations. (Thomas D. Mc Carty, 2007) Earlier these concepts were confined only to the manufacturing processes but down the line they were extended to all parts of the business and in all fields. This has become a sort of benchmark for any company to achieve the best possible output from the process. (Kazo Ozeki, 1996)

These tools have procedures that are to be followed in order for the continual improvement of the process. For ex: in Six Sigma it is DMAIC and DMADV. We cannot deny the fact that every process is a cycle and every inspection is also a cycle. The continual process improvement follows a cycle which is suitable for the particular process. From Defining the problem in a process to Controlling the improvement strategy it follows PDCA (Plan Do Check Act) cycle.

### 3.2.4 Traceability

Traceability, be definition is the information completeness about every step in the process chain.
- They interrelates the uniquely identifiable entities so that they can be verified.
- It is an ability to verify the history, application or location of any item by the recorded documentation.
- Basically having documented information of each and every activity of the process. (M. Lormans and A. van Deursen, 2006)

Each and every field of work requires traceability and transparency, however in the software field it is linked to the stakeholders and also clients. Software artifact traceability is the ability to
describe and follow the life of an artifact (requirements, codes, tests, modes, reports, plans, etc) developed during the software life cycle in both directions forward and backward. (Kazo Ozeki, 1996, Fawaz Abdullah, 2003)

After all the developments in the software industry, software artifacts are created as a part of processes which went disconnected to each other. The lack of traceability in software is caused due to:

- Language: the artifacts written in different languages, the natural language and programming language.
- Software system at various levels. (Requirements Vs Implementation)
- Lack of support and source to maintain the traceability. (A. D. Lucia, 2007)

If the software is provided by the high level traceability, the requirements flows down through the design and can be traced back at every stage of the process. This is easy to trace the coding decision back to the design process to satisfy the requirement.

**Requirements Traceability**

Software requirements traceability is the concept and the ability to provide references which gives the relationship between the software requirements, their sources and system design. Requirements traceability links between the different requirements, Source traceability links these requirements to the stake holders, and Design traceability links the requirements to the system design documents (M. Lormans & A. van Deursen, 2007). The ultimate goal of the software traceability is to have a track of everything and nothing falls apart from the process link.

**3.2.5 User Satisfaction and Acceptance of Information Systems**

User satisfaction is the most important aspect and measures of an Information System. Meeting the requirements and expectations of the client or the end user seems too blurry at first, but after all the hard work and team’s performance to achieve the goal and meet the timelines, if it doesn’t satisfy the end user, it can just be understood that all the efforts are in vain.
The user satisfaction is considered at every stage of the process, when the data in organizations are moved from Data processing to End User Computing (EUC) (Bailey JE, 1983, Baroudi, 1986, Benson DH, 1983). The End User Computing Satisfaction instrument was developed by Doll and which has 5 factors or components. The EUCS instrument has the following which are the commonly considered components for the User Satisfaction of any Information System unless until the IS has any special environment or requirement. (Torkzadeh G, 1991)

EUCS Components:
- Content
- Accuracy
- Format
- Ease of Use
- Timelines

Because of the reason that internet emerged during the decades, it has become an easy source of accessibility of any kind of information. We can infer from the facts and figures that in 1993 there were 130 websites and which the number increased enormously to 17 million in the year 2000 (Coopee T, 2000). This has become a gateway for the information without any local or international boundaries.

Even the user has improved a lot in the usage of the information systems and user’s requirements or standard have increased rapidly with the changes and proliferation of the Web based Information Systems. Lot of research has been conducted on the End-User client satisfaction and the EUCS instrument discussed above was used by every other, assuming that the instrument is reliable for any type of IS such as for Web Based IS.

However the web based IS and the Traditional IS used in the corporate world are completely different as the Web based IS has no boundaries for the information flowing in which it is enhanced and easily accessible for everyone around the world for all ages and groups. So, these

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5 EUCS-End User Computing Satisfaction
web based IS are as complicated to rate as much as they are very easy to access, more factors play in role other than Content, Accuracy, Timelines, Ease of use and format to measure the user satisfaction with them.

Going by these differences between both, Web based IS and Traditional IS, it would not be appropriate to use the EUCS instrument to measure the end user satisfaction with web based IS as the validity and reliability of the IS or the instrument might work in a specific environment, requirement and usage. (Li Xiao & Subhasish Dasgupta, 2002)

And User acceptance reflects on the flexibility of the IS as there is a question of “whether the system fits adequately to the characteristics of the end user and the characteristics of the task. User acceptance is the main indicator to check whether an IS supports the working process of the end user.

When User satisfaction and acceptance is taken into consideration or the support, then this can be the main adequate indicator for an IS to be successful in an overall view. For this to know the user acceptance on an IS, questionnaires and surveys are the best ways to know the mind game of the End User.
4 Empirical Study

As discussed throughout the thesis of how to go on with the empirical study, we came up with an idea of interviewing companies or people or any kind of end users of Information Systems. Every product is improved during or after implementation by surveys and feedback from surveys. An interview with the end users rather than any professional would give us those points which the implementation team might overlook at times. We have decided to interview the following:

- A Student or students at a University.
- A researcher.

There leads a question why only these two when there are many available? The answer might be just as simple, availability of resources and easy accessibility.

Being a student it is not very difficult to interview a fellow students and a researcher at a university and by taking the help of my friends working at a company we can also approach the management for the permission to interview an employee or the end user of any Information System.

The process for the empirical study or the case study has been conducted as follows:

- A questionnaire was prepared taking the important aspects into consideration for which the end user or a product user might look up to.
- The questionnaire was sent by email to few students and a couple of researchers and also to a couple of our friends who are working at an organization.
- After the replies from the above mentioned we gathered the data and also asked for a one on one interview with them so we can gather more data in person than in email where in through email the data might be restricted only to those questions we framed.
- A personal interview has been conducted and of course as expected a little more data has been gathered.
The questionnaire that we prepared has all the aspects that an end user will look into an Information System like

1. Greetings
2. Switch between links
3. Right Information.
and many more.

The Questionnaire is given below and we have tried to include all the important aspects that are looked into while implementing an Information System.

A rating is also done on the basis of the interviewed person as to how much an IS is used by him/her in the field of profession or work.

Below is the Questionnaire that was sent to the respondents

When a guest visits a website (technically called ‘Information Systems’), there are many aspects that a visitor experiences while working on it for any sort of information. For example: to book a train ticket on a travel website, searching for a journal from a library database, looking out for beast deals in hotel booking and festival shopping offers, a particular shop’s information on opening hours, its location and contact details.

We here are trying to figure out from an end user point of you on a common platform as to what kind of problems the end user faces when visiting a website (Information System) as a part of our thesis work with the title “Problems when implementing Information Systems – Proposing Check List & Strategies to increase user satisfaction and user acceptance” at Högskolan I Borås.

1. What is the first thing that comes to your mind when visiting any website?
2. Greetings from the Website?
3. How far language translator buttons are important on any website around the world?
4. How far the website performance ex is: speed to the next step makes you feel?
5. Accessibility of the information, right access to the information which is searched for?
6. Advertisements that pop up during the transition of the website from one link to another?
7. Website Design?
8. How long can you wait if the website is under maintenance?
9. Search bar’s importance in the website for you?

We shall now discuss the interviews and the response given by each of them.

**Interviews Response:**
This interview was conducted with a student (Harshavardhan Gottapu, a Master Student in Sustainable and Resource Recovery, Högskolan I Borås, Borås, Sweden) from the university and a Researcher (Rudrajeet Pal, a PhD researcher at Swedish School of Textiles, Borås, Sweden) who is in need of any Information System for his study and knowledge. The questions were made simple so that the respondent can understand easily than any technically sound personality. We here write our analysis based on the information given at the time of interview.

Going by the questions framed from a student point of view, it was seen that how much ever excellent the implementation of Information system can be, that doesn't make any difference as he has only one frame of mind that is to get the information what he is looking for as soon as it is possible.

Of course the design and the environment play a vital role when a student visits a website, but easy accessibility is what every student looks for. Not too much of information should be put in and not many links should be given as it makes the user confused as to where and what the link leads to.

Another issue that the user faces is that the ‘run’ of an Information System without any hurdles, this leads us to the maintenance of the Information System from time to time apart from the implementation. Maintenance of an IS takes a lot more care than the implementation as this is a timely process which is also a continual improvement process.

Improving the quality of the data that is loaded in the IS is also another important aspect. i.e., updating the information day to day and giving the user the latest information. Sometimes the
Information System is very heavy due to the content or the platform used. Every care is to be taken in order for the IS to load quick and fast for the user accessibility. Even if it is a bit costly for maintaining the IS up to the standards, optimized solution has to be found out so that the user faces no problem in accessing the information.

The results from the theoretical and empirical parts of the research are discussed here with full analyzed data that is collected by different approaches throughout the thesis. As always known there are always differences between theoretical and a practical approach. And here we too also have few but are very negligible.

**Question**

*How useful or how fast accessible is the implemented Information Systems is to the end user from what it is originally thought of?*

Information systems are developed in such a way that they are accessible easily to every user that is in need of and utmost care is been taken for the information system not to face any problems or shutdown or getting hanged for any reason. However at some or the other point of time due to technical problems, the Information System faces known or unknown problem that has to be rectified as the users might be waiting to use the IS. When went by the empirical study there were a couple of problems that came out which were frequent with every user around the world. A perfect implementation of the Information System has to be followed few steps that are a part of the project management such as

- Program and Planning
- Training
- Implementations
- Applications
- Inspections

At every stage of the process and project, the above has to be followed in order to achieve the best implementation and usage of the Information Systems.
5 Analysis and Result

As we have discussed in the second chapter about the research analysis and methods we use to analyze the data gathered theoretically or empirically so we arrive at the right result, using that Qualitative analysis here in this chapter we tried to analyze our findings to draw a conclusion.

As we learned that the information obtained in the form of Qualitative research from the participants is not in numerical form. The emphasis is mainly on the experiences of the participants and to their environment.

“The cardinal principle of qualitative analysis is that the casual relationships and theoretical statements be clearly emergent from and grounded in the phenomena studied. The theory emerges from the data; it is not imposed on the data” (Patton 1980; cited in Coolican, 1984)

Theoretically we found that updates of the information systems is done periodically and for this new data is stored and of course new methods are to be adopted.

However the scenario is quite different when it comes to reality and the updates of the Information Systems might not be done periodically but according to the requirements and necessities. We have seen in the interviews that users are tend to access the updated information from any system rather than going with the same old which is already present and if the IS is a service oriented it needs to be updated and maintained quite frequently than that of data IS. This requires lot of attention and maintenance to update the IS every time and the end user looks forward to it. One way of doing it is to have a constant updating system with the data that has to be put up. This can be done by introducing a new member to the team who takes care of the updates of the IS.

As we know IS is the collection of people, data, hardware, software and procedures that work together to give the quality information.

As the IS development taken into consideration theoretically the following aspects come into picture:
The qualitative research is carried out mainly by the interviews, case studies and observations. We observed there are a couple of problems when we go by the qualitative research method,

1. Biased information

Most people want to present themselves in the possibly right manner, so they tend to give the answer we desire than an honest input.

2. Personal Interaction

The data gathered also depends on the personal interaction between the interviewer and the interviewee. This plays an important role too.

Taking these types of problems into consideration it is very important for us to analyze the data collected in both stages of research.

Cross validation (see topic 2.5) is one such data validation tool which validates the data that is gathered and it makes us analyze in a perfect manner.

When we had the direct interviews with the interviewees, we recorded the conversation. We heard the recorded conversation to identify the key areas in their response and we noted down, we repeated this gain and again until we came up with a firm conclusion from their responses. Even though it took more time to evaluate the responses from the interviews in this way we felt it was very effective way to collect data from the interviewees instead of simple yes or no questions.

When the empirical study was done we came across one important aspect called ‘Training and Improvement’. The implementation of a system is done in a perfect manner and the members or the team should be well equipped with the techniques and skills so as to be aware of what is happening and should be able to resolve any kind of issue. Training and Improvement goes hand in hand, the continuous improvement is one part of the system nowadays. Experienced and trained members are recommended for the improvements in the IS to be more effective and performance oriented.

Apart from the Computer based IS as we talk about now, the other IS might not require every day update or improvements. However, the computer based IS has to be updated time to time as the virtual world communication is a bit faster and widely used now a days.
In the theoretical zone we have seen the cultural barriers are one of the components that are to be taken into consideration, especially language in order for the IS to reach more people and it will be easy for them to understand. We came across the same while interviewing and this is one of the very important aspect in the IS as we have thought of. There are two ways to approach and resolve this issue:

1. To have an external link from the IS
2. Writing (translating) the whole data by the organization itself.

There are pros and cons for each way. In the first one, we get to see many languages as the external link might have more than one or two languages to translate into and this reduces some effort on the members and also manpower. But at the same time it is not for sure that the translation will be exactly the same or in the way that is to be conveyed. And in the second type, it takes more manpower for the organization to translate the information and that too in how many languages it is planning to put up the information is also counted. One benefit from this type is that the organization takes whole care for not going wrong or for any misinterpretations after the translation and the information is rightly reached to the user in a qualitative and quantitative way.

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6 Discussion

6.1 Conclusion

Our research revolved around the topic ‘Information Systems, Problems when Implementing Information Systems - Improve the User satisfaction and acceptance”. When the research was going on, we came through so many important yet interesting facts about the Information Systems and about users.

Nowadays, the usage of information systems is in a wide range where it has become difficult to find those parts of the world who are not in use of these systems. These made the world easy in accessing any kind of information around the world irrespective of the location. As we know where there is a new system that is found or any new technology is introduced, the intruders try to break in to cause some disturbance in that way security has become one great concern for everyone who is using an Information System.

According to the theoretical research, the key concepts and the main areas included

- Information Systems
- Customer and End User
- User Satisfaction and Acceptance
- Continuous process improvements
- Integration of software developments
- Cultural Barriers

these were discussed and researched and found out that these concepts and these areas play a vital role in the implementation of Information systems. Each one of them is directly related to the empirical study, and also towards the practical approach of the Implementation of Information systems.
On a global platform, Cultural Barriers play a different and prioritised role in the implementation whereas Security and source to the right information has an equal importance irrespective of the user and geographic location.

The empirical study has revealed few other facts that of course are a part of theoretical but may be a bit in detailed to study.

The practical usage is what makes the difference to the user satisfaction and user acceptance. The user is neither bothered about the Integration of Software development tools nor the continual improvement of the information system on the technical standards, but only about the right information, easy access, cultural understanding, easy language and the very important, security of the information or the data entered.

As suggested by us and the main aim of the thesis is to give the right strategies and a checklist for the companies implementing the Information Systems so that the problems during or after the implementation can be resolved without any further delay.

Find the checklist following this discussion which describes the problem faced and a solution/strategy in order to make sure the implementation of the Information System is up to the requirements of the users which eventually results in the User Satisfaction and User Acceptance.
### 6.1.1 Check list of the problems faced in the Implementation of Information Systems and the Strategy to be followed

<table>
<thead>
<tr>
<th>Common problem when implementing Information Systems</th>
<th>Strategy/ Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Environment</td>
<td>Suitable environment to be provided by the Organization for a better development and implementation.</td>
</tr>
<tr>
<td>System Design Defaults</td>
<td>Training</td>
</tr>
<tr>
<td></td>
<td>- New technology</td>
</tr>
<tr>
<td></td>
<td>- Updates</td>
</tr>
<tr>
<td></td>
<td>- Process</td>
</tr>
<tr>
<td>Cultural Barriers</td>
<td>Effective Communication with the users with respect to the geographical location.</td>
</tr>
<tr>
<td>Unchanged Processes in the Organization</td>
<td>Continual Improvement needs to be introduced.</td>
</tr>
<tr>
<td>Lack of Traceability</td>
<td>Every step of the process and development needs to be documented in order to be traced the needed.</td>
</tr>
<tr>
<td>Integration of Software Development tools</td>
<td>Compatibility tools, methods and software are to be introduced.</td>
</tr>
<tr>
<td>Security</td>
<td>Information Security tools, with integration.</td>
</tr>
<tr>
<td></td>
<td>- Verification</td>
</tr>
<tr>
<td></td>
<td>- Validation</td>
</tr>
<tr>
<td></td>
<td>- Constant Check</td>
</tr>
</tbody>
</table>
With respect to the key concepts derived and found few of them play a vital role in the implementation of Information systems, the strategies can be seen above in the check list on the same concepts which can be a cause for the problems during the implementation of information systems.

How much ever the difference in the problems faced in the implementation of the information systems from the studies, the type and the nature of the problems encountered are on the same platform with a relation between them.

### 6.2 Implications and Informatics

In this technological and fast world, it is now time for the virtual database and virtual knowledge exchange to take place more than the real world. Everyday there are new implementations of this technical virtual world for a better usage and better understanding and easy access. The informatics deals with the development and the use of information systems.

This research is done on the field of informatics, Information Systems. We tried to amplify the problems that we face in the implementation of information systems. A clear idea and a worldwide knowledge of usage of information system is needed when it is developed and later implemented.

Our research has shown the problems that are faced in the development and the implementation of information system and we came up with few suggestions that are given in the previous section whether they are directly or indirectly related to the Implementation of Information systems.

Our research has also shown the various fields in which a user is not willing to accept the information system or is not satisfied with it. Theoretically taking the suggestions and ideas from books around the world and empirically by interviewing the users directly that are available.
The informatics is all about using the information systems so every part of it has to be improved and developed day by day for a better use and for a better acceptance of it.

### 6.3 Method Evaluation

As said in the previous sections about the methods we followed to gather the data for the research work, theoretical and empirical.

Theoretical Study has been good enough with our steps to gather all type of data regarding Information Systems and its implementation. We had a blue print of ‘for what are we gathering the data?’ how to sort it? And what is required for the research? - Optimization. We went through the course books or the textbooks of Information Systems, from the university library and journals regarding the Implementation of Information Systems. Also we have gone through many articles over the internet and also the hard copies from the library about the implementation of Information Systems.

In the empirical study, we went through the interviews from students and other people who are using the information systems. In order to perform these interviews we have sent a mail to the people whom we shortlisted for the interview. A questionnaire was prepared which was an open ended one so the ideas can be more in open than being restricted to the point. The questionnaire was sent to the interviewees in prior and made sure that the information sent by them is kept confidential and used only for academic purposes.

### 6.4 Result Evaluation

As stated in the chapter 2 about the Result validation, the simple steps that we followed from the Cross validation for Qualitative research, we maintained the same strategy throughout the research work when all the types of data has been gathered.
So we followed the same strategy to evaluate our results.

- We validated the methods we used to collect the data, whether it was through books or interviews or journals or online.

- Having validation of the data from Theoretical and Empirical study by comparing all sorts of sources and the data collected, so there is no mismatch or contradiction or bias.

- Online sources tend to update the information from time to time and add new data or improve the information about any particular topic. We made sure that we had an eye on those references that we used and noted down the date when we collected the information from any virtual source.

- Every source data after the collection has been brought together to compare how far the information is needed, required or apt for our research work.

After all the evaluation of the findings we feel that the information given in the thesis work is foolproof and trustworthy from our point of view.

### 6.5 Possibilities to Generalize

We have been talking a lot throughout the thesis of how we carried out the research work and the flow and the stages, two stages were carried out which stood as the backbone for the research in collecting, analysing the data and evaluating the findings and results.

During the theoretical study many literatures have been considered including previous thesis reports, journals, and books written by many professors around the world. By which we can say that the knowledge that was gathered in the form of information or data about Information Systems and its implementation can be globally accepted.
And from the empirical study, we have interviewed the users who are well known and accepted people in any form, a student who uses an Information System for the academic and study purposes, a Researcher who uses an IS for any of his findings and research documents to study looks for a genuine information and has a good knowledge about what is missing and what needs to be done from an end user point of view.

Taking these into consideration the feedback given by the interviewees and the data collected by us are obviously valid outside the box of our research for any developments.

6.6 Ideas for continued research

When a product or a technology is invented, day by day the requirements go high and the organizations want to improve the performance and the durability of the product.

The User Requirements change from time to time and down the line and day by day they increase and it is hard for the organizations to meet the expectations of the customers or the users with the old product or technology.

Change is what everyone wants and also improvement in the performance of a product. So an organization always wants to improve the performance and also add new features to attract the customers and make them feel much better to work on it which directly or indirectly deals with User Satisfaction and User Acceptance.

The main areas we found out from this research were given in 6.1 and the companies when concentrate on these main areas can build up a good research to improve the product day by day in future.
After going through the data we collected in both phases of our research we came across some very interesting points and in those the most important aspects were,
- Security
- Compatibility
- Continual improvement
  - Integration of Software tools
  - Cultural Barriers

Whatever the data on an Information System, the security levels are to be high enough to protect the data from the hackers. Now-a-days it has become very common to hack the accounts and crack the software and is also done professionally. It is a recurring process for the companies to come up with new ideas, new strategy and new plans to secure the information and data. Even though if it is a free source given out to the public, the company has to make sure that no one tampers by easily sneaking in to the servers or the master data files.

Compatibility comes into picture for all types of users around the world. Language considerations, type of information, cultural barriers, type of information provided to a particular part of the world without creating any chaos. The main aspects in this compatibility area are Cultural barriers and Integration of Software tools. Yes, for a product to reach out to the world in a broader perspective cultural barriers play a major role especially in those countries where the spoken language is not English.

It is important for the company to design the product which is close to the local nativity to attract more customers and make them feel better and satisfied.

And the second aspects in the compatibility area are Integration of software tools. Day by day every company is updating their software to a newer and higher versions and also new software are being introduced. The developed Information System has to be in connect with the newly introduced software i.e. the company has to improve and build up a compatibility tool in order for the users or clients to
access the data from the Information System and also a user might not want to access the data in the form it was uploaded to the information system, in order for the user to access the data and make the use of it in any format the user requires has to be fulfilled with these integration tools.

And finally updating the information in the system, user always looks for updated information on a particular subject or any topic or field that he/she is working on, this makes the system, user friendly when he/she finds the right information or what the user has been assigned to do for.

A continued research can be done keeping these key aspects in mind as people are very much into the virtual world than going for any hard copy resources. This will increase the easiness and makes the Information system user friendly than ever before.

Taking the check list and provided strategy into consideration the companies or the stakeholders can work on the continual improvement platform and a research for future needs can be done in order to reach the expectations of the users and to mark its value on User Satisfaction and User Acceptance.
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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 IT (HIT), 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 a 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 InnovationLab, which is the department's and university's unit for research-supporting system development.