POST-IMPLEMENTATION SUSTAINABILITY OF ERP IN INDIAN HIGHER EDUCATION

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Approval Sheet

This thesis/dissertation/report entitled **Post-Implementation Sustainability of ERP in Indian higher education** by Manjeet Kumar is approved for the degree of **DOCTOR OF PHILOSOPHY IN MANAGEMENT.**

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CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the thesis, entitled "post-Implementation sustainability of ERP in Indian higher education" in fulfillment of the requirements for the award of the degree of Doctor of Philosophy in Faculty and submitted in Galgotias University, Greater Noida is an authentic record of my own work carried out during a period from January 2018 to October 2021 under the supervision of Prof. (Dr.) Avadhesh Kumar and Prof. (Dr.) Adarsh Garg.

The matter embodied in this thesis has not been submitted by me for the award of any other degree of this or any other University/Institute.

(Manjeet Kumar)

This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

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The Ph.D. Viva-Voice examination of_____Research Scholar, has been held on_____.

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ABSTRACT OF THESIS

ERP stands for enterprise resource planning, and it is an integrated system that allows a company to manage the operations of its different divisions, including logistics, production, finance, administration, finance, and human resources. ERP is widely utilised in a variety of industries and enterprises since it gives a single application and database to organise the complete firm. The ERP system has received widespread acceptance and a favourable response from industry and business. As a result, it has found a home in the ever-expanding education sector, which includes everything from schools to colleges. An ERP system is a computerised system that aids in the streamlining of corporate processes and operations, as well as the organisation of data. With this in mind, educational institutions have been quick to embrace the method for their own organisations. However, the ERP model for the educational sector differs significantly from that of the corporate sector. The ERP models that are accessible include sub-categories that are influenced by the industry sector's needs. The majority of educational institutes are re-engineering the commercial model of ERP for their educational system, which is not entirely in agreement with their needs, resulting in failure.

Because ERP systems were originally intended for the business sector, adapting them for educational institutions necessitates changing the system's basic architecture to include the three key nexuses of an academic institution, namely finance, students, and human resources. Furthermore, ERP adoption necessitates a significant financial commitment on the part of the adopting entity. Each extra domain was more expensive. In addition, educating thousands of end-users is a time-consuming process. In addition, the security of data connected to student examinations and staff files is a key concern in every academic institution.

The writers of this paper evaluated the literature in connection to the ERP system's post-implementation repercussions in educational sectors across the world. It has been found that the majority of organisations have re-engineered an already existing ERP system to meet their needs, making their manual to online transition a failure. A key element

impacting the filed shift is a lack of training at the end-user interface of the software implementation. A study of end-users from six major colleges and institutions in Delhi/NCR who have already adopted and are presently using the ERP system was also performed. The study examines the aforementioned concerns as well as end-user perceptions.

The System of Higher Education is a group of institutions that are dedicated to the advancement of higher learning. Following the initial implementation of an ERP system for Student Administration, this research study evaluated the post-implementation experiences of six higher education institutions to identify how they utilised the post-implementation phase to maximise the benefits of the ERP system. In order to acquire the information, a mixed-method strategy was employed, which included an online component. Each and every one of the higher education institutions that took part in the project made use of adjustments and third-party software to suit operational requirements that were not met by the Student ERP system. If we take into consideration the amount of modifications and enhancements that have been completed or are currently being assessed, it is apparent that current student ERP systems do not meet the demands and requirements of higher education institutions across a wide range of domains. .

The random snowball sampling approach was used to obtain data for the aim of the study. The ERP system was first used at educational institutions in the Delhi-NCR region. Six such higher educational institutions were chosen, each of which is an autonomous-UGC accredited university with a distinct ERP system provider. In addition, respondents from these colleges were approached to complete an online questionnaire survey that was especially intended to collect data from three categories of respondents: faculty, students, and administrative workers. The goal of gathering data from teachers and students is to survey end-users in order to determine post-implementation success, as well as administration workers in order to survey the implementation method. The findings of this study can aid higher education administrators in comprehending and planning for the institutional implications and changes that will occur in the ERP environment as a result of the adoption of the ERP

system in their institutions. Administrators will be better equipped to analyse the overall efficacy of their project based on the post-implementation characteristics and experiences of the institutions participating in this study, and they will be able to apply the insights gained to improve future ERP system design.

DEDICATION

To Life

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First and foremost, I'd like to express my gratitude to my parents for their unwavering commitment to my well-being, without which I would be completely unable to do anything for myself.

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Please accept my sincere thanks on behalf of the entire research team for their contributions, which included donating their time and graciously sharing their expertise and experience in the field with me.

For her continuous support, patience, and encouragement, I'd like to convey my gratitude to my wife, who has been a tremendous help to me. In addition, I'd like to convey my appreciation to my friends and co-workers for their assistance.

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LIST OF ABBREVIATIONS

ERP	Enterprise Resource Planning
MRP	Material Resource Planning
IoT	Internet of Things
AI	Artificial Intelligence
TEIs	Technical Educational Institutes
HEI	Higher Educational Institute
HEIs	HEIs Higher Educational Institutes
ASA	Adaptive Security Appliance
UGC	University Grant Commission
IS	Information System
HR	Human Resource
SAP	Systems, Applications and Products in Data Processing
SDLC	Software Development Life-Cycle
CSF	Critical Success Factor
CSFs	Critical Success Factors
PPM	Portfolio and Project Management
POM	Process Oriented Model

CHAPTER I

INTRODUCTION

"We are living in a world where everything is focused on security," Alain Robert asserts. As technology advances, security becomes increasingly important, particularly when it comes to protecting an organization's informational assets. First and foremost, when an organisation seeks to upgrade its technological capabilities, it must shift the majority of its operation from a manual to an automated state. ERP is the most appropriate solution for this upgrade (Allen, 2002).

ERP, a module-based system software whose purpose is to combine the essential functions of an establishment's business procedures in to an integrated software environment. In an ERP system, ERP modules provide functions that support the key business divisions such as accounting and human resources, production and raw material management, customer and public relationship management, and supply-chain management, among other things. Companies employing ERP opt for the modules they need as per the requirement of their business. ERP is the answer for adopting and integrating vital business processes across an establishment, whether it's in the same city or across the globe. The broad adoption of ERP systems demonstrates that ERP is a critical component of a successful business or every corporation.

Any ERP has now become a common piece of corporate technology. ERP systems have a considerably longer history than one might imagine. Although the system has been around for sixty years, it has gone through several different generations and various names have been given for it over time.

The of ERP history began with a different name, MRP system (Material-Requirements-Planning system) for supply chain management logistics in 1960s, when J.I. Case, the owner of a manufacturing company, collaborated along with IBM and developed a system that is thought to be the 1st MRP system for any organisation. Following that,

large manufacturers in a variety of industries developed MRP solutions for their businesses.

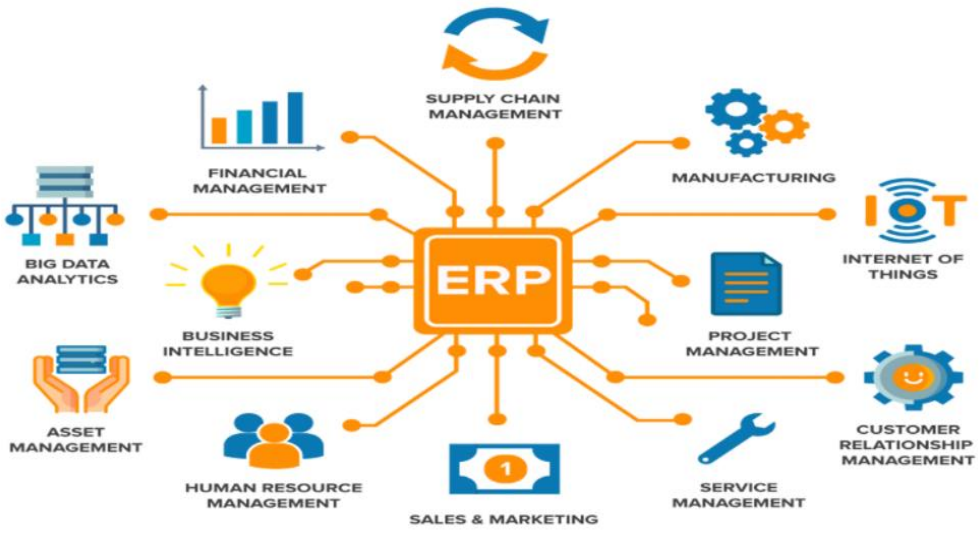


Figure: 1.1: Modules of Business-ERP Model

The of ERP history began with a different name, MRP system (Material-Requirements-Planning system) for supply chain management logistics in 1960s, when J.I. Case, the owner of a manufacturing company, collaborated along with IBM and developed a system that is thought to be the 1st MRP system for any organisation. Following that, large manufacturers in a variety of industries developed MRP solutions for their businesses.

Although such systems were costly to develop, they also need team of computer experts who maintain the database, but they also required huge space and assets in the organization. Initially, MRP systems allowed any type of business to track their inventory and production, which aided manufacturers in managing their raw materials, procurement of raw materials, along with production and dispatch of products and their delivery to customers ensuring the well-oiled functioning of their establishments.

Although the adoption of MRP systems among manufacturing companies accelerated during early 1970s, the adaptation was restricted to large establishments with the budget

and resource which can be allocated for the development of intramural systems. Later on, many software companies, namely Oracle, JD Edwards, among others, came forward and developed this software.

The terminology Enterprise Resource Planning was first given by the research organization named Gartnet. This newly coined terminology was appreciated by a wide range of business entities, not only in the manufacturing sector, but also in other industries that are utilising this software-technology to improve overall efficacy of their procedures for the benefit of the organisation as a whole.

This was the point at which the ERP system acquired its existing identity: centralised database management system for all data from across the firm, whether it is located in the same location or in another location. Other dimensions of corporate tasks, such as Human Resources accounting, Customer Relationship Management, sales engineering, and so on, are created by ERP systems, which aid as a sole basis of reliable information for all of the company's personnel.

Throughout the 1990s, the evolution of an ERP system was ongoing. One of the most significant advancements has been the development of cloud-ERP, which was introduced in 1998 by NetSuite. The organisation can perceive cloud ERP as an upgrade over on-premises static systems, and the corporation can access essential business information using any device having internet connectivity via the web. Cloud-ERP solutions also eliminated the need for firms to buying and maintaining hardware, hence decreasing the demand for information technology workers and facilitating the implementation of new systems.

The ERP cloud approach opened the system up to smaller businesses, whereas it had previously only been available to large corporations. CRM, e-Commerce, and online marketing automation are just a few examples of front-office apps that can be integrated with ERP II, according to Gartner. Back-end applications like as Supply Chain Management and Human Capital Management are also included.

Despite the fact that this was a big development in the system, the more information we feed into the ERP systems, the easier it will be to identify and rectify difficulties as well as capitalise on chances for the organization's growth.

Leading ERP systems today contain huge libraries of data information and the ability to generate reports that help illuminate the performance of every aspect of a company's operations, from marketing and sales to human resource operations and product development, among other things. A huge network of ERP software is available, each of which is tailored to certain industries, business models, and difficulties. ERP software serves as a command centre for all of these activities, which may be accomplished through the vast network of ERP software.

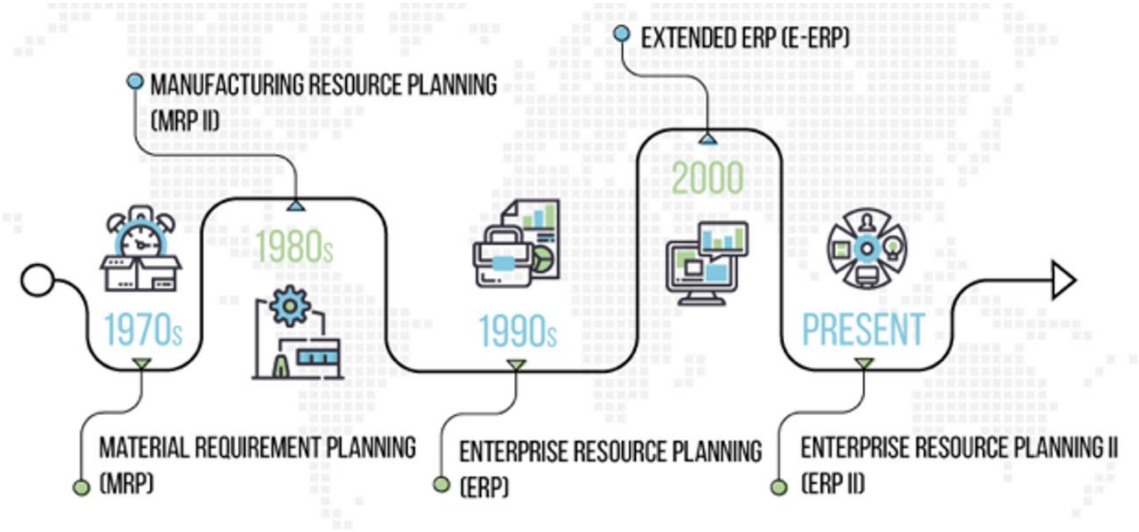


Figure: 1.2: Stages of ERP Evolution

1.1 ERP System Future

Several significant technologies, such as the internet of things (IoT) and artificial intelligence (A.I.), will have an impact on the future of modern enterprise resource planning systems, according to the current age trend. Applied to ERP systems, machine learning is a subset of Artificial Intelligence that helps them learn to detect patterns in data and draw conclusions, reduce the number of human chores and errors, anticipate

future market business trends, and reduce the number of human tasks and errors. To put it another way, ERP systems can benefit from machine learning. Machine learning is the process of gathering new data and feedback in order to become more innovative and efficient with time.

In order to do machine learning, a large volume of data that is both diverse and granular is required, which an ERP solution both provides and enables the usage of. Tine When an ERP system is able to mimic human behavior, it opens the door to new possibilities in terms of automatic data collection, reconciliation, and error detection.

Because of technological improvements, the tremendous amount of data that a modern machine can collect and analyse generates a treasure trove of new insights. Evaluate consumer purchasing habits and estimate future demand and supply changes, or recommend the optimization of new choices, such as targeted emailing or a variety of site experiences, to increase system conversion.

However, a back end of an ERP equipped with this functionality can detect anomalies that could suggest fraudulent transactions quickly and identify processes that are creating an unusually high amount of damaged products. In short, machine learning will empower our companies to make quick judgments that will aid them in their pursuit of success.

Machine learning, AI, IoT, and other innovations will propel ERP systems forward in the years to come, resulting in continued advancement and a newer shape for ERP history in the years to come—65 percent of CIOs expect to integrate AI into their ERPs by 2022.

1.2 Educational ERP System

In higher education, the educational ERP system differs from the corporate ERP system in that it has different modules. ERP in higher education should be designed to meet the fundamental needs of the educational system. When it comes to legacy systems, basic enhancements or adaptations that are based on real-world experience do not necessarily yield the desired results. The research investigates the effects of enterprise

resource planning systems (ERP) after they have been introduced in India's higher education system.

Figure: 1.3: Modules of Educational ERP

In technical educational institutes, enterprise resource planning (ERP) is widely employed (TEIs). Regardless of the level of failure, ERP systems should continue to provide services to their users. In ERP, there could be a variety of losses.

For ERP systems to handle considerable degrees of success and failure, there are a plethora of features or measurements that can be defined (Fisher, 2006).

An ERP system is used to provide an approach that integrates the functionality of different departments in any Higher educational institution (HEI), to conduct the operations from a central database with accuracy and convenience. Any ERP System is basically developed with the help of two parts: hardware and software.

The hardware part is also known as the physical devices to the system's infrastructure, which includes the server of the system where the softer is to be installed, and the other

thing is the network device to help connect the clients. The other hardware which has been used to make the ERP system functional is the security-related hardware such as firewall, ASA, etc.

The software part of the ERP is the modules of the different departments which have been developed and integrated and made one application. The data and information that passes via hardware is referred to as software. Both sections are susceptible to failure. It's possible that hardware and software resources may fail, and data will become damaged, resulting in ERP failure. Different sorts of failure circumstances are addressed differently in security systems. Different features may be established for these systems in order to handle failure and improve security.

Higher education institutions were forced to modernise or exchange obsolete software system, that no longer met and supported current technical standards throughout the previous decade (Oliver, et.al., 2015; Nah, et.al, 2003). Choosing and implementing ERP has demonstrated as a effective strategy for many organizations.

Prior to initiation of enterprise resource planning (ERP) phenomena, all organizational operational data was saved in their own software programme. It was difficult for the organisations to combine data using different database management systems to collectively gather the entire required information required for the management of the organization. Thus, rendering the decision-making task difficult (Davenport, 2000).

Several suppliers by using their expertise in ERP provided tailor-made ERPs to be utilized for designated industrial operations in the current ERP versions utilised by institutions of higher learning, drawing on their ERP experience (Soh, et.al., 2003). Integration of commercial software promises "simplified procedures, improved customer service, and as a result, higher corporate value." The integrated commercial software is available for purchase on the internet (Siau & Messersmith, 2003).

Higher education ERP installations had a wide range of outcomes during the first wave of implementations. The implementation activities of some institutions were plagued by over-budgeting, missed time limits, and operational interruptions, all of which were publicly recorded (Fowler & Gilfillan, 2003). Despite a rocky start, enterprise resource

planning systems (ERPs) have grown in popularity year after year, with more institutions adopting them.

The authors have observed that in spite of the rise in the ERP implementation in the educational sector from the literature review, it can be deduced that 60 to 65 percent of ERP systems have a failure rate, and 30 to 35 percent of ERP implementations are cancelled because of different factors. In the area of the higher education system, the implementation and success of ERP are very critical; failure of ERP system is comparatively higher as well (Habadi, et.al., 2017, Pollock & Cornford, 2005, Amgad & Essam, 2013, AlQashami & Heba, 2015). Several factors contribute to this high failure rate, including the following. Technical user training, cost input, step-by-step deployment rather than a "big-bang" strategy, and end-user training are all important considerations.

ERP systems are one of the most expensive expenditures a company can make, as well as one of the most significant investments in terms of human and financial resources that a company can make (Dewey & DeBlois, 2016a, 2016b). Because it incorporates industry-compliant solutions into the ERP software, it also provides a considerable organizational process reengineering component to the institution. The adoption of these best practises often necessitates the modification of an institution's operational procedures to become compatible with the modules offered by the system (Wagner et.al., 2016).

After they must continue to justify the institution's major ongoing expense and operational implications despite the realisation of the applications and benefits of an ERP system, as well as the ability to better quantify these benefits into the outcome and becoming more accessible to those administrations and chief ERP officers (Hawkins & Barone, 2003). The enterprise resource planning system (ERP) serves as the production database for the organization's operations, allowing users to enter actual data for real actions. The benefits of the system are typically not apparent until the project is completed and put into operation. Depending on the size of the organisation, it could take weeks, months, or even years to fully integrate all of the new system's operations and improvements (Hawking, Stein, & Foster, 2004; Markus & Tanis, 2000).

1.3 Study's Purpose

The main goal of this research project is to learn about the ERP working experiences of students, faculty, administrators, developers, and higher management personnel at selected higher education institutions, as well as to share their challenges & successes, so that HEIs' administrators and management can learn from their mistakes. This research will also add to the organization's tiny corpus of knowledge. This study focused on the ERP experience in higher education after installation and contributed to the burgeoning field of ERP post-implementation research in general. In addition, the report provides significant insight into the ERP implementation project's long-term influence on the HEIs' settings after adaptation is live.

1.4 Problem Statement

With periodical increase in the number of courses offered by the universities and the gradual increase intake in the number of students, it is necessary to include the technology to save time, minimize cost, maintain and access the records. This is the place where ERP comes into play. But the problem with the system is 1. End-user access 2. Security 3. Post-Implementation issues. The issue of end-user access can be answered by giving appropriate training to the users. But for answering the problem of security, especially during the post-implementation phase, is essential. The present work focuses on answering the third issue, which includes the issues related to end-user access, training of users, security of data, changes in job profile, etc.

1.5 Research Objectives

1. To identify the awareness on ERP systems among Indian educational organizations/universities.
2. To identify the most critical consequences of ERP Implementation Process.
3. Propose the prospective solutions to the challenges identified during the work.
4. Recommend a specific ERP implementation process for the Indian educational organizations/universities.

1.6 Research Questions

The following are the overarching research questions that the authors have recognised as important to explore and focus on:-

1. What are the Educational ERP modules?
2. What are the elements that impact ERP post-implementation in HEIs?
3. How do post-implementation approaches and activities aid in the improvement or resolution of issues that arose or were not handled during the initial implementation period?

General questions are utilised in the online inquiry and are complemented with extra questions and problems, as indicated at the end of Chapter III of this thesis, to collect rich material necessary to perform theory creation and analysis related to my core research.

1.7 Terminology Definition

The following definition of terms are listed here to elucidate their usage in research:

Configuration or Customization — Adding institutional-specific area definitions and values to database tables created specifically for this purpose without the need for any coding or programming changes. This is something that many potential users do because it does not necessitate any programming knowledge (Brehm, et.al. 2001).

End-User Requirements – According to Dery et al. (2006), an end-user is "anyone who relies on the ERP software in a significant operational sense," but for the purposes of this study, end-users are students, administrators, or faculty members of the institution who may use or add operational information to the ERP system that relies on data retrieved from the ERP system (or vice versa).

Enterprise Resource Planning Systems (ERP Systems) - When a firm implements an enterprise resource planning (ERP) system, it consolidates several data sources into one central database, allowing information to flow more easily throughout the organisation (Nah, 2012).

Go-Live — When the project reaches this step, the ERP system has been transformed into a production-oriented component that supports the organization's activities, and users are able to enter real-time data into the system for everyday operations.

Implementation Approach - When a company designs and implements an enterprise resource planning system (ERP), one or more approaches are employed. This is the software production stage for any company.

Big-bang-Implementation Approach – A quick employment strategy wherein ERP is implemented in its entirety at the same time as the business process management system (Davenport, 2010).

Phased or staggered implementation - a way of implementing enterprise resource planning in which each module, such as a business unit or a functional area, is implemented in stages over time (Davenport, 2010).

Initial Implementation - The initial stage of implementation, which is one of the study's techniques, refers to the phase of an ERP system's implementation at the level of an organisation, as defined by the study.

System Modification– Changing the programme code based on the ERP's base structure. This is usually heavily reliant on the developers and administrative personnel

At the institution, because it makes patch updates and improved versions more convenient, as well as because it increases the resource expenses associated with system maintenance.

Post-Implementation —Within minutes of becoming live, the ERP (individual component or entire module) begins to serve as the primary system for real, day-to-day operations in the organisation.

1.8 Research Design

This current research is an investigation carried out by employing a research-survey approach as methodology. It was decided to conduct an online survey in order to determine the existing status of ERP employments in HEIs (both public and private) in

India. Solutions for the research problems identified and supplementary study inferences were generated after within-sample and cross-sample analysis of the data collected, with assistance of literature review analysis, in conjunction with the quantitative online survey data.

1.8.1 Online Survey

In order to understand the present status of ERP adoption by private HEIs the country, the researcher created an online survey to find out what people thought. The survey was created with the goal of gathering information from five major ERP stakeholders: administration, students, teachers, developers, and management of the institute where the survey was conducted.

1.8.2 Population

This research used a random snowball sampling technique to acquire data for the purposes of the study in question. To begin, educational institutions in the Delhi-NCR region that have already deployed the ERP system were identified and invited to participate. Six such higher educational institutions were selected; all of these HEIs are autonomous, UGC-approved universities that run their operations with the use of enterprise resource planning systems from a variety of suppliers.

A questionnaire survey was also distributed to respondents from these colleges, and they were asked to complete it online. The questionnaire survey was designed to collect information from three types of respondents: faculty, students, and administrative staff. Data collection from academics and students will be used to poll end-users in order to ascertain post-implementation success, as well as administrative employees in order to evaluate the implementation process. The total sample size, which includes all respondents, is 444 people from six different universities.

1.8.3 Data Collection & Analysis

The quantitative survey conducted as part of the research, which is summarised here, was designed to determine the current stage of institutional ERP deployment as well as the characteristics of different sectors of the sample data population. Individualized

responses are being employed to determine which HEIs met standards for participation in the qualitative research of this study's operations, which will be conducted in the coming months.

1.8.4 Criteria for selection

The ERP system was selected based on the conclusion of the primary phase of deployment of ERP teaching-learning module, which was the major selection criterion. Student Faculty is one of three enterprise resource planning (ERP) modules that are most commonly utilised in higher education to optimise teaching-learning processes; the other two modules are human resources and finance (Goldstein, Kvavik & Voloudakis, 2005). One of the key institutional selection modules was chosen to be the teaching-learning module because it is conspicuous and distinguishing to higher education institutions, and because there is insufficient research available specifically on teaching-learning enterprise resource planning systems. The design was further improved by include the requirement of the institutional size as an additional section determinant, which was incorporated into the final version. Several articles on ERP implementation experience make mention of the fact that organisational size is a CSF in the adoption of ERP, and that additional study relying on size of an organisation are required (Hawking et al., 2004).

1.8.5 Data Gathering and Analytical Services

We collect all of our information and data online, and we code it according to conceptual categories that are regularly analysed and then further refine it during the research process (Lincoln et.al, 2005). Resulting in the generation and categorization of the data enabled for the use of table matrixes and statistical analysis to be performed.

1.8.6 Authentication and Validation of Information

For years, traditional research has developed valedictory tests for establishing the reliability of data quality; throughout time, these tests have been more refined and may be broken down into specific separate aspects that assist in validating the data's veracity. Each of the four categories of validity are as follows: initial validity, idea validity, reliability validity, and external validity (Yin, 2004). For the most part, the following

phrases and requirements, which correspond to the traditional valedictory tests, have been reinterpreted and made more relevant for qualitative research in the process: (a) credibility, (b) confirmability, (c) dependability, and (d) transferability (Erlandson, 2003; Lincoln & Guba, 2005). The reliability and trustworthiness of the study's data were established, and these approaches were then used to the research.

In order to ensure that the system's confirmability was achieved, the research was documented internally and externally, various sources of evidence were gathered, researcher bias was identified and the data collected was authenticated by reviewing the response time stamps, among other measures. (Erlandson, 2003; Lincoln & Guba, 2005; Yin, 2004). For the purpose of addressing data transferability, purposive sampling was employed, with further explanations provided in the dissertation's research chapter.

1.8.7 Analysis

Miles and Huberman (2004) recommended employing table matrices for data analysis, and replication logic was used in the study to aid in theory construction and analytical generalisation, both of which were accomplished (Yin, 2004). All size ranges accepted literal replication or similar analysis results, but the theoretical image of the system or opposite consequences were expected across all size ranges.

1.9 The Significance of The Research Study

A recent review of the literature indicates that the research recommendations are important because they provide a collection of data that HEIs and management can use to gain a better understanding of the ERP implementation's long-term impact on the institution's environment after implementation and go-live. Also contributing to the growing body of knowledge is this study's identification of criteria that can be used to predict ERP and its implementation effectiveness at the outset, with a particular emphasis on factors that are special to higher education. It is hoped that the findings of this comprehensive study will assist higher education administrators in understanding the influence of ERP in institutional settings and will highlight the changes that will

appear in organizational functioning post-ERP-implementation in the foreseeable future.

The results of the post-ERP-adaption in HEIs shared via this work, organisations and their management will be better able to evaluate the overall performance of their project and use the findings to improve planning for future ERP system initiatives in the future.

CHAPTER II

LITERATURE REVIEW

The educational ERP system in pedagogy is subjected to a different module than the business activities ERP system. ERP in pedagogy should be tailored to the specific requirements of the educational system. Enhancements or even diversifications of inheritance solutions that result from the application of business skills are not always successful in their endeavours.

ERP systems are commonly used in TEIs. ERP systems should continue to provide services to its users regardless of how many times they fail. Within ERP systems, there could be a wide range of faults. For ERP systems to handle the quantity of loss, some alternative measures or characteristics may be described (Goel, et.al.,2012).

ERP system is used for providing an approach that integrates the functioning of assorted departments in any TEI to conduct the processes from a central information center with accuracy and convenience. Any ERP system involves a system that has two parts: hardware and package. Hardware half is often referred to as an infrastructure system that incorporates networks, databases, laptop peripherals, and servers. The package half is that the information and knowledge that flows through hardware. There are often failures in each element. The hardware and package resources may fail, and knowledge might get corrupted, and it will cause ERP failure. Varied sorts of failure conditions square measure handled otherwise in systems making specific security. These systems will have totally different characteristics outlined for handling failure and thus safety (Goel, et al.,2012).

ERP systems specialize in combining the original sub-systems by employing a central information repository. ERP enable their end-users to work using a computer network or net-primarily based settings. Furthermore, end-user access privileges are not restricted to a single sub-system, but are rather defined in accordance with the duties assigned to employees; as a result, ERP systems are exposed to a variety of security

and different challenges, such as 'lack of amendment management,' 'data ownership,,'securing custom-designed modules,, 'complexities in managing roles,, unauthorised data access,, and hacking.' When it comes to ERP systems, the issues are typically split into two categories: "generic obstacles" and "product-specific challenges." The "generic challenges" are those that are common to all products, while the "product-specific challenges" are those that are specific to a single product. Issues of this nature can be faced throughout the entire ERP system. The authors of Tanis and Markus (2000) argue that enterprise research can make a significant contribution to the body of knowledge about Information Systems (IS), particularly in the areas of finance, technological risks and issues, resource management, IT system incorporation, uses, and effects on organisational functioning.

The chapter takes a close look at the existing ERP research. First, a review logical exploration of ERP system beliefs and assumptions gathered from the literature is presented, followed by a history of ERP research. The chapter finishes with a review of existing material on ERP post-implementation and a study of ERP systems as they relate to any organisational fit in higher education.

2.1 ERP Research's Evolution

ERP is for enterprise resource planning, and it is software that aims to bring all business-related operations and functions together on a single IT platform for simple management, allowing the company to run more efficiently and effectively (Tarhini, Ammar, Tarhini, Masa'deh, 2015).

Figure: 2.1: Structural Function of ERP system

ERP is an old term in the manufacturing and production industry that dates back to early of the 1960s when the ERP was in the form of an Inventory Control system where it acted as accounting software; later in the 1970s, this inventory control system was modified into MRP - Material Requirements Planning which was a package that provided support to the planning and control unit of the business production houses. This system was replaced by a more advanced MRP II system in the 1980s. This new advanced system was aiming towards the integration of technology with manufacturing to increase the manufacturing of products (Habadi, et.al. 2017).

Table 2.1: Depict the development of ERP.

Development of ERP		
Time Line	**Systems**	**Platforms**
1960 – 1970	Inventory Management and Control	Mainframe system where IIIrd generation software's such as Cobol, Fortran were used.
1970 – 1980	Material Requirement Planning	Mainframe system where IIIrd generation softwares such as Cobol, Fortran were used.
1980 – 1990	MRP-II	Mainframe system wherein IVth generation database softwares were used specifically for manufacturing units
1990 – 2000	Enterprise Recourse Planning	Mainframe client-server architecture using IVth generation database management software and manufacturing application
2000 – till present	Extended Enterprise Recourse Planning or ERP-2	Client-Server system employing web and cloud platforms, some are open sourced alongwith 5th generation application like (SCM, SRM, SFA (Sales Force Automation), APS.

Several books and articles have been written about the development of enterprise resource planning systems. A piece of software designed for the manufacturing industry at the time of its development was used to help create the system, which was implemented in the early 1970s. During the following decade, the solutions were referred to as Materials Requirement Planning (MRP) systems, eventually evolving into MRP II systems. Introduction of MRP and MRP II was primarily motivated by the goal

to improve inventory management, production scheduling, and financial management capabilities inside a company (Aloini, Dulmin, Mininnno, 2007).

Because of continual evolution and designs for industry-specific requirements, ERP systems are applicable to a wide range of sectors, including human resources (HR), finance, and administration, as well as activities specialised to particular industries, such as higher education. The majority of earlier literatures concentrated on ERP system use and expansion in commercial businesses, from which it can be concluded that the works were majorily focused on studying installation technologies.

Pastor and Esteves (2001) undertook an evaluation of the early ERP literature, with a particular emphasis on information systems research undertaken between 1997 and 2000. They searched for information systems journals and academic conference proceedings, as well as phrases that contained the word "enterprise" in various permutations, such as enterprise-wide information systems. Pastor and Esteves also investigated the major enterprise resource planning (ERP) suppliers of the time, including PeopleSoft by Oracle SAP, and J.D. Edwards. Pastor and Esteves (2001) devised a six-phase ERP life cycle categorization approach to aid them in their search. In the life cycle, the phases were as follows: (1) acquisition, (2) use, (3) implementation, (4) use, (5) evolution and (6) retirement. The life cycle phases were as follows: (1) acquisition, (2) use, (3) evolution and (4) retirement. The implementation phase was covered by 62 percent of the 78 publications that were included in the life cycle phase of the literature. Pastor and Esteves deemed the completion of the implementation phase to be a successful completion of the project. In addition, the remaining documents were categorized as research based on life-cycle and which are divided into four categories: acquisition, adoption and usage phases, and evolution phases. This classification reflects that in the earlier works the success of ERP was based on the success of the project only, and the impact or realisation of ERP benefit for an organization were not addressed. If it didn't fit into the ERP life cycle category, the rest of the material was categorised as either educational or general. General category for recent studies in research-related concerns, organisational behaviour and knowledge, business modelling, and ERP development of product-related challenges, among other things. A

total of 16 articles targeting ERP integration into curriculum were uncovered throughout the education inquiry, suggesting an increased interest in ERP academics. Only ten articles on the subject were discovered, indicating that ERP was still in its early stages of development and acceptance by higher education institutions (Pastor and Esteves). According to Pastor and Esteves (2001), when doing their literature review, they discovered a scarcity of thorough research on end-user gratification and their participation in ERP systems. Both of them also emphasised on fact that ERP system are interdisciplinary in nature, emphasising the significance of addressing future ERP research from this standpoint.

An investigation on ERP research trends was carried out by Millet et.al., 2005 whose study of the literature, revealed that the number of ERP related research publications climbed from eighteen in 1996 to 461 in the year 2003, representing a tenfold increase. During same time period, there has also been a growth in the adoption of enterprise resource planning systems. Take, for example, the most recent ERP study advancements. A search across disciplines in 2003 and 2004 for papers and conference proceedings that contained the phrase "ERP" or any sort of summary information linked to ERP was carried out by Botta-Genoulaz et al. (2005), who found nothing. After conducting this search, it was discovered that there were over 250 relevant publications on the subject, which were then analysed and narrowed down to the 80 pieces that were later studied in the literature review.

Based on a review of the literature, Botta-Genoulaz (2005) identified six essential areas for the current study, which she further elaborated on (a). ERP implementation, (b). ERP optimization following the introduction of a new system (c) ERP software is a type of business management software (d) ERP-Case Studies and ERP-Supply Chain Management are two examples of ERP-related research (SCM). While ERP implementation has long been a key topic of ERP research, they discovered that it continues to attract a great deal of attention in more recent studies. Also, the recent works are focussed on social-cultural variables, business processes and their management, and innumerable human and organisational characteristics which

determine the success or failure rate of an ERP deployment have become more common in recent ERP implementation research.

According to the subsequent category of current noteworthy research, ERP Optimization, researchers discovered a slight but increasing devotion in the post-implementation phase of ERP projects, as well as a shift in emphasis to investigate the return on investment and benefit received by a company from ERP system adaptation and implementation. Botta-Genoulaz (2005) proposed a definition of ERP success that was based on their experience.

Nevertheless, success will be realised when any company execute its functionalities using ERP, and organization's performance and development are supported by an integrated information system. The research into ERP system optimization and installation can be divided into three types of categories: (i) post-implementation factors, (ii) end-user gratification, (iii) competitive gain resulting from the use of Markers are all discussed in detail. It was argued by Botta-Genoulaz that ERP system maintenance and upgrades were a distinct component of post-implementation considerations, highlighting the scope of ERP maintenance study. They discovered that there has been an increase in research into user happiness and the relationship between user satisfaction and the effective adoption of an ERP system within an organisation. It was also pointed out that with the increased usage of technological advancements by the work-force at an organization impacts more effectively on working of the organization than the technological advancement itself During the study of the third post-implementation investigation, Botta-Genoulaz discovered that the literature did not support the actual achievement of a competitive advantage as a consequence of employing an ERP.

It was in Botta- Genoulaz (2005) who worked on the third area of significant research, the effect of ERP system on organisational functions and the requirements for cross-functional interface. He conducted studies that looked at management issues, organisational impacts, ERP implementation to best business practises, and ERP implementation to best business practises, among other things. The two domains of ERP study, software and supply chain management, are documented in order to

facilitate the extension of ERP into explicit areas of system software itself, as well as the altering dynamics of ERP system, which entail relations with supplementary softwares. During her presentation, Botta-Genoulaz emphasised the importance of new understanding as well as the possibility of more research in these areas being conducted. According to the authors, "it is astounding to note that so much of the research is concentrated on the ERP' s fringes rather than on the systems themselves". According to Botta-Genoulaz, owing to the continuous and speedy growth of the ERP systems, its practice, it is critical for researchers in the ERP field to be up to date on current research in their own fields of interest as well as related disciplines. It is at this point that they begin to advocate for the use of case studies and methodology as essential components of ERP research. In spite of the fact that the vast number of case study revealed the choice of company that the contributing firm belonged to, Botta-Genoulaz pointed out that it is a common practise to conceal the new names of organisations that participate in case studies in order to protect them from competition in the future.

Botta-Genoulaz, also determined from the research study they conducted on the previous works done that futuristic ERP related/focused researches should take into account ERP systems evolving and altering their dynamic behaviour. They also acknowledge and recognise that the existing concept of an ERP system is evolving as a result of changes in the system's structural design and functionality. Additionally, scholars must also be attentive of influence of ERP on an organization, as well as its across-the-board ramifications on all sectors organisation, & should reason for these factors in future researches, according to the authors. Final point made by Botta-Genoulaz and colleagues was that ERP, research, and information are all interrelated fields, and that there are few studies that fully incorporate this part.

Dery (2006) built on Paster and Esteves (2001) study by exploratory ERP researches conducted between 2000 & 2005 and categorising them according to the Esteves and Pastor category approach developed by Esteves and Pastor. Dery et. al., examined approximately 200 research articles in order to evaluate the ongoing progress and modification of ERP literature. They discovered that research on the impact of the implementation of the life cycle phase continues to dominate research, and that the

examination of research also revealed an increase in studies on the system's utilisation and maintenance (post-implementation). Post-implementation study was classified into two categories by Dery: (1) end-user gratification and management use, (2) ERP return for investment. The findings demonstrated that investigators addressed the issue of a lack of thorough ERP study by doing their own research. The findings of Pastor and Esteves on user happiness and engagement were consistent with the findings of the Botta-Genoulaz solution study (2005).

Dery's (2006) literature evaluation contains a journal-style analysis of ERP literature by category, which is included in Dery's (2006) literature evaluation. These studies were published in journals in the fields of business, logistics, accounting, and human resource management. It is possible that an inter-disciplinary approach to ERP research will arise as a result of the discovery of evidences and the spread of ERP research into fields other than information systems. The findings of Pastor and Esteves (2001) as well as Botta-Genoulaz (2001) indicated that this advancement in research was required in order to be successful.

Bohorquez and Esteves (2007) updated their previous review of the work, which was made by Pastor and Esteves (2001). Following up on their earlier work, Esteves and Bohorquez reviewed ERP research from 2001 to 2005, employing the same type of search method as in the prior study, adding an additional 260 papers to their collection. Botta-(2005), Genoulaz-(2005), and Dery-(2005) explanations of recent ERP research advances and trends were corroborated by their findings (2006). Bohorquez and Esteves discovered that as the research progressed, new avenues for investigation were available, which represents the dynamic expansion of enterprise resource planning systems within firms. A complete 180-degree shift in ERP developers' attention from large corporations to medium and small firms provides opportunities for research into a wide range of industry sectors. Considering the current state of ERP vendor acquisitions and mergers, researchers have a unique chance to explore and analyse the effect of this action on the ERP market and businesses. They likewise asserted that their inferences were based on a lack of systematic and comparative studies across all firms,

industries, and geographic areas, and they stated that they will continue to advocate for an inter-disciplinary approach in ERP research.

A basis for comprehending ERP system phenomena and illustrations, as well as the dynamic nature of ERP system development and use, was laid by the growth of ERP research. A thorough understanding of the early and present disciplines of ERP focused works, in addition to awareness of the gap that have been recognised, has assisted this research in establishing the key issue for this current research study and picking the most appropriate research technique.

2.2 Gap Analysis

A basis for comprehending ERP system phenomena and illustrations, as well as the dynamic nature of ERP system development and use, was laid by the growth of ERP research. A thorough understanding of the early and present disciplines of ERP focused works, in addition to awareness of the gap that have been recognised, has assisted this research in establishing the key issue for this current research study and picking the most appropriate research technique.

Following are some of the major papers reviewed:

Table 2.2: Gap Analysis

PAPER NAME/VOLUME	OBJECTIVES	VARIABLES	RESPONDENTS	DATA ANALYSIS TOOLS	MAJOR FINDINGS
impact analysis of ERP post-implementation modifications: design, tool support and evaluation, minou parhizkar, marco comuzzi, computers in industry (elsevier) 2017 84 (pp 25-38)	Propose a framework for impact analysis of ERP post-implementation modifications. Our framework allows mapping dependencies among ERP system components and, based on these dependencies, automatically assessing the impact of a proposed change on both the design-time structure and run-time landscape of the system through a novel set of impact metrics.	SAP, ORACLE/JD EDWARDS, MICROSOFT DYNAMICS	7 ERP PROFESSIONAL+12 MASTER STUDENTS (BUSINESS SYSTEMS DESIGN)	SAP, MS DYNAMICS NAV	This paper has presented a framework, i.e., a set of methods and a tool, to support stakeholders such as business analysts in assessing the impact of post-implementation changes to an ERP system. The framework defines a meta-model of the dependencies among ERP entities, a mechanism to assess the impact of proposed changes and a set of metrics to synthetically quantify the scope and depth of ERP changes. Based on the instantiations, our framework is able to assess the impact of changes of the main entities of an ERP system, such as business processes and functions, but it still fails to capture change at the level of roles and responsibilities in the organisational. The evaluation of the tool with ERP experts has revealed that our framework provides an effective solution to an issue that is relevant for practice.
critical successs factors (CSFs) of enterprise resource planning (ERP) system implementation in higher education institutions (HEIs): concepts and literature review, ashwaq alqashami, heba mohammad, computer science & information technology (CS&IT) 2015 10.5121/csit.2015.51508	this paper provides a critical literature review with a special focus on Saudi Arabia. Further, it defines Critical Success Factors (CSFs) contributing to the success of ERP implementation in HEIs. CSFs that will help practitioners to implement them in the Saudi context	Literature review	85 articles	literature review	This research is considered as a starting point to conduct in-depth analysis of CSFs in HEIs to increase the success rate of ERP implementation. Furthermore, it will enrich the academic knowledge in this field because of the lack of previous research on the successful implementation of ERP systems in the HEI sector. The researchers intend to carry on the reach by conducting in depth analysis of different universities in Saudi Arabia that have implemented an ERP system.

analysis of the critical success factors for enterprise resource planning implementation from stakeholders' perspective: a systematic review, ali tarhini, hussain ammar, takwa tarhini, ra'ed masa'deh, international business research 2015 vol. 8 No. 4	This research will fill this gap by providing a systematic review for the literature related to CSFs in the ERP implementation and also present them while considering the participants' different perspectives.	Literature review	This paper presents a systematic review of 35 research articles published on the CSFs implementation between 2000 and 2013.	literature review	We collected and analysed 35 of the key articles discussing and analysing ERP implementation. The paper identifies a total of 51 CSFs in ERP implementation. In these 51 CSFs, top management support and commitment, training and education, project management, clear vision and objectives of the ERP system, careful change management and Interdepartmental communication were the most frequently cited as the CSFs to the successful implementation of ERP systems. A better understanding of the CFSs will help the practitioners and managers to improve the chance of success in the implementation projects.
critical success factors for ERP implementation: the case of jordan, emad abu-shanab, rasha abu-shehab, mousa khairallah, International arab journal of e-technology 2015 vol 4 no 1 january	This study tried to explore the major key success factors (KSFs) that will turn the implementation process to a success	the study will try to answer two main questions: · RQ1: What are the major factors that define the success of ERP systems? · RQ2: And how they are ranked by Jordanian firms and experts?	The sample used was 60 managers in 43 Jordanian firms where an instrument was developed and used to measure their perceptions in relation to the major success factors	The survey used was translated to Arabic to make it easy to all respondents to answer. The survey included 22 KSFs utilizing a 7 point Likert scale. The scale included a statement that rates each factor as least important to the success of ERP implementation (value = 1) or most important to the success of ERP implementation (value = 7)	The results indicated an important role for top management support, user training on software, interdepartmental communication and cooperation, and project team competence. On the other hand, more controversial factors were listed at the bottom of the rank list as marginal influence on the ERP system implementation and they are: partnership with vendor, architecture choices and use of consultant. This study is the first in the Jordanian environment that utilizes a sample from the local market and addresses the perceptions of managers and executives. In this regard, a larger sample would increase the validity of this research and its findings. Also, more research in this area would enhance the instrument used and improve our understanding of the top factors influencing ERP success. Finally, results emphasize the important of top management support and involvement.

critical success factors in enterprise resource planning implementation: a review of case studies, raafat saade harshjot nijher, journal of enterprise information management 2016 vol 29 issue 1	RQ1. What are the Practical Critical Success Factors for ERP Implementation? This article also establishes a new understanding of ERP implementation stages implementation which is more understandable to the practitioners in the industry	Our research work presented in this paper entails two methodologies: The first involves the literature review; and the second relates to the treatment (analysis and synthesis) of the content of the articles	literature review	*Step 1: Levels of analysis:* the literature research scope being specific to ERP systems and not other types of IS systems. *Step 2: Steps to code for:* The coding process identifies whether a pre-determined set of concepts or an interactive approach for coding is followed. *Step 3: Decide whether to code for occurrence or frequency of a concept:* The frequency of a concept was explored. By this measure, were able to identify how many times a particular CSF has been mentioned in the body of literature of case studies. *Step 4: How to distinguish among concepts:* The 'distinguish factor' used was similarity/difference in the meaning. *Step 5: Develop rules for coding the text:* All the case studies were re-read to ensure that the factors mentioned were critical success factors. *Step 6: 'Irrelevant' information* – Only case studies articles were selected. *Step 7: Coding of text/information:* During this stage, the actual coding process was conducted. *Step 8: Analysis of results:* The results analysis consisted of measuring the count of CSFs identified in each article and noting their context that helped to understand the areas.	In this article we focused on the identification of a consolidated CSF set for a successful ERP implementation using case studies in different contexts alone. There have been articles which also mention the critical success factors according to the stages of ERP implementation (Somers & Nelson, 2001; Bharathi & Parikh, 2012); however literature shows that these stages are not understood in the same way by industry. There is a need to not only condense these factors but also be as specific as possible to eliminate overlap, redundancies, and multiple meanings across the factors and to simplify them by assigning them to industry agreed upon stages. A total of 37 related case studies were selected; a total of 64 critical success factors were extracted which were condensed to 22 unique ones. To provide clarity about the duration of their usage and importance, these CSF's were divided into five categories based on their occurrence in the ERP implementation stages. The five categories were organizational state, business requirements, technical solutions, project implementation and post implementation usage. Once the CSFs were consolidated, it became clear that there some stages do not have enough factors to appropriately represent the conceptual stages. This paper opens the possibility to view the ERP implementation life cycle and the related critical success factors from another consolidated point of view which also focuses on the factors related to change management that are applicable throughout the ERP implementation process. Change management can be considered as a dimension for all the CSFs found herein.

critical success factors for enterprise resource planning implemantation success, mohmed Y. mohmed al-sabaawi, international journal of advances in engineering and technology 2015 vol 8 issue 4 pp 496-506	This paper proposes a new framework for critical factor success for Cihan University analysis. the purpose of this the study is to describe critical success factors for ERP implementation for empowering Cihan university of investigation of the success in has been adopted this is the projects. This paper is the first to explore the factors that influence the success and failure of ERP systems in Cihan university . an instrument was developed and used to measure perceptions of sample at Cihan university in relation to the major success factors. Based on that, the study will try to answer two main questions: 1. "What are the critical factors for ERP implementation success in a Cihan university?" 2. What are the KCSFs (Key Critical Success Factors, most preferred CSFs) that should be taken into high priority for the successful ERP implementation in a Cihan university and how they are ranked by sample? Based on the above explained research problem and the literature available the following objectives	1. Commitment and support of top management 2. Project management 3. User training and education 4. Business Plan and Vision 5. Technological infrastructure 7. Change Management 8. Communication 1. Commitment and support of top management 2. Project management 3. User training and education 4. Business Plan and Vision 5. Technological infrastructure 7. Change Management 8. Communication	The research steps including MIS Literature review, factors extraction, Extracting factor assessment questions, data collection, data analysis, and finally Conclusions . The questionnaire used for data collection contained scales to measure the various factors on influence the success of ERP systems in Cihan university. The questionnaire was designed after a preliminary observation on the practice and reviewing the available literature. The researchers circulated the research questionnaire among the parties that had the ability and knowledge to answer it.The survey instrument asked the experts to rate the impact of 8 identified factors of ERP success using expressions relevant. A set of a questionnaire was created which contained a total of 24 questions (see appendix). The categorized the questionnaire under the following dimensions according to their functions and goals: •Commitment and support of top management (question 1-3(•Project management (question 4-6(	statistical analysis : Descriptive and factor analysis were conducted using SPSS.	ERP have been recognized. 8 CSFs in relation to ERP implementations in high education sector at developing countries. Where identified and these are Commitment and support of top management, Project management, User training and education, Business Plan and Vision, Technological infrastructure, Departments(Stakeholder) participation, Change Management and Communication. Our analysis from during the Descriptive Statistics (Mean, standard deviation) and factor analysis of critical success factors for ERP implementation success was found that the most of factors have been accepted , But the most important success factors was ERP implementation success are Project management, Technological infrastructure and Commitment and support of top management . This study has contributed to academic research by producing the empirical evidence to support the theories of CSFs and ERP implementation success at higher education at iraq. Understanding these factors is critical for the progression of the field in both academia and practice, therefore, providing a strong foundation of CSFs for further research in ERP implementation is very essential. All of these eight aspects are important to be aware of and managed in order to ensure the success of ERP initiatives in developing countries.

	have been listed 1. To explore the CSFs for the successful ERP implementation in public sector at Iraq. 2. To rank the CSFs based on their importance for successful ERP implementation in a Cihan university?.		•User training and education (question 7-9) •Business Plan and Vision (question 10-12) •Technological infrastructure (question 13-15(•Departments(Stakeholder) participation (question 16-18(•Change Management (question 19-21(•Communication (question 22-24(The questionnaire used for data collection contained scales to measure ERP success using items (1 = disagree, 2 = Neither agree nor disagree , 3 = agree).		

antecedents of ERP systems implementation success: a study on jordanian healthcare sector	The purpose of this paper is to study the effect of ERP implementation success antecedents which consists of training, supportive leadership and ease of use on ERP implementation success itself through a mediating effect of user satisfaction.	Empirical data were collected using a survey questionnaire which was distributed to ERP users in Jordanian healthcare organizations.	175	analyzed using structure equation modeling.	A significant relationship was found between these antecedents and ERP implementation success. Furthermore, user satisfaction plays a significant mediating role between ease of use and ERP implementation success.The outcomes of this study are useful to ERP users as they would be able to strategize future ERP system implementation in different sectors such as education, manufacturing and insurance industry. Finally, the findings may be useful to ERP system adopters in different developing countries.

the relationship between change management strategy and successful enterprise resourse planning (ERP) implementations: a theoreticaL perspective, hamzah altamony, dr ali tarhini, dr zahran al-salti, ala'a hamdi gharaibeh, dr tariq elyas, international journal of business management and economic research 2016 vol 7(4) pp 690-703	This research aims to explore the critical success factors in change management strategy in order to guarantee a successful implementation of an organisation's Enterprise Resource Planning (ERP) system.	Paper discusses the change management strategies that led to success of an ERP system through strategies and processes. The motive of conducting literature review is to find out the impact of change management over the implementation of ERP. The aim of this paper is to analyse the theoretical approaches in the basis of practical derivations. Furthermore, literature review was focused on exploring various theories on the previous studies in change management area as well as its relation to enterprise resource planning implementation in order to understand better the relationship being studied.	literature review	literature review	This study found that ERP critical success factors fall under one of five main categories, namely: change management, top management support, business process re-engineering, vendor support and user involvement. This study found that the ERP critical success factors fall beneath one of five main categories, namely change management, top management support, business process re-engineering, vendor support, and user involvement. However, based on previous studies conducted in the study area from 2000 to 2015, the change management strategy, one among the foremost widely cited critical success factors in ERP Implementation. Also, the most important and citation studies of change management strategies on ERP implementation, as follows: change management model; approaches for managing change associated with ERP; actors of ERP project; the elements of change management strategies, and change management model.

the effect of ERP implementation CSFs on business performance: an empirical study on users' perception,mustafa agaoglu, e. serra yurtkoru, ash kucukaslan ekmekci, 4th international conference on leadership, technology, innovation and business management (science direct) (procedia - socila and behavioral sciences) 2015 210 (pp 35-42)	ERP implementation project in a multinational consumer goods company to investigate the CSFs and their effect on ERP implementation success from users' point of view.	in this study we hypothesize that immediate project success comes before business outcomes and has positive effect on. Thus our first hypothesis is H1: ERP project outcomes have positive affect on business process outcomes. H2a: ERP system environment CSFs have positive affect on ERP project outcomes H2b: ERP adopting organization environment CSFs have positive affect on ERP project outcomes	This study is conducted on 220 employees involved in ERP implementation project in a multinational consumer. The survey of this study is conducted in a multinational consumer goods company, implementing ERP project from a business unit located in Istanbul. Questionnaire is distributed to 220 employees involved in the project and 184 questionnaires returned with 83.6 % return rate. The sample consists of 72 female (39.1 %) and 112 male (60.9 %) employees with an average age of 28.7 (SD=3.6). All the respondents are university graduates, 29.3 % of them have master's degree, and 2.7 % have doctorate. Working years in this company ranges between 1 to 7 with a mean of 2.7 and standard deviation of 1.3. goods company	A multi-item questionnaire measured on a five-point interval scale is used in this study. Six ERP system environment CSFs are measured with 24 items and nine ERP adopting organization environment CSFs are measured with 35 items based on the literature. Business process outcomes are measured by 10-item scale and ERP project outcome are measured by four items; being on time, being within budget, achieving predetermined goals and being in line with quality standards. In addition, respondents are directly asked to evaluate how important are those critical success factors in realizing an ERP project.	in our study, we found that organizational CSFs do not have a significant effect on project success and indirectly on business outcomes. Our findings indicate that ERP project outcome is explained by 'vendor support', 'careful selection of ERP software', and 'software analysis, testing and troubleshooting'. However, they also found top management support as an important factor that was not significant in our study. As expected ERP project success has quite high positive effect on business process outcomes. Since business process improvements is the major motivation for ERP implementations this finding supports expectations. Since in this study user's perception is considered this ranking procedure is replicated. As a result of the findings it is found that, the most important factor to achieve success in ERP project implementation is 'user involvement' according to respondents' perception, which is followed by 'user training'. The least important factor is 'vendor support'. These findings are contradictory with path analysis result where 'vendor support' is one of the most important factors that explains the project success. Moreover, 'user involvement' and 'user training' are not significant factors.

actors' interaction in the ERP implementation literature, bambang P.K., bintoro togar mangihuut simatupang utomo sarjono putro pri hermawan, business process management journal 2015 vol 21 issue 2	this paper attempts to find the studies that are focused on actor interaction analysis as well as on how the interaction is managed in each stage of ERP implementation. If such studies do not exist, then this paper will propose a further study that is focused on the exploration of the types of conflicts arising in the interaction among actors in each stage of ERP implementation, their causal factors, and the best methods to resolve the conflicts.	The primary purpose of this research is to find out the actor's interaction, including how to manage the interaction among them, which contribute to the outcome of ERP implementation. In the first stage, the research begins by characterizing ERP implementation based on two key dimensions: the outcomes and determinants. The outcomes of ERP implementation are related to success and failure ERP adoption. The determinants are related to factors and actors of ERP implementation. The two dimensions are able to capture the existing literature status on both the actors and factors that determine the results of ERP implementation.	78 articles	literature review	The general findings can be categorized into five points. First, the articles on ERP implementation studied more on critical success and failure factors but very few on critical success and failure actors. Second, almost all of the articles used CFFs as the mirror of CSFs, which explain why there were fewer articles on CFFs than CSFs. Third, the result of CIMO analysis on CSFs and CFFs articles also confirmed that the mechanisms to carry out the interventions were similar with the list of widely known CSFs of ERP implementation. Fourth, there was no further elaboration on CSAs and CFAs articles which mentioned user interaction as a determinant on ERP implementation. Fifth, the result of further analysis using SOSM approach showed that all of the articles fall within the category of simple problems/situations with unitary and pluralist participants

a step-by-step performance assessment and improvement method for ERP implementation: action case studies in chinese companies, hongyi sun, wenbin ni, rocky lam, computers in industry (elsevier) 2015	In this article, a step-by-step assessment and improvement method for ERP implementation is proposed and applied in three companies. First, a fivestage ERP implementation model is proposed. Second, about 80 critical success factors (CSFs) from the literature are elaborated into key performance indices (KPIs), which are associated with each stage of ERP implementation by ten local ERP experts. Third, the weights of the KPIs are calculated using the Dumpster–Shafer method and the evaluation of ten experts An implementation flowchart is developed based on a five-stage model and the philosophy of continuous improvement.	about 80 critical success factors (CSFs)	Three action cases in Chinese manufacturing companies are conducted to	key performance indices (KPIs), Dumpster–Shafer method and the evaluation of ten experts	We believe that this study enriches the ERP implementation literature and practice. Its main contributions include (1) the dynamic lifecycle perspective, (2) the step-by-step assessment approach, (3) the allocation of over 80 CSFs into five stages, (4) the expert evaluation of CSFs' importance and (5) the continuous improvement approach during the implementation process. The action cases may also be another feature in ERP implementation literature. The model has been commercialised in a local consulting firm, but has the potential to be adopted in other countries. However, this study does have a limitation in terms of the generalisation of its results to other countries. The action case research was conducted in Chinese manufacturing companies and CSFs in other countries could be different.

implementation and updation of ERP systems in India: A survey, divya tuteja, international journal for advance research in engineering and technology 2014 vol 2 issue III	This research investigates the organisational and national context within which ERP is adopted and used in India, and how the context and ERP influence each other. In general, this research is based on the need to study organisations in their societal contexts and information systems in their organisational settings.	Literature review	This research focuses on the controversial debate on the conflict between standardization imposed by ERP systems and localisation of business practices. This study also provides some key insights into the implementation and use of ERP systems in the public and the private sectors in India	literature review	Case study findings suggest that the company sector plays an important role in ERP implementations in several key dimensions. ERP systems with in-built business practices express the tendency toward standardisation. In addition, the study investigates the challenges faced by organisations implementing ERP systems in India and factors influencing ERP upgrade decisions. Findings of this research suggest that ERP implementation and upgrade is influenced by, but not necessarily bound by, existing contextual factors -- national and organisational.

cost, benefit and financial risk (COBEFR) of ERP implementation, amgad badewi, essam shehab, proceedings of the 11th international conference on manufacturing research (ICMR 2013) 19th-20th sept 2013 pp 207-212	The purpose of this research is to develop Benefits, Costs, and Financial Risks (CoBeFR) model to show and measure the impact of ERP related decisions, such as degree of business process re-engineering and the level of hardware investment, on the organisational financial value (OFV).	degree of business process re-engineering and the level of hardware investment, on the organisational financial value (OFV). OFV is based on current time value of money (i.e. interest rate), financial risk, and net cash flows	ERP projects in market business companies	cost of finance, with taking into consideration financial risk, should be addressed in the planning process of ERP implementation.	The main conclusion is that there are interrelated impacts of ERP implementation decisions to the organisational financial value. Therefore, decision maker should look at the implementation decision from a new perspective which is Organisational Financial Value (OFV) perspective

an examination of post implementation success determinants of enterprise resource planning: insights from industrial sector of pakistan, atif ali gill, arfan shahzad, subramanium sri ramalu, international journal of supply chain management 2019 vol 8 no. 3	The current study will focus on the key determinants that ensure the post-implementation success of ERP systems. This research is based on the Technology-Organization-Environment (TOE) theory. In this study, project management posited as a technological aspect, leadership involvement as an organizational aspect while external support depicted as an environmental aspect.	An empirical analysis was done in the context of the industrial sector of Pakistan.	the industrial sector of Pakistan.	This research is based on the Technology-Organization-Environment (TOE) theory.	The results depict the strong influence of project management, leadership involvement and external support on ERP post-implementation success. This research delivers practical as well as theoretical implications by providing an integrative model of critical factors for ERP success at Post-implementation phase

risk management in ERP project introduction: review of the literature, davide aloini, riccardo dulmin, valeria mininnno, information and management 2007 vol 44 pp 547 -567	We collected and analyzed a number of key articles discussing and analyzing ERP implementation. The different approaches taken in the literature were compared from a risk management point of view to highlight the key risk factors and their impact on project success	literature review	The literature contributions were primarily of articles from: Emerald, which publishes a wide range of management titles and library-and-information services titles by publishers world-wide. Subjects covered included management, HRM, Marketing, Librarianship, Mechanical engineering, electronic and electrical engineering. Emerald contains 42,000 searchable articles from over 100 of its journals. Science Direct (Elsevier), the electronic collection of science, technology, and medicine full text and bibliographic information. Springer, the specialist publisher of the Science, Technology, Medicine (STM) sector and integrated Business-to-Business publishing houses in Germanspeaking and Eastern European countries.	we used only literature published since 1999. The following method was adopted: Main research lines were carefully explored. Bibliographic databases were used extensively. Web search facilities were used and articles concerning ERP critical success factors, selection, implementation, risk management during the ERP life cycle were collected and analyzed. Papers without these foci were eliminated. Papers were classified depending on their research objective. Papers were analyzed to determine their main message.	An ERP implementation is not merely a ‘‘computer project’’, it is strategic and must be approached as such. ERP systems are integrated applications with an impact on the entire organization. We have presented a review of recent work on ERP systems, investigating risk factors in the ERP life cycle. The different approaches were compared from a risk management point of view to highlight key risk factors and their impact on projects. Literature was further classified in order to address and analyze each risk factor.

An analysis of ERP security issues in ERP implementation process of Indian power distribution companies (Discoms)	The current research study is based on searching such Industry Specific factors with a Focus on “”ERP Security Issues”” of a Power Discoms. The prime objective for adopting the ERP solution by DISCOMs is for Process & Efficiency improvement, Cost reduction and better Customer Services & Meeting Regulatory Norms and ATC Loss reduction. It is felt that that while adopting the ERP solutions the DISCOMs should review the ERP security issues, so that there is no scope of security breach during /after the process which may ultimately turn into financial losses for the DISCOM’s.		IT consultants working with Major IT companies in India, 443 peoples across the India, who are working with Information Technology Department of different Power Distribution companies in India	5 Point Likert scale based on Agree, Strongly Agree, Disagree, choice	In order to get an overall success in an ERP implementation process, ERP security is a vital element. Which having regulatory & financial impact. No one can ignore the same. Most of the Indian State Utilities not yet implemented the ERP solution to integrate their business as per the information received from the Survey. If they adopt the structured manner and give importance to the said evaluated Success factors related to ERP Security during or after ERP Implementation, it is expected that they will achieve the success in their efforts, though there are other invisible issues which may effect the whole process. Hence there are further scope on research on this area also indicated.

Security Issue and their Countermeasures in ERP Implementation, Dr. Ramdas S. Wanare, Amar R. Mudiraj, International Journal of Management and Social Sciences Research (IJMSSR) Volume 3, No. 6, June 2014	This paper highlighting the importance of ERP systems security and various security issues tackle by the organization. We start our journey from understanding the ERP system and then moves towards the security issues in the ERP system and how the people plays their role in ERP system. The next part of journey, we suggest some countermeasure about the security issues in ERP system. With the final word in the abstract, this research paper is all about the security of ERP systems.	Literature review	literature review	literature review	The paper highlighting the importance of ERP security in the business. The study shows that, many organizations are not giving the importance to the security constraints of organizational database and information. The Paper lists the important issues in the regards of ERP security which creates huge problem in organization to prevent the important and vital data. The ERP security plays a vital role in the organization and taking attackers or hackers serious can solve the problem of ERP security at some level. The paper underscores the list of some key security issues which many organizations not considering into their account while deal with the data during the process. The paper also helps by considering some of the countermeasures as mention in sixth section to overcome the problems or issues in the given research. The paper conclude the importance or Data security and information protection mechanism in ERP systems and some of the fundamental and simple resolution to the problems which help the organization to feel safe in protective hand of technology called ERP.

Case study of Database security in Campus ERP System, Varang Acharya, Sweta Jethava, Adarsh Patel, International Journal of Computer Applications (0975 – 8887) Volume 79 – No 15, October 2013	The aim of this study is to identify the risks and controls used in ERP database access, with the objective to understand the ways in which organizations can minimize the business risks involved. In this paper are describe different types of vulnerability of database and Suggestions are offered in resolving the issues for database security in ERP system	various security issues	literature review	literature review	Although, vulnerability assessments of Campus ERP are necessary as system security functions, they are not sufficient to protect system from all security threats. Both measures should be included in a more comprehensive security strategy that includes security policy and procedure controls, network firewalls, strong identification and authentication mechanisms, access control mechanisms, file and link encryption, file integrity checking, physical security measures and security training. A simple approach to data protection looks the various layer of security that can be applied. This approach includes activization of protective mechanisms of DB, protection of server, workstations, a local area network, and use of cryptography. The structured approach to protection of a DB is more expanded and includes, except positions of the simple approach.

Challenges in Implementing Enterprise Resource Planning (ERP) system in Large Organizations: Similarities and Differences Between Corporate and University Environment	This thesis focuses on challenges of ERP implementation between corporate and university environment. I review previous studies that determine Critical Successful Factors (CSFs) and risk factors to implement ERP in both environments.	Literature review	literature review	literature review	First, both corporate sector organizations and universities are seeking the benefits of ERP systems as identified in the literature, including much easier access to reliable information by integrating disparate legacy systems and reengineered business processes. However, the company in the corporate sector reengineered their business processes more easily than universities. does. On the other hand, in a rapidly changing business environment, competitors continuously threaten companies in the corporate sector. The companies stand to lose their competitive advantage or lag behind when they move later than their competitors.

ERP Systems Functionalities in Higher Education, Amin Y. Noaman, Fekry Fouad Ahmed, International Conference on Communication, Management and Information Technology (ICCMIT 2015) Procedia Computer Science 65 (2015) 385 – 395	The current paper shows the contents of the ERP that serve the education system successfully also shows the needs and future expectations of higher education institutions and the current business oriented ERP system.	Literature review	literature review	literature review	This paper proves that ERP is not the a mere acquiring of ERP application. Current ERP for business have different set of functionalities that is significantly different from the academic functionalities required for higher education institutions. ERP for higher education should be tailored specifically to address the academic functionality. Therefore ERP for higher education should start with the organization structure including strategy / policy , data flow, business processes structure, and academic functionalities as an unique discipline. The paper strongly recommend that , the Saudi Ministry of higher education should establish a unique ERP road map for higher education functionalities according to the suggested framework. This road map can achieve better control on universities operations, and effective processes management. In addition it will represent a new statement of requirements for ERP in higher education to which the ERP vendors will respond with a new ERP specifically addressing the real need of higher education.

Security for Enterprise Resource Planning Systems, Wei She and Bhavani Thuraisingham, 2, Information Systems Security, 16:152–163, 2007 DOI: 10.1080/10658980701401959	This paper introduces ERP technology from its evolution through architecture to its products. The security solution in ERP as well as directions for secure ERP systems is presented.	Literature review	literature review	literature review	ERP system now is going towards a system with more coordination/ collaboration, higher heterogeneity and integrity, more intelligent, operating on the level of knowledge, and even wireless-enabled. The security issue within ERP has been there for a long time, but most of the solutions are based on the assumption that an ERP system is a closed environment. Given current trends, where the ERP is more likely to be an open system, these solutions are insufficient to provide the security. he research should focus on the following areas: Policy, model and design of the security architecture. Securing the exchanged documents. Securing the management and sharing of knowledge . Securing web services and service oriented architecture. User authentication and authorization methods in open environment. Securing data transfer in wired and wireless communications, especially security issues on low power devices. Examining the security of the interfaces between different

Moving ERP Systems to the Cloud - Data Security Issues, Pablo Saa, Andrés Cueva Costales, Oswaldo Moscoso-Zea, Sergio Lujan-Mora, Journal of Information Systems Engineering & Management, 2017, 2(4), 21 ISSN: 2468-4376	This paper brings to light data security issues and concerns for organizations by moving their Enterprise Resource Planning (ERP) systems to the cloud.	Literature review	The research approach was based on an exploratory search to review the existing literature on SaaS cloud-based ERPs and its benefits. Additionally, several papers were studied to identify issues on data security, particularly confidentiality and integrity problems that organizations should be aware of before adopting cloud-based ERP solutions. More than 50 articles from 2008 to 2015 were found from several A and A* journals (CORE, 2017) like Journal of Information Systems, MIS quarterly, Journal of Innovation, Management and Technology, Journal of Systems and Information Technology, International Journal of Computer Applications, Journal of Network and Computer Applications among others. Searches were made using remarked academic databases and search engines for Computer Science and Information System fields: IEEE Xplore, Emerald, ACM Digital Library, Gartner Core Research, Science Direct, etc.	literature review	Cloud-based ERP raises specific concerns about the confidentiality and integrity of the data stored in the cloud. Such concerns that affect the adoption of cloud-based ERP are based on the size of the organization. Small to medium enterprises (SMEs) gain the maximum benefits from cloud-based ERP as many of the concerns around data security are not relevant to them. On the contrary, larger organizations are more cautious in moving their mission critical enterprise applications to the cloud. A hybrid solution where organizations can choose to keep their sensitive applications on-premise while leveraging the benefits of the cloud is proposed in this paper as an effective solution that is gaining momentum and popularity for large organizations.

University ERP Preparation Analysis: A PPU Case Study, Islam K. Sowan, Radwan Tahboub, Faisal Khamayseh, (IJACSA) International Journal of Advanced Computer Science and Applications, Vol. 8, No. 11, 2017	This paper focused on the university's situation during the preparation of ERP system implementation. In addition, the study concentrated on technical success factors' influenced on and important to PPU case.	This research was conducted by using three questionnaires in total. The first two aimed to study CSFs; one specifically focused on the technical problems which current systems in the PPU suffered from, in order to extract the particular CSFs which are needed to implement ERP systems. The other simply focused on the most technical critical factors that ensure successful implementation of the ERP project. he third questionnaire studied the degree to which the technical people utilized standard software engineering practices and activities during the PPU's systems' implementation. The completed questionnaires were statistically analyzed and recommendations were extracted.	The population studied was technical people at PPU, who are responsible for developing system inside the university.	Statistical analysis of the data was done by extracting figures, percentages, mean, standard deviations, and t-test using SPSS.	The results of the study were used to support the structure that must be followed during the implementation process. The final list of technical CSFs of PPU includes: 1) Security 2) Training. 3) Data analysis. 4) System integration. 5) IT infrastructure. 6) Database administrator. 7) Complexity. 8) Efficiency of use. 9) Robustness and error prevention. 10) Business process reengineering. In the case of software engineering practices, we found that the most applying activity is project management, then software development, after that software specification, then software design. At the end we find verification and validation activity is the least applied. The results of the study were used to support the structure that must be followed during the implementation process. The final list of technical CSFs of PPU includes: 1) Security 2) Training. 3) Data analysis. 4) System integration. 5) IT infrastructure. 6) Database administrator. 7) Complexity. 8) Efficiency of use. 9) Robustness and error prevention. 10) Business process reengineering.

Moon, Young, "Enterprise Resource Planning (ERP): a review of the literature" (2007).Mechanical and Aerospace Engineering. 4. https://surface.syr.edu/mae/4	This article is a review of work published in various journals on the topics of Enterprise Resource Planning (ERP) between January 2000 and May 2006.	Literature review	A total of 313 articles from 79 journals are reviewed.	literature review	First, it will be useful to researchers who are interested in understanding what kinds of questions have been addressed in the area of ERP. Second, the article will be a useful resource for searching for research topics. Third, it will serve as a comprehensive bibliography of the articles published during the period.

An Investigation Study on Optimizing Enterprise Resource Planning (ERP) Implementation in Emerging Public University: Al Baha University Case Study, Moh'D Suliman Shakkah, Khaled Alaqeel, Ali Alfageeh, Rahmat Budiarto, International Journal of Electrical and Computer Engineering (IJECE) Vol. 6, No. 4, August 2016, pp. 1920~1928 ISSN: 2088-8708, DOI: 10.11591/ijece.v6i4.10863	This work investigates the correlation between the organizational readiness in Albaha University (ABU) and the respective Critical Success Factors (CSFs) with regards to the Enterprise Resource Planning (ERP) implementation. The investigation also considers some suggestions to improve the ABU's ERP systems and roadmap towards the self – development strategy and reduce vendor-dependency	he four significance success factors: Project Management, Business Process Re-engineering (BPR), System Integration, and Training and Education	VThis work investigates the correlation between the organizational readiness in Albaha University (ABU) and the respective Critical Success Factors (CSFs) with regards to the Enterprise Resource Planning (ERP) implementation. The investigation also considers some suggestions to improve the ABU's ERP systems and roadmap towards the self – development strategy and reduce vendor-dependency	SPSS software was used with data and reliability were firstly checked, they were with good values. Demographic data are: End-users, Experts, and Developers.	ORGD influences the success of ERP implementation. Alabaha University management need to study the university's organizational readiness to measure the technological, human, and infrastructure capabilities in designing and implementing ERP systems. The four significance critical success factors: PM, BPR, SI, and TED are recommended to be adopted to assure the smooth adoption of ERP at Albaha University.

Critical Issues Affecting an ERP Implementation, Prasad Bingi , Maneesh K. Sharma & Jayanth K. Godla, Information Systems Management, 16:3, 7-14, DOI: 10.1201/1078/43197.16.3.19990601/31310.2	Implementing an ERP causes massive change that needs to be carefully managed to reap the benefits of an ERP solution. Critical issues that must be carefully considered to ensure successful implementation include commitment from top management, reengineering of the existing processes, integration of the ERP with other business information systems, selection and management of consultants and employees, and training of employees on the new system.	Literature review	literature review	literature review	ERP systems are very large and complex and warrant a careful planning and execution of their implementation. They are not mere software systems; they affect how a business conducts itself. How a company implements an ERP system determines whether it creates a competitive advantage or becomes a corporate headache. Once implemented, an ERP system is difficult and expensive to undo. Since no single ERP solution can satisfy all the business needs, organizations may have to implement custom applications in addition to the ERP software. Integrating different software packages poses a serious challenge, and the integration patchwork is expensive and difficult to maintain.

2.3 Designing an ERP System

ERP, which stands for Enterprise Resource Planning, is a system that connects a company's key operational divisions in order to streamline operations. ERP systems are software systems that are composed of modules. In an enterprise resource planning system, modules, which are critical software components of the architecture, are largely responsible for integrating the different functional areas of a company's operations. These areas include finance and accounting; human resources; manufacturing and raw-material administration; client-customer relationship management; and supply-chain administration. Anyone running a business is free to select the types and quantities of modules they require from the pool of modules maintained by the outsourced company, or to design and create their own set-up from the ground up, which the parent organisation can also do (Sun, Ni, Lam, 2015).

ERP design is one of the most important aspects in defining a company's long-term health and success since it determines how well it will perform in the future. Three-tier architecture, web-based architecture, service-oriented architecture, and cloud computing architecture are the four fundamental forms of ERP architecture (King, 2002).

Because of this, there is no direct contact between the client and the database in a three-tire architecture. When using this design, the presentation layer is used to browse through data and also serves as a user interface. The application layer is the next layer, and it is responsible for the application of business rules and logic, as well as the transmission and retrieval of data from database servers (Dillon, Wu, Chang, 2010).

Because of the web-based design, users will be able to access their ERP system from any location. Web services are covered on one level of the presentation, while the web browser is covered on another level. Generally speaking, business establishments are not interested in using this form of ERP since they do not want anybody else to have access to their system. Although this strategy is not suitable for use in educational contexts, it has been shown to be effective (Clarke, Dawson, Heard, Manohar, 2014).

As the third architectural type, service-oriented architecture is simply concerned with the services provided by an ERP and is unconcerned with the network approach that is being used. In this architecture, each service has its own defined system, which ensures that the functionality of the services is not jeopardised.

Cloud computing technologies are becoming increasingly popular, and as a result, the last architectural model type, cloud computing architecture, has developed as a result of this growth. The whole system, including storage, is housed in the cloud in order to make access easier and the system's operation more productive.

A result of the ERP's success in the corporate world, educational institutions have embraced it to transform their operations as rapidly as they can. Although this appears to be the case in theory, in practise it is quite different, as the ERP model used by academic institutions differs greatly from that used by commercial institutions (Bishop, 2005).

According to the findings of the literature research, around 40 percent of academic institutions have used enterprise resource planning (ERP) systems (ERP). Because ERP was originally intended for use in the business sector, a significant variety of hosting services are accessible for deployment in the academic market. This is due to the fact that ERP was originally developed for use in the business sector. SAP, Oracle, and Microsoft are the most well-known of them; IBM and Oracle are the other two major players (Elragal & Kommos, 2012). Preparation and planning, design, development, testing, deployment, and operation are the essential steps of the educational industry's implementation process, which are as follows:

ERP deployment in the educational sector has also been shown to be inefficient, due to the fact that most academic institutions reengineer ERP from pre-existing business models that are fundamentally different from their requirements.

Software for educational institutions that automates their databases on a technological level allows them to make better use of their available resources. A vast flow of data must be managed in an organised and easily accessible manner in order to meet the rising demand for education among the future generation. The information provided in

the following sections relates to school administration, student and/or staff management, attendance, inventory management, financial management, and payroll administration. Using enterprise resource planning (ERP) at academic institutions has a number of advantages, including the following:

1.) Since all records are stored in digital format, the amount of paper utilised has been reduced significantly.

2.) Its installation shortens the queues for fee deposition, which may now be done through e-portals.

3.) Provides extra help to the administration for handling numerous sites, if any, by connecting different departments on campus.

4.) Assists in increasing staff productivity.

5.) After ERP has enabled the mobile application in the system, clients will be able to access the database at any time and from any location.

6.) Employee attendance may be controlled by the human resource department, and the payroll system can be automated at the end of the month (Badewi, Shehab, 2013).

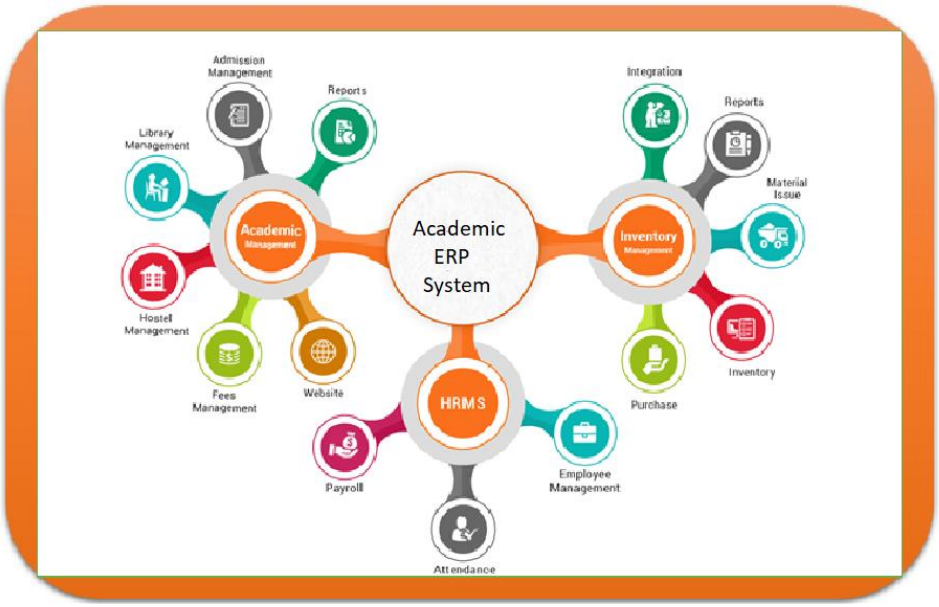


Figure: 2.2: ERP Modules in Educational Institution

Figure 2.2 depicts the usual modules and sub-modules that are acceptable for an academic enterprise resource planning system. They are listed below in alphabetical order:

• A database containing information on students' personal and academic details at the time of admission is created and maintained by the Student-Information-Module, which also includes student photos and previous educational mark sheets and certificates, as well as other relevant evidence, by this module. It also maintains a thorough record of all of the students that are enrolled in the school. This module includes sub-modules such as a] Student Registration, b] Identity Card Generation, and c] Student Database Enrollment (Frantz, 2002).

• Attendance-Management-Module: This module assists staff and instructors in maintaining accurate and real-time attendance records.

• Modul de gestion des frais (Fee-Management-Module): This module provides access to parents or guardians to make fee payments as well as to examine their ward's performance inside the organisation. The procedure of collecting various types of fees that apply to each student on an individual basis is also reorganised as a result of this change. It is divided into three sub-modules: a) Online fee payment; b) Fee reminders and dues notices and information; and c) Total Fees Collected Report (which displays the total amount of fees collected).

• Hostel-Management-Module: In this thorough session, you will learn about the organization's several hostels, the students who are housed in each hostel, room assignment, fee processing, and other hostel amenities. Real-time tracking of daily expenses helps the hostel management to keep track of how much money is being spent at the hostel. Admission, room assignment, and hostel mess management are the three sub-modules that make up this system (Polyakov, 2018).

• Library-Management-Module: Ensures that library catalogue data, such as book availability and issue-return information, is kept up to date. The search function also enables for the discovery of library materials. It also generates real-time statistics on

the total number of books, the number of books that are now available, and the number of books that have been published, among other things (Parhizkar, Comuzzi, 2017).

• Course-Management-Module: This module enables faculty to create a timetable, assign faculty, create quizzes, assessments, and assignments, as well as enrol students in courses, all from an one location.

• Staff-Management-Module: This module gives end-users access to payroll information. This module can also be linked to a biometric system to keep track of employees' attendance in real time. It allows employees to request vacation time and keep track of their vacation days. In this domain, there are several types of sub-modules: a] Employee-Information-Management b] Time-and-Attendance, c] Payroll, and d] Employee Self-Service

• Inventory-and-Purchase-Management-Module: It is responsible for keeping track of all purchases, product availability and/or consumption records, asset movement data, both within and outside of the firm.

2.4 Research Approach

This section reintroduces the concept of a healthy debate on the key theoretical methodologies used in ERP research, which was first introduced in the previous section. Five types of approaches are included in this list: I. Determining Success, II. ERP life cycle models, III. Critical Success Factors, IV. Alternative Process-Oriented Approaches, and V. Work and Organizational Theory Approaches are all topics covered in this chapter.

2.5 Defining Success

It was determined through a thorough literature analysis that one of the initial hurdles in ERP research was determining how to define success when analysing ERP project outcomes. The lack of a single definition that everyone can agree on is a source of contention. Additionally, successful ERP deployments must consider social technological theory, procedure models, factor-research, and the organization's impact after adoption in addition to a systems-oriented approach to technology. According to

the research question, there are two groups of ways to define ERP deployment success, which are as follows: According to Parr and Shanks, project success is defined as "completing the project on time and within budget." The second factor is project risk. The second category, which is focused with the analysis and improvement of business processes, is primarily concerned with the structure of the organisation (Barrett, Gallagher, Worrell, & Gallagher, 2007). Although it is possible that the definition of success for an ERP project change during the course of its life cycle, Parr and Shanks believe that this is unlikely.

Rather than a static assessment, Axline, Markus, Petrie, and Tanis created the notion of success as something that is dynamic and developing rather than something that is static (2000). Depending on the point of view from which it is measured, he asserted that success can be described in a number od=f different ways. Markus grouped his findings from his study of the experiences of sixteen manufacturing companies that used ERP systems into five categories to consider when evaluating their success or failure: (3) the degree to which business activities function smoothly within the company; (4) management and staff perspectives; and (5) customer and other external stakeholder perceptions are all considered in this analysis. A further hypothesis put up by the authors was that successfulness of ERP can also be demarcated by employing the time frame in which it is measured. Following the structure provided by Markus and Tanis (2000), Markus assigned various success measures to three distinct times in the ERP life cycle. During project-phase, successfulness is defined by the timely completion of the project within budget constraints and the deployment of operational functionality in accordance with the project's scope definitions. In the shakedown period, also known as the transition phase, short-term adjustments in operations and the effects of such changes on performance are critical success factors. Obtaining the required results while also improving the overall operation of the organisation. Markus and colleagues link the third phase of the project, which they refer to as the "onward and upward" phase, to periodic ERP system maintenance and updates. Markus (2000) examined the sixteen manufacturing and production companies and confirmed that established criteria had no effect on success and were consistent throughout the life of an ERP

project by applying the various aspects of success factors to the organization's ERP experiences. According to the authors, one must examine what occurs at each stage of the ERP experience cycle in order to fully comprehend the success of the ERP implementation for example, problems encountered and efforts at problem resolution.

"In light of its business context, the best results an organisation may possibly accomplish with enterprise systems, as assessed against a timeline of project, early functioning, and long-term occupational success measures," according to Markus and Tanis (2000). In their opinion, the notion of optimum successfulness is both theoretically and practically useful. As a result of an ERP deployment, it takes into account unanticipated events and repercussions that occur within the organisation but are not accounted for in the project's targeted metrics and outcomes. As a result of this connection, emergent process theories were developed, which link organisational goals to external events. They employed it as part of their Enterprise System Experience Cycle, which will be explored in further detail in the following section of this document.

It is believed that a complete understanding of the several approaches for measuring the efficiency of an establishment's ERP practice, mentioned in literature, would open the door to a plethora of new research prospects in the future.

2.6 Models of The ERP Life Cycle

In an effort to understand and accomplish ERP implementation procedures in general, a large number of academicians have focused on the growth of theoretical ERP life-cycle outlines or procedure models.

2.6.1 Early ERP Life Cycle Development

Greci and Hull (2004) presented the outmoded model for representing life-cycle of information systems, as a framework for understanding the distinguishing features of novel ERP softwares from those of the pre-existing ones specially in terms of integrating ERP systems instruction into current information systems curriculum (SDLC) There are the following periods of the SDLC lifecycle (i) planning, (ii) analysis, (iii) design, (iv) implementation, (v) support, were determined to be connected

with the phases of the ERP life cycle by SAP, a provider of enterprise resource planning software, in a literature review (planning, research, configuration, installation, support). However, according to Peslak (2007), the SDLC was originally intended to help firms manage in-house software development, and "It is recommended that the genuine installation of commercial ERP software have its own life cycle." (Peslak et al. 2007). As this researcher discovered in the literature, there was no other significant study that employed SDLC as foundation for ERPs research, indicating that this allegation about the SDLC being limited to ERP research is correct. In their article on adopting SAP's R/3 ERP system, Bancroft et al. (1998) developed an early ERP life cycle framework that was adopted by the industry. This team's 5-phased cycle concentrated on procurement and actions from the beginning of plan until it completed installation of their ERP system. This approach provides a skewed perspective of the ERP life cycle because it concludes with the deployment phase and does not take into consideration the continuous maintenance, support, and organisational transformation that ERP programmes impose (Fowler & Gilfillan, 2003; McCredie & Updegrove, 1999).

When Ross and Vitale (2000) investigated whether industrial organisations gained commercial value profits from ERP system investments made by them, they employed 5-staged life cycle plan. The companies involved in the study were chosen because they had successfully implemented an enterprise resource planning system from one of the major ERP providers in the industry. The event was attended by representatives from SAP, Baan, Oracle, and PeopleSoft, among other companies. The researchers went out of their way to locate each and every one of the vendors among the companies that they had previously identified as potential candidates. Users at three different levels, viz., executives, implementation heads and department heads, participated in the study, with data collected through phone interviews. As per by them, a 5-staged life cycle plan was used to examine how organisations, their experience of ERP from zero to the existing level they are functioning on. According to them, the following five steps must be completed: (i) design of ERP, (ii) employment or implementation, (iii) stability, (iv) regular upgrading, and lastly (v) alteration, respectively. Based on their understanding of how the ERP life cycle works, they recognized and investigated the hindrances,

roadblocks, and results that arose at every step of the ERP implementation process. Both of them also observed that there was no diversity in experiences of the organisations; all of them seemed to be travelling down the same pathway in terms of technological implementation, according to them. These organisations' ability to overcome any obstacles that arise along the way will be the determining factor in their overall success. Despite the fact that the authors provided no theoretical framework or reference to support their research strategy, which was particularly important for designing and implementation of the ERP, the authors' findings were nonetheless significant. According to this researcher, there was a flaw in the study's methodology.

2.6.2 Cycle of Enterprise System Experimentation

Markus and Tanis developed a four-phased strategy in 2000 to establish the Enterprise System Experience Cycle, which they dubbed the Enterprise System Experience Cycle, and it was implemented in 2001. Any stage of the ERP implementation process, from conception to upgrading or replacement, can be started at any time. There are many ways to develop goals and objectives, establish performance measures for them, and evaluate the outcomes of those efforts. Neither Markus nor Tanis distinguish between the rational actor theory and the external control theory, both of which are widely used in information technology-related research and are based on the same theoretical foundation. The goal of rational actor theory, which is based on social psychology, is to analyse people's interactions with technology and explain how users adjust to a reasonable acceptance of it as a result of those interactions, according to the author (Agarwal, 2000; Bendoly & Cotteleer, 2008; Fichman, 2000). Bendoly and Cotteleer (2008), Fichman 2000, Markus & Tanis 2000, and others were interested in "how organizational behaviour depends on both acuities of ease-of-use and helpfulness of information technology." It has been pointed out by researchers that the balanced hypothesis does not take into account how environmental factors can influence the outcomes of technology acceptance experiments.

Markus and Tanis (2000) developed a second theoretical paradigm to investigate the influence of external factors on human behaviour. An organisation or its employees are subject to external influences if, according to this definition, technology has a negative

impact on the organisation or its employees (Markus & Tanis). An additional feature of this theoretical viewpoint, as revealed in an empirical study by Liang et al. (Liang, Saraf et al., Hu et al.), is the impact of external institutional forces on an establishment's absorption of ERP by its impression on top administration (2007). The researchers used survey methodologies to investigate six premises relating to top administration, outside establishment determinants, & information technology adaptation when conducting their institutional theory-based study of 77 Chinese firms that were using ERP systems. The findings of this study confirmed Markus & Tanis' summary statement that "a strength of outside control models is their unambiguous recognition which organisations have less than perfect capability to bring their goals into certainty" . Markus and Tanis (2000) used emergent process theory as the theoretical foundation for their Enterprise System Experience Cycle, which guided them through the process of analysing both internal and external consequences on the organisation and its environment. While Gattiker and Goodhue agreed with the theoretical choice, they disagreed with the method (2005). The findings of Gattiker and Goodhue, who investigated the factors influencing ERP findings, confirmed the assumptions of Markus and Tanis' emergent process theory. They discovered that there was no significant amount of unexpected variability in the factors influencing ERP findings. Further investigation revealed differences in research focus, leading Gattiker and Goodhue to the following conclusion: whereas Markus and Tanis' research focused on implementation, Gattiker and Goodhue's research focused on the company following a successful ERP deployment, according to the authors. Given the difficulty in predicting implementation results, Gattiker and Goodhue propose that emergent process theory be used in conjunction with other methods when analysing the implementation phase. It was also determined that employing a prediction model to investigate the consequences of post-implementation is a wise decision by the researchers.

To better understand enterprise systems, Markus & Tanis, 2000 devised 4-phased ERP implementation-cycle that includes (i) leasing phase, (ii) development phase, (iii) shakedown phase and lastly (iv) up & go phase. The leasing phase is focused on primary administrative procedures which might leads to buying of an ERP; the development

phase includes all events essential for development and finally releasing it as the manufacture setting; the shakedown phase is the time spent between up & go phase and the point at which normal operations on the new ERP system become stable and routine; and the onboarding phase is the time period between go-live and the point at which normal operations on the revised ERP become stable and routine.

Markus & Tanis (2000) model's shakedown, forward, and upward stages, as well as the shakedown and onward and upward stages, were used in conjunction with the shakedown and forward and upward stages for the purpose of conducting this research study. It has been pointed out by Markus and Tanis that using the framework has a number of advantages, including: (1) using appropriate terms for naming and describing of each step; (2) taking special deliberation of outside influences, including their effect on problem solving; (3) focusing on goals that are appropriate for the organization's strategic objectives.

2.7 Critical Success Factors

Various studies have looked at the usefulness and measurement of the ERP system, and their findings have shown that it is ineffective.

The important success criteria can be categorised into the following categories based on a review of the literature:

a) Impact on data processing, labour reduction, and time savings, i.e., the unit work perspective.

b) From the point of view of the end user — this includes dependability, convenience of use, and security.

c) The ERP cost includes a cost-benefit analysis and the organization's return on investment (Gill, Shahzad, Ramalu, 2019).

According to a Tsichritzis assessment from 1999, 40 percent of ERPs that have been implemented are fully functional, however 20 percent are considered complete failures (Zornada, &Velkavrh, 2005). Several studies, like those conducted by Ptak and

Schragenheim (1999), have revealed that 60 percent to 90 percent of ERPs installed are less effective than anticipated.

It is widely accepted that education is a significant component impacting end-user training, and this is supported by research. The distinction between training and education, on the other hand, must be acknowledged. The teaching component includes topics such as the notion of ERP, how ERP effects an organization's operation, and end-user ERP familiarisation, among other things. The implementation of ERP is a two-part process. Training, on the other hand, is a hands-on operating experience of working with the ERP system, which includes data input as well as understanding the operation of each module of the deployed system in the organisation, among other things. Training can be provided in-person or online. As a result, while assessing the critical success factors, education and training are treated as two separate entities.

Education Enterprise Resource Planning (ERP) is a computerised system that is created particularly for academic institutions in order to assure smooth operations. A variety of advantages of enterprise resource planning (ERP) in educational institutions include cost savings, quick access to data, and an organised database for each institution member, as well as the ability to easily synchronise fresh data. All members of the institution's brotherhood, including the administration, faculty, students, and non-teaching personnel, have access to the necessary database for efficient working (Hashizume, Rosado, Fernández, Fernandez, 2013).

The literature review revealed that ERP is most typically utilised at technical-educational institutions, which makes sense (TEIs). With the use of a centralised database, ERP can be used to combine the activities of multiple divisions within a technical-educational-institution (TEI) and to perform divisional operations with precision and adaptability. In general, enterprise resource planning (ERP) is divided into two parts: hardware and software. The ERP's infrastructure is comprised of computers, servers, networks (intranet and internet), and databases, and is referred to as hardware in this context. The programme contains information and data from all of the organization's divisions and units, as well as from external sources. Any failure in one of these two ERP components results in the failure of the entire system, and vice

versa. As a result, both hardware and software are critical success factors in the deployment of an ERP system. Security is another critical success factor in the ERP implementation. It consists of several components such as database and information storage security, access to various system modules, and administrative control. Any intervention into these domains has a direct and immediate impact on the success rate of the adaptation process (Ruivo, Rodrigues, Oliveira, 2015).

For the past two decades, business sector units have been utilising and defining the benefits of enterprise resource planning (ERP) despite the difficulties encountered before and after deployment. Because of this, ERP at higher education institutions (HEIs) has been altered in order to increase the organization's overall working efficiency, according to the report.

Pollock and Cornford stated in 2004 that ERP adoption increases stress among employees, which has a negative influence on the functioning of higher education institutions. According to a prior report by Feemster from 2000, when ERP was deployed at schools in the United States, the merging of old and new databases demanded extensive personnel retraining, resulting in significant financial and emotional hardship. The merge technique of adoption, according to a study conducted by Frantz in 2002, is preferred by higher education institutions since it has been proved to be successful. At 2002, King identified the important benefits of implementing the ERP system in HEIs, including:

(a) End-users can access multiple division's databases in real-time.

(b) Making use of the most up-to-date online and mobile phone technology to allow end-users and stakeholders to communicate with the company.

(c) Ease of access to information about the organization's planning and management
(d) Security-related concerns are reduced

(e) End-users' working efficiency is improved.

In 2009, Sabau et al. added increased business and technical utilisation to the list of benefits of ERP adoption in the educational sector, which had previously been listed. It

is possible to conduct ERP studies that include factor research, which investigates the aspects of ERP implementations that are believed crucial to their success. This is the second technique used in ERP research, after the first (Aladwani, 2001). In a variety of industries and fields, such as general project management, industrial systems, and reengineering, the theory of key success factors (CSF) has been developed and applied (Holland & Light, 2003). The success or failure of ERP implementations has been estimated by a number of academics who have used previously discovered critical success factors (CSFs) to do so.

This type of thinking can be traced back to Bancroft and colleagues' book on ERP deployment, which contains the earliest examples of this type of thinking (1998). To achieve significant implementation success, the authors assert that there are nine characteristics of general project methodology that must be taken into consideration. They are as follows: in addition to commercial aspect of changed administration and organizational procedure transformation, communication and high-level backing were taken into consideration. Other variables taken into consideration were team composition and project methodology; training; and a commitment to change. The evolution of corporate culture, as Bancroft and others have pointed out, is being ushered in by enterprise system implementation. Since the stakes associated with implementing an ERP system in this new environment are so high in terms of both financial and technical complexity, they contend that all nine criteria must be adhered to with greater rigour than in the previous environment.

2.7.1 CSF Applied Management Perspective

Holland and Light (2003) conducted a highly cited study in which they used case-study research practice to create a CSF framework and evaluate its real-world application for ERP initiatives from the perspective of an applied management approach. It was case studies of firms that had already adopted ERP systems that helped the team fulfil their assignment during the project's first phase, which was primarily concerned with the construction of a CSF framework. In order to provide a wide range of implementation experiences and to contribute to the development of the theoretical framework, seven organisations from a diverse range of sectors were selected through the use of a method

known as intentional sampling. As part of the research, interviews with key functional and technical employees, as well as secondary data acquired from a variety of sources, were performed over the course of two years. Using single-case and cross-case analyses, Holland et. al. devised their CSF technique for ERP implementations, which they have since improved upon.

It has been divided into two conceptual domains, which are strategic and tactical, for the purposes of developing the framework for critical success factors. Project planning is, according to Holland and Light (2003), the primary activity in which strategic elements are involved, and this is especially true during the early stages of the project. Strategic considerations become more important as the project progresses because they are concerned with the tasks that must be completed in order for the project to be completed. The age-old database systems, corporate visualization, policy, senior administration support, procedural timetables, and scheduling were all important components of Holland and Light's CSF architecture. In addition to client consultation and acceptance, the tactical components of the framework included employees, organizational procedural changes such as inclusion of softwares, monitoring and feedback (including communication), and troubleshooting (among others).

Holland et. al investigated the framework's real-world application by putting it to use in two scenarios, both of which were based on case studies from the study's first phase. Two strategic factors, legacy information systems and ERP implementation procedures, were found to be extremely important, with a significant difference between the two organisations, according to their findings. They were replacing a legacy information system that had a variety of ramifications for the two organisations, including an impact on the way their respective enterprise resource planning systems were implemented and maintained. For example, one organisation chose a straightforward, minimalist implementation approach in order to reduce the stress associated with the transition away from their legacy system. The other organisation made the decision to go all-in and implement all modules across all of its business divisions, and it is reaping the benefits. Implementation techniques were found to have a significant impact on tactical

factors such as business process changes and software configuration within each organisation.

Holland and Light used these case studies as a starting point for their investigation into how the planned components cooperated with key success agenda for ERP employment venture, and the results were published in their paper. These investigators discovered that because ERP systems are pervasive, they integrate all branches of an organisation, resulting in an ERP altering the organization's information technology infrastructure. In order to better understand the complex, perceivability of ERP systems from a broad perspective, including the post-implementation problems that organisations encounter, additional research, according to Holland and Light, is required to better understand the complex, multifaceted nature of ERP systems.

2.7.2 ERP Project Best Practice CSFs

An investigation into big enterprise resource planning (ERP) projects was carried out by Ferratt, Ahire, and De (2006), who looked into whether the embracing of finest practises for ERP installations give rise to beneficial project outcomes in a variation on success factor research. They noticed that early ERP adopters lacked ERP-specific best practises and were forced to rely on more broad project management strategies to get their projects completed. A considerable basis of ERP best practises, also known as CSFs, has been gathered by researchers as a result of the evolution of ERP implementation. This is evidenced by a review of the literature. During the first part of the study, Ferratt et al. (2006) conducted a systematic literature review in order to recognize administrative refrains grounded on ERP research. A examination of relevant literature revealed that the components of project success could be divided into three categories: (a) on-time performance, (b) on-cost performance, and (c) total project success. These categories were then further subdivided. After relying on the literature, they developed a list of 9 top practise criteria that had previously been established in ERP research, as well as the results that were associated with each of these criteria. Following that, more than 4,000 CTOs were requested for participation in research-survey for determining how these variables were incorporated into their organisations' enterprise resource planning activities. After analysing the responses to the 120 survey

questions, it was discovered that the best practises were mainly followed and that the implementation projects had positive outcomes.

According to Ferratt et al. (2006), he results of the survey revealed four best practises: top-level backing and contribution, software choice and procurement, involvement of IT systems, and engagement by consulting firms. It was also determined whether contextual factors could be used to forecast an organization's ability to reap the benefits of an ERP implementation, which was the goal of the study. In this case, the size of the organisation in question was one of the factors to consider. Ferratt and his colleagues came to the conclusion that the size of the organisation had no effect on the outcome of the experiment. Despite the fact that they acknowledged that larger or more random samples might produce different results, they cautioned against drawing any conclusions from their findings. Even while Cramer (2005) agreed with Ferratt's findings on the importance of organisational size, this finding is at odds with other studies in the literature that have demonstrated that the size of an organisation has an impact on ERP project outcomes and benefits (e.g., Cramer et al., 2005).

2.7.3 CSFs (Critical Success Factors) for ERP Implementation

In the wake of a thorough research effort, Nah, 2004 recognized 11 critical success factors that were resolute to be essential for accomplishment of ERP employment initiatives. A survey of CIOs from corporations was then conducted to assess their perceptions of the significance of the 11 CSFs in the context of an ERP implementation. A successful implementation, according to CIO responses, is preceded by (1) senior management support, (2) the presence of a venture expert, (3) solidarity and structure, (4) venture administration, and (5) the presence of an organisational change management culture. These features, according to other ERP experts, are highly valued by CIOs, which is steady with the CSFs provided by ERP specialists. When Ngai et. al. (2008) conducted a CSF literature review, they were building on the findings of Nah et al's (2003 study) and their own research. They organised the findings of the research according to the 11 criteria developed by Nah and his team. A total of 48 papers on the topic of ERP implementation were reviewed for this study. During their research, Ngai and colleagues discovered seven additional critical success factors, for a total of 18

CSFs. These characteristics were assessed for their relevance to ERP employment in general, and to ERP installations in ten countries and regions in particular, by a panel of experts. It was highlighted by the findings of Ngai et alresearch. that the CSFs they saw were not always transferrable to ERP programmes in other nations or areas. Due to cultural differences, information technology competence and structure, as well as variations in organisational structure, in addition to economic difficulties, this was the case. This is what they came up with as a conclusion: It was proposed that a further examination into the accomplishments and obstacles related with ERP systems in different countries and cultures could be undertaken as a possible next stage in the process.

2.7.4 CSFs for ERP Implementation in HEIs

The degree to which implementation consultants, users, and vendors work together to fulfil the organization's long-term strategic objectives has a substantial impact on the success of an implementation project. When a standard package is being executed, changes may occur that are either trivial or significant in terms of "functionality." These changes may be minor or significant in terms of "functionality." It is the process of making these modifications that is known as customization.

A "big bang" implementation method, in which all modules are implemented in all locations at the same time, allows you to accomplish this goal. Among the many advantages of this technique are the absence of the need to create temporary interfaces, the low necessity for legacy software maintenance, cross-module capabilities, and a cheap total cost, assuming that no contingencies develop during the implementation process. It is common practise to implement projects in stages, one or a group of sites at a time, and most commonly one site at a time. One of the benefits of the technique is that it smooths out resource requirements, allows you to concentrate on a specific module, makes existing legacy systems available as a fallback, reduces risk, allows you to gain knowledge with each phase, and provides you with a demonstrable working system. The following is an example of the wave approach: Change management that employs waves of change is applied to different business units or areas of the organisation in this method of change management. This strategy involves running both

the ERP system and an existing system at the same time for an extended period of time to determine how well they interact with one another. Snapshot cutovers (also known as "flip-the-switch"): In addition to being less expensive, this strategy encourages customers to upgrade their systems and eliminates the need for multiple backup systems. The disadvantage is that it is potentially dangerous and stressful for users, and that it necessitates extensive preparation for unexpected events (Noaman, Ahmed, 2015).

2.8 ERP Implementation Procedures and Guidelines

Before beginning the deployment of an ERP package, it is important to understand the main guidelines that should be followed.

1. Recognizing the needs and culture of the organisation, and then adapting the implementation plan to meet those needs and culture.

2. Before beginning the implementation, do a business process redesign exercise.

3. Creating an effective communication network throughout the organisation.

4. Providing strong and effective leadership is essential for keeping employees motivated throughout their careers.

5. Identifying a project manager who is both qualified and efficient

6. Assembling a well-balanced team of implementation consultants who are able to work effectively together is essential.

7. Choosing an appropriate implementation methodology that requires the least amount of customization.

8. End-user training.

9. Workplace adaptation and change management are required to ensure that a new system is successfully implemented and can be used efficiently in the future.

According to Nielsen (2005), a review of the literature was conducted, and list of 29 CSFs was developed as a result of this synthesis. Nielsen (2005) noted that there had

been a dearth of research on CSFs that was relevant to higher education. After testing the usefulness of these features in the context of an ERP deployment study at his university, Nielson was able to demonstrate their significance in the context of a postsecondary academic setting. An organisational framework was developed by after the literature review research on the effectiveness of information system projects, as well as past research on ERP implementations and CSFs in order to better organise the research project's objectives. The framework was composed of six components, which were as follows: Strategic considerations, organisational context, ERP superiority, ERP implementation excellence, ERP plan possibility, and end-user fulfilment and exploitation are all discussed in detail in this section. As a key data collection approach for the university study, Nielsen performed pre-&postintervention interviews with administrators, faculty, staff, and students, in accordance with Yin's recommendations (1994). Additionally, secondary sources and personal observations were used to supplement the information gathered earlier. Through the use of multiple data sources, the study was able to triangulate its findings, thereby increasing its credibility. Most significantly, according to the study's primary findings, participants in the case study selected 22 out of 29 CSFs defined by earlier while reviewing the literature as being essential to their ERP experience as being essential to their ERP experience. As a result of its findings, the research team identified four new CSFs that had not previously been identified in the literature: competitive advantage; student service; information management; and system proprietorship. The findings of this research study, on the other hand, revealed a number of significant differences between ERP system experiences across industries, particularly during the employment phase. These differences were evidenced by four additional CSFs identified in the educational journey that had not previously been recognised as being significant in the literature. According to this researcher's findings after doing a review of the literature on CSFs, he observed that the vast bulk of the research had been undertaken in connection with ERP implementations. He decided to pursue this further. There have only been a few empirical studies that have directly applied CSFs to the post-implementation setting, and these studies are extremely uncommon. The majority of ERP CSF research, according to Ngai and colleagues (2008), has remained focused on implementation,

which they discovered during their investigation. Previous ERP researchers had discovered something similar, and this was confirmed by this study. Although most ERP CSF studies have concentrated on implementation issues, the authors asserted in their discussion of future research implications that the ERP's postimplementation phase was just as important to the business as the ERP's implementation phase and that, as a result, all phases of the ERP lifecycle warrant additional investigation.

2.9 Process-Oriented Approaches as An Alternative

2.9.1 Model of the Project Phases

But it was pointed out in the discussion that neither the life cycle phases nor the CSF theory were capable of dealing with all of the complex issues involved in analysing the impact of enterprise resource planning systems in a comprehensive manner. Using a single project phase model, it improved on previous findings by combining life cycle stages and critical success factors (CSFs) into a single model (PPM). Certain CSFs are associated with specific project stages, according to this model, which depicts the ERP life-cycle in 3 parts: (i) preparation, (ii) scheme, (iii) improvement. "Rather than viewing the project as merely another phase in an overall implementation enterprise," the researchers explain, their model is "focused on the precise, distinct stages of ERP employment itself". Parr and Shanks (2000) used two case studies to empirically test the effectiveness of the PPM model, which they discovered to be successful. The two organisations were selected in order to provide a cross-case comparison of successful and unsuccessful ERP implementations. The company units were independent and distinct from one another, but they were all affiliated with the same parent corporation. In order to gather information, quasi-interviewing directed by a semi-structured interview approach designed using the PPM model were conducted in order to collect data. In order to improve the validity of the study, additional data was gathered via an examination of organization and venture-related papers. Several stakeholders from each firm were interviewed in order to acquire a varied variety of viewpoints. We interviewed a minimum of five stakeholders from each firm in order to obtain a fair and balanced representation. There were a variety of stakeholders who were involved in the project, including administrators, technical and operational managers, end users,

consultants, and team members. Using a case study technique, Parr and Shanks (2000) were able to determine which CSFs were viewed as significant for each phase of the PPM model by the businesses that participated in the research. According to the findings of their research, the organisation that had a successful ERP installation project valued seven key success factors (CSFs) throughout all phases of the project management model, including: To name a few of the critical factors to consider: project management assistance, a project champion, a change culture, a vanilla ERP system, empowered decision makers, full-time staff support, delivery dates, and a well defined project scope and goals. In the case of the firm that failed to successfully deploy ERP, a single key success factor (CSF) was identified as being crucial to its failure. This came in the form of management help, which was really appreciated. Due to the model's stricter definition of project success, such as finishing a project on time and within budget, and the fact that the study concentrated primarily on the project's implementation phase over the course of the study's duration, project portfolio management was only used in this study. Following the outcomes of the research conducted by Parr and Shanks, there are ramifications for the dissertation subject that is now being considered (2000). According to their findings, there was no statistically significant change between the time following go-live and the time before, indicating that there is no statistically relevant difference between the two times. According to the findings of researchers that used life cycle process models to investigate the effects of post-implementation stages, they determined that they were essential, which is in direct contrast to previous findings.

Process researchers Aladwani (2001) and Yu (2005), in their respective viewpoints on process research, emphasised the dynamic nature of the ERP system and its multifaceted components, with the former emphasising the latter. On the basis of factor research, which Aladwani and Yu argue is effective for analysing specific components of ERP deployment but inefficient for researching dynamic processes due to the static nature of factor research, and the approach proposed in this paper, a comparison was made between the two approaches. Because the implementation of an ERP system is not a one-time event, but rather a sophisticated exercise that continues to function and

improve over time and across the organisation, as Yu explains, "the measurement of effectiveness cannot be simplified and appreciated in a single aspect simply".

2.9.2 Process-Oriented Model (POM)

The problem of employee resistance to ERP adoption was addressed by Aladwani (2001) in an integrated process-oriented technique that was designed to address the problem of resistance. It was created as a result of the application of two marketing principles to an ERP framework, according to Aladwani's model: strategic marketing and consumer behaviour, which were combined to create the model. A comparison was made between the users, implementers, and systems of the ERP project and the marketing elements of consumers, sellers, and the product under consideration. In addition, a theoretical foundation for identifying user resistance to technological advancement was included in the methodology's design and implementation. As Aladwani points out, Sheth (1981) identified two sources of resistance: the perception of danger and the repetition of old habits. It is defined as the level of comfort a user has with knowing and performing procedures on a regular basis, while habit is defined as the level of comfort a user has with knowing and performing processes on a regular basis, according to this idea According to Aladwani's theory, the purpose is to provide a framework for top-level management that will enable them to confront and overcome user resistance to ERP system installation..

To support his change management model, Aladwani (2001) devised a three-phase process technique that served as the cornerstone for his work. It was necessary to identify and evaluate the attitudes and beliefs of individual users, as well as those of various stakeholder groups, in order to pinpoint the source(s) of resistance during the first phase, which was known as knowledge formulation. Second, knowledge application was carried out, which required identifying and analysing the attitudes and beliefs held by individual users, as well as by various stakeholder groups. The second step consisted in the dissemination of knowledge to various stakeholders, which was accomplished through a series of seminars and conferences. Using the information gathered in phase one, ways to managing change were designed and implemented in the second phase of the project, which was finished in the third phase after the

completion of the information collection. Businesses and project managers have put in place strategic efforts in order to positively influence or improve user attitudes regarding ERP implementation. This was the second step of the process of putting the plan into action, and it was accomplished as a result. Awareness, feelings, and adoption were all employed in a number of various ways to handle these approaches in a variety of ways. A review of the findings of earlier ERP research prompted Aladwani (2001) to propose the following change management techniques, which are described in further detail below: According to Aladwani (2001), change management strategies should be applied in order to have a beneficial influence on users at one or more of the following levels: An emphasis will be placed on informing users and organisations about the benefits of using the ERP system, as well as how the system will function once it has been established. Budgeting not only for the ERP system but also for all ERP systems; c) budgeting not only for the ERP system but also for all ERP systems; d) budgeting not only for the ERP system but also for all ERP systems (3) Cost-cutting measures, including

The status evaluation phase of the change management process model serves as a feedback system for managers, allowing them to assess and judge the effectiveness of their change initiatives. Performance measurement systems for change management activities, according to Aladwani (2001), are just as important as performance measurement systems for achieving organisational goals and objectives. In order to overcome any unfavourable attitude signals that may emerge during the implementation of the ERP system, managers can use the systematic and dynamic feedback provided by this model to make necessary adjustments to their strategic initiatives. Aladwani concluded his proposal by outlining several options for putting the concept to the test in the real world, all of which were well received. This dissertation presented theoretically based conceptions of user resistance that contributed to a more complete explanation of user resistance as reported by the case study institutions in this dissertation, despite the fact that no empirical research was conducted on the proposed model.

A number of causal chains were investigated by the author Yu (2005) to determine how ERP operational success is influenced in the post-implementation environment. This is one of only a few studies that has specifically addressed the post-implementation environment. In support of his case for a focus on ERP systems, he pointed out that, while many organisations have implemented ERP systems, only a small number of them are actually making effective use of them. The study's research methodology was based on social and cognitive psychology theory, and it investigated how attitudes influenced the effectiveness of interventions after they were put in place. In this research, the first step was to conduct a review of the literature, followed by interviews with representatives from Taiwanese companies that have used enterprise resource planning solutions.

In addition to the measurement variables, there were five belief components, seven attitude variables, twelve behaviour factors, and five influencing variables discovered, in addition to five belief components (Yu, 2005). Fourteen Taiwanese enterprises in the manufacturing and service sectors participated in the study, and a questionnaire was developed using these characteristics to be used in interviews. The questionnaire was administered in English only, and no other languages were used. The organisations were chosen on the basis of their ability to complete a fully functional ERP system by the deadline set by the government. In order to acquire information, three interviews with representatives from each organisation were performed over the course of three days in order to obtain information. Members of the project's governing board, key end-users, ERP vendors and consultants, technology directors, and top-level organisation administrators were among those who took part in the project's many activities. Personnel, management, and project involvement levels were represented in the interviews, as was a range of levels of commitment to the project among those who took part in the interviews. All interviewees were requested to complete a questionnaire, and a total of 127 valid responses were received out of the 140 surveys that were delivered.

Yu offered four hypotheses in 2005, following the conclusion of the literature study and the collection of data from the business interviews, which were all rejected. A

number of hypotheses were developed in order to investigate the interaction of various combinations of effectiveness variables, behaviour variables, and attitude variables In addition, stepwise multiple-regression investigations were carried out, and the findings of these investigations were made accessible as part of the project's outcomes package. This study, according to Yu, asserts that the post-implementation experience may be described even before the system is put into operation, and that this is based on a comprehensive end-to-end causal chain that has been constructed as a result of the research. The involvement and participation of top-level administrators and intermediate-level dedicated management in project implementation activities, as well as the utilisation of the project management team's professional talents and expertise, are crucial to Yu. As a result, he came to the conclusion that "dealing with human people throughout the organisation, including all levels of management and end-users, was the biggest complexity and difficulty in ERP implementation." (p. 128). As you point out, the vast majority of the literature indicates that the most essential aspects in ERP project planning are implementation methods and business process reengineering, which are the most important elements in ERP project planning, respectively. The first order of business, according to him, should be to identify the most competent individuals for project leadership positions as soon as possible after the start of the project. The findings of the study led to numerous accolades for futuristic research focused on post-implementation of ERP, which Yu shared in 2005. These accolades were based on the increasing importance of ERP post-implementation success factors, as well as the problems and dilemmas that can arise as a result. These proposals included the formulation of a metric for explicitly quantifying post-implementation effectiveness, as well as the expansion of the study framework to encompass western cultural traditions.

2.10 Work and Organizational Theory Applications

Jacobs and Bendoly's adaption of the term of enterprise resource planning (ERP) reflects shifting beliefs about what the installation of an ERP system means for a company's bottom line and overall success (2003). A distinction is made between an enterprise resource planning concept and an enterprise resource planning system,

according to the authors of the paper: Essentially, an ERP idea is the fundamental framework through which all corporate operations are connected in order to create effective and efficient outcomes; whereas an ERP system is the technique by which this integration can be accomplished . Theoretical perspectives in work and organisational theory that reflect this broader idea have been utilised in current study.

2.10.1 Socio-Technical Theory

ERP literature, including recently published works, has incorporated a significant amount of socio-technical theory, which seeks to explain the relationship between technological design and organisational work-life in an attempt to explain the relationship between technological design and organisational work-life. In particular, user-centric models, which have lately received a great deal of attention, serve to demonstrate this argument. When Calisir and Calisir (2004) conducted research on end-user satisfaction with ERP, which was published in 2004, they highlighted the application of socio-technical theory to an ERP organisation as a case study of how socio-technical theory may be applied to an ERP organisation. In order to gather information on the elements that influence end-user satisfaction with enterprise resource planning (ERP) systems, surveys were performed among end-users. A questionnaire was distributed to 24 companies, and it was based on previous IT research that had been discovered in the literature. The researchers were able to identify the organisations because they were provided by ERP providers, who represented a diverse range of company industries. Each organisation distributed three questionnaires to end-users who were picked at random. According to the findings, which were based on 51 survey responses, ease of learning and perceived utility was shown to be important factors for determining satisfaction rate of end-user with the ERP they were using. It was also discovered that end-user's perceptions of the ERP's efficacy were most important factor in determining their degree of satisfaction. According to the findings, when people felt that the system was difficult to use, their overall happiness with it was reduced in an indirect way as a result of this. A research constraint, according to the authors, was the fact that the survey participants represented a diverse range of industries (education, not among them). Individual industries may or may not find the

findings of the study to be accurate, depending on their own circumstances. The authors' recommendation for future research was to analyse end-user gratification with ERP system in a specific industry, which they did. The identification of unmeasured elements that were not described by the conceptual model that was employed in the study was indicated as the second area of research to investigate. When Calisir and Calisir (2004) tested their model, they discovered that the variables explained just 48 percent of the variance in ERP satisfaction, leaving a significant portion of the satisfaction components unexplained.

2.11 ERP and Organizational Fit

When an organisation is in the post-implementation environment, the implementation decisions that are taken by that organisation may have far-reaching effects for that organisation in the post-implementation environment. While many ERP solutions are sold as "off the shelf" solutions that incorporate decades of industry best practises, the reality is that each organisation has its own set of requirements that may necessitate a combination of system adjustments and customizations, as well as institutional business process reengineering (BPR), in order to achieve satisfactory results. As part of their research on ERP adaptation, researchers looked into how organisations might respond when there is a misalignment between the provided system and actual business processes. Enterprise resource planning (ERP) software allows businesses to implement business practises, making the essential modifications to existing procedures as per need. As an alternative, the company might choose to utilise the system as-is, without making any changes to its existing business processes, while accepting the limitations of the solution's capabilities, or by depending on workarounds or shadow systems to accomplish the required functions. Following the advice of industry experts, the third, and most commonly employed, solution is to customise the ERP system to match specific business process needs while simultaneously improving operational business process efficiency. According to the literature, the third and most commonly employed approach is to customise the ERP system to fit the unique business process needs of the organisation.

In their study, Brehm and colleagues looked at the risks and costs associated with maintaining a system that had been customised to meet the demands of a certain institution or group of institutions (2001). According to the findings, there are nine different types of ERP system tailoring, and the researchers developed a typology framework that can be used by future researchers to quantify the impact of system adjustments and adaptations on a company's bottom line. The researchers hope to publish their findings in a journal in the near future. The nine tailoring areas on which the typology is based are as follows: (a) configuration; (b) bolt-ons; (c) screen masks; (d) improved reporting; (e) workflow programming; (f) user exits; (g) ERP programming; (h) interface development; and (I interface development (I package code modification). Additional aspects that contribute to the influence of ongoing system support and maintenance, as well as the related costs to the organisation, on their findings, as well as the implications of their findings for other organisations, were explored by the researchers as well. Many other factors were taken into consideration, including: (a) how much of each tailoring type is used, (b) how many tailoring types are used, (c) the quality of the programming changes made, the modifications to data and data structure that are made, the interdependence between tailoring types, and the ease with which tailored programming can be retained for upgrades. Additionally, organisational complexity and geographical dispersion were taken into consideration. Based on the study's response to the question, "Does extensive customization enhance consumer acceptability and corporate success?" a proposal for more research was made, which will be investigated in the next months and years, according to the findings.

2.12 ERPs and Higher Education

Over the past two decades, corporations, which are more likely than non-profit organisations to operate in financially competitive environments, have reaped a variety of benefits from enterprise resource planning systems, despite the difficulties associated with implementing ERP systems in their organisations. To address this research-based result, universities have begun deploying enterprise resource planning (ERP) systems in order to attain the same goals as corporations (Fisher 2006), specifically, increasing operational efficiency while concurrently reducing costs (Fisher 2006).

Universities and colleges of higher education (HEIs) have invested significant resources in the deployment of enterprise resource planning (ERP) systems, in order to increase the efficiency of institutional business operations (Mehlinger, 2006). According to Abugabah and Sanzogni, higher education institutions have spent more than $5 billion on business resource planning in the previous five years (2010). ERP providers have lately expanded their product offerings to include more commodities, according to the results of a recent survey, in response to relatively fresh market requirements. This type of technology is represented by student lifecycle management tools from businesses such as Oracle and SAP.

Although technological breakthroughs have been made, ERP system deployment at higher education institutions has been judged difficult. Rabaa'i, Bandara, and Gable (2009; Rabaa'i et al. Rabaa'i, Bandara, and Gable Mehlinger (2006) discovered that ERP deployments failed to accomplish their predicted objectives in 60 to 80 percent of higher education contexts, and that the performance results were regarded unacceptable by the participants. Business process management (ERP) was created with the needs of corporate organisations in mind. However, while ERP provides a variety of customisation choices, these capabilities may increase the risk of failure by, among other things, expanding the scope of work, increasing the cost of implementation, and delaying the implementation deadlines.

In the words of Pollock and Cornford (2004), ERP deployments cause conflict and modify university identity, resulting in the creation of new organisational challenges that are based on the perceived distinctiveness of individual institutions' identities. A highly hard, as well as exceedingly expensive and time-consuming, task, according to Feemster (2000), was the integration of "a system of decades-old databases and the re-education of university employees."

According to Frantz (2002), higher education institutions view ERP adoption as a tool for strengthening the integration of existing management systems in order to better manage more complex activities. As a result of falling government funding and increased stakeholder expectations, schools and universities are under increasing pressure to deliver higher-quality educational services at lower costs to students. Taking

into account these concerns, enterprise resource planning (ERP) systems may be particularly appealing to higher education institutions as a cost-effective means of meeting these criteria.

2.13 ERP Benefits in University

Integration of enterprise resource planning (ERP) systems in higher education institutions (HEIs) brings administrative operations that were previously handled by separate legacy systems together (Zornada & Velkavrh, 2005). After doing their research, Allen and Kern (2001) discovered that several legacy systems were "incompatible," which resulted in "duplicate resources and services." 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) (Allen and Kern, 2001) Heterogeneous data and outdated systems can be unified, and best-of-breed procedures and technology can be integrated into higher education institutions (HEIs) through enterprise resource planning (ERP).

End users can also access information in real time since various departments within an organisation share a single connected database. Faculty, students, and employees who interact with the institution on a daily basis have access to best-of-breed information technology, such as web technologies, mobile phones, and online services, as well as to other resources. Information technology, including web technologies, mobile phones, and online services, that is best-of-breed is also beneficial to the management of the institution (Murphy, 2004; Zornada & Velkavrh, 2005).

King (2002) states that the most significant benefits of ERP in higher education institutions are (1) improved data accessibility to aid in planning and management of the institution; (2) improved services for faculty, students, and staff; (3) reduced business risks; and (4) increased income and decreased expenses as a result of increased efficiency. According to Sabau and colleagues (2009), accounting and information technology (IT) benefits for universities have been presented from a business and

technical perspective. Munten, Bologa, Bologa, and Surcel (2009) have also presented accounting and information technology (IT) benefits for universities.

2.14 Challenges of ERP Implementation in University

As a result of the unique organisational structures and decision-making processes that universities have developed, ERP software (which integrates best practises from the corporate business sphere) is not the most appropriate solution for universities, according to Heiskanen, Newman, and Similä (2000).

It is important to note that the culture of an organisation has a significant impact on the installation of an ERP system. In the words of Tsichritzis (1999), today's institutions are being compelled to recognise that "education is a business, and students are the customers." Education institutions are forced to approach teaching in a more businesslike manner as a result of ERP adoption, resulting in cultural modifications such as "the use of administrative terminology and procedures" and "the use of administrative terminology and procedures." In the world's opinion, Allen, Kern, and Havenhand are three of the most talented persons on the planet (Allen, Kern, & Havenhand, 2002). Universities may be reluctant to adopt an ERP system because it needs more than just the adoption of a new information system; it also necessitates a change in organisational culture, which may be unpopular with some faculty and students.

While management hierarchies differ from institution to institution, Birnbaum and Edelson (1989) distinguish between two sources of authority within a university: administrative power and academic authority. Administrative power is a source of authority that is delegated by the university administration. An administrative authority is the source of power in a hierarchical administrative structure. The deployment of an enterprise resource planning system (ERP) is viewed as a governance paradigm that will improve senior management performance. Therefore, academics may be afraid that adopting a new system that improves the transparency of their interactions may result in a loss of control over their research and teaching. If redundant processes are

eliminated and labor-intensive tasks are automated throughout an institution, administrators may be concerned about their job security (Allen et al., 2002).

Moreover, because ERP is a "generic sort of solution" from the corporate market, Pollock and Cornford (2005) feel that pursuing it could be a high-risk approach for institutions. The fact that higher education institutions require specialised business operations does not change the reality that ERP solutions limit their options and urge them to select a "generic solution." There is little confidence that the process will be effective because there has been little discussion and consideration of the challenges that schools may confront as a result of the deployment of a generic ERP system.

Another issue is that, because ERP systems are "big integrated packaged solutions" with dynamic complexity, they may present implementation challenges for university administration and information technology employees, even for those who have a thorough understanding of their own organisations' processes (Pollock & Cornford, 2005). In part, this is owing to the proliferation of a range of systems at universities, many of which compete with one another for functions when they have unique requirements (Pollock & Cornford, 2005). In the worst-case situation, institutions may be lacking in management or information technology people who are familiar with the functions of the organisation.

University systems are restricted in their ability to adapt due to standardisation and integration, both of which are critical components of enterprise resource planning systems. When faced with a loss of flexibility, employees may invent "workarounds," in which they attempt to continue their previous procedures in another manner. It is possible that this reaction to new ERP systems could result in increasing workloads for staff as well as data gaps between the system and reality.

During the previous decade, higher education's adoption of enterprise resource planning systems (ERP) has mainly followed the pattern set by corporate enterprises. "At the turn of the century, advancements in information technology were redefining higher education," wrote Okunoye and colleagues (2007). The implementation of enterprise resource planning systems at colleges and universities was prompted by the need to

replace outdated softwares that were unable to keep up with changing technological needs. The efforts to adapt enterprise resource planning system in HEIs resulted in diverse variety of outcomes. A number of institutions' implementation efforts were beset by over-budgeting, missed timelines, and operational disturbances, all of which were extensively recorded (Fowler & Gilfillan, 2003; Kvavik & Katz, 2002). Although ERP systems got off to a rough start, their popularity has grown as more and more institutions use them year after year.

However, research into the experience of higher education has not evolved at the same rate as other fields of study. ERP study with respect to HEIs has only recently instigated in the literature, with the first publication of ERP higher education research occurring only ten years ago. Between 2000 and 2005, there were 238 ERP research publications published, but only 10 of them were regarding university ERP systems (Dery et al., 2006). This reflects the fact that enterprise resource planning systems (ERP) have only lately found their way into the architecture of higher education (mid to late 1990s). Upon conducting a thorough review of the literature, this researcher discovered that extensive research into ERP deployment and post-implementation experiences in higher education institutions has continued to grow in recent years (2006-2008), which corresponds to the significant number of higher education institutions that have implemented ERP systems. In order to persuade stakeholders of the importance of higher education-specific ERP research, it is critical to identify the elements that distinguish the college and university setting from the commercial organisation environment. Identifying these elements is critical to the success of this research and to the success of higher education in general. While there is no consensus in the literature on whether higher education institutions possess sufficient distinguishing characteristics to be considered distinct from businesses, some researchers have identified specific areas of differentiation in which "business information systems may not be directly appropriate in universities," according to their findings (Okunoye, et al., 2006). According to Pollock and colleagues, the vendor attempted to shoehorn the student function into the broader ERP human resource architecture that was intended for an employee or customer, resulting in serious operational issues for both the vendor

and the customer (2003). According to Fowler and Gilfillan (2003), another characteristic that is unique to academia is the typical committee decision-making culture of significant institutions. This culture presents its own set of challenges throughout the ERP project implementation process, according to Fowler and Gilfillan.

2.15 Post-Implementation

To begin, many post-implementation issues can be traced back to erroneous expectations and anxieties. Corporate management's expectations and concerns about an ERP have been widely publicised. Of course, ERP providers and their pre-implementation sales pitch share some of the blame. The following are some of the most common expectations:

• A boost in productivity

• Increased productivity across the board.

• Complete automation and the elimination of all manual operations.

• All critical performance indicators are improving.

• All manual record keeping will be eliminated.

• On-demand access to real-time information systems for those who are worried.

• Complete operation integration.

•ERP deployment also raises a slew of concerns.

• Job redundancy is one of them.

• Information is no longer a personal choice, so it loses its significance.

• A change in job title.

• A fear of losing adequate control and authorisation within the organisation.

• More stress as a result of increased transparency

• Individual apprehension of losing power.

• A key component of the implementation process is balancing expectations and worries.

2.16 Second Wave Research

In accordance with a recent study, enterprise resource planning systems and technologies are still growing and improving at an exponential rate. Research suggests that as organisations at the forefront of ERP technology embark on their second (or more) subsequent system update or replacement initiatives, there is a proportionate increase in research into areas other than initial product selection and installation difficulties. It is widely discussed as Second Wave in literature, and it was characterised by a focus on "maximising advantages," "creating continuous improvements," as well as "captivating benefit of novel technology, particularly those which are web-based and devising innovative methods of developing new system" (Shanks, Seddon, & Willcocks, 2003). In addition to the post-implementation implications and advantages addressed previously in this chapter, current ERP research has included an evaluation of ERP systems' influence on work, end-users, and the organisation, as well as an evaluation of ERP systems' effect on end-users and the organisation [6]. System assessment following ERP deployment is not a goal in and of itself, but rather a process that must be carried out in real time, as Yu (2005) points out.

An enterprise resource planning (ERP) system is software designed to bring all business-related operations and functions together on a single IT platform for easy management, supporting the organisation in running more efficiently and effectively. ERP software is designed to help businesses operate more efficiently and effectively.

In order to keep up with technology in the modern world, cloud ERP systems were introduced in the early twenty-first century with cutting-edge technological capabilities. These technologies can be accessible from any device that has an internet connection, such as a mobile tablet or a PC. There are two primary advantages of using these applications: 1. The ERP system that integrates with the cloud displays all departments. 2. The centralised database management system (DBMS) facilitates all corporate communications, including recording, monitoring, and processing.

ERP system are used by businesses to keep track of their resources such as raw materials, finances, production capacity, and the status of business assurances such as salaries, sale-purchase orders, and so on. This system ensures that relevant data is provided with the business's connected departments and that they are linked to the company's core data by connecting them together. In other words, enterprise resource planning (ERP) guarantees data flow between the many departments of a firm and organises the sharing of information with the various stakeholders of the company. When the ERP modules link with the business or organization's own data management process, it has been noticed that the amount of effort required to match the data increases. However, despite the system's inadequacies and the risks associated with its use, a significant increase has been noticed in the previous decade worldwide in the number of organisations that have used ERP systems to streamline their operations, particularly in higher education.

Enterprise resource planning (ERP) in the educational sector is a software application that integrates all of the modules and departments of an educational institution into a single system that is accessible to all of the institution's fraternity members as well as to students, their parents, and other stakeholders. Each individual who is a part of the institution has a user id and password that are unique and separate from the others. Utilizing master ID and password access, the administration can keep a close eye on everything that takes place within its domain. The ERP structure in the educational sector is completely different from that in the corporate sector. It contains information about programmes, fees, the library, events, the hostel, faculty details, and the examination.

The primary goal of an educational enterprise resource planning system is to provide a platform that brings all of the features together in a user-friendly interface. Every piece of information and data in the educational ERP system is digitalized, and it is only accessible to administrators who can make changes. It also provides access to all students and faculty members. It eliminates the need to keep track of data on paper and to keep an eye on the store in order to assure data protection. Once the information has

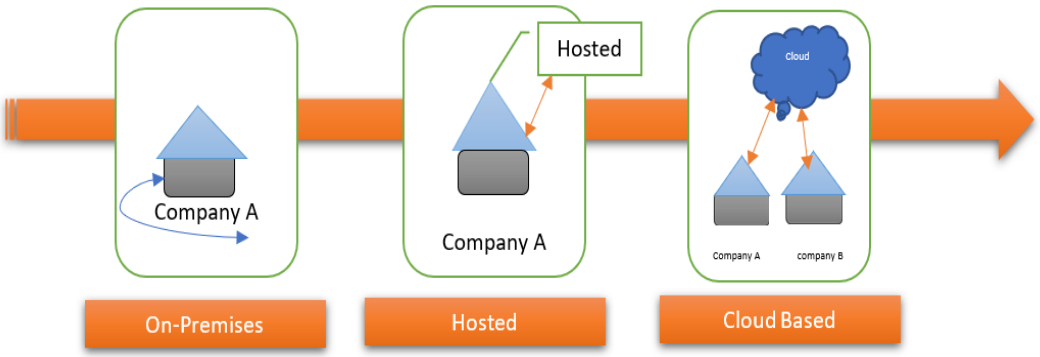
been entered into the system, the digitised facts are kept on a server that can only be accessed by those who have valid login credentials.

A literature review revealed that even though ERP use has increased in the educational sector, 60 to 65 percent of ERP systems do not achieve the goals for which they were implemented, with 30 to 35 percent of ERP installations being abandoned for a variety of reasons. However, while the installation and success of ERP systems in the higher education system are vitally important, ERP system failure is substantially higher in this sector as a result. It is possible that end-user training, cost input, incremental implementation rather than a "big bang" deployment strategy, and eventually technical training of the users all contribute to this rate of loss.

Because of the more competitive marketplaces, organisations are being pushed to concentrate squarely on the major goals of their businesses rather than on supporting services, which has resulted in an increase in the use of third-party providers to handle such services. As a result, this is one of the most compelling arguments in favour of cloud-based enterprise resource planning solutions. Those firms that have made the transition from traditional ERP systems to cloud-based ERP systems have reported that they have been able to manage their costs more efficiently and have seen an improvement in how well they perform. As a result, the notion that implementing an enterprise resource planning system in an organisation can aid the firm's growth by improving its resource and service management system is supported.

Cloud-based services, according to Gartner, are capabilities of scalable systems that may be offered to customers through the use of internet services. As a result of the rising demand for cloud-based ERP systems, a new market has been developed in which the new subscription-based delivery model of ERP, also known as SaaS ERP, has been demonstrated and discussed. This kind of ERP performs functions that are comparable to those of classic ERP systems. SaaS ERP is accessed through the use of the internet. The information and the system application are controlled through the use of a cloud service provided by a third party that charges a monthly or annual subscription fee to the client (Johansson, and Ruivo, 2013). Figure: 6 displays a cost, complexity, and

implementation time comparison of traditional ERP systems versus cloud-based ERP systems, with traditional ERP systems being the more expensive option.



Implementation Size	Large	Medium	Small to Medium
Solution Complexity	High	Medium	Low
Capital Cost	High	Medium	Low
Operating Cost	Low to Medium	Medium	Medium
Implementation Time	12 to 36 Months	9 to 18 Months	4 to 8 Month

Figure: 2.3: Comparison of Traditional ERP system and Cloud-based ERP system

In brief, the advantages of cloud-based ERP over traditional ERP can be summarised as follows (Hashizume, Rosado, Fernández-Medina, Fernandez, 2013):

- It permits small organizations to implement a complete ERP system without using much space.
- It saves infrastructure costs, software, maintenance, and upgrading costs.
- Cloud-based ERP decreases the need for staff needed for ERP support and maintenance.
- Cloud-based ERP system is implemented faster as comparatively less effort is required due to their agile approach (Elragal, and Kommos, 2012).
- It offers more scalability
- It enables more mobility

Despite having the aforesaid advantages, there are some concerning disadvantages of cloud-based ERP systems:

2.16.1 Issues in Relation to Data Security

As ERP systems manage the essential data needed for an organization's functioning, these organizations need to make sure that their data is secured in a cloud. As pointed out by Bishop that the security of any computer-based service depends on the integrity, confidentiality, and accessibility to the data stored; the cloud-based ERP systems are influenced directly by the security level ensured by the service provider (Bishop, 2005, Dillon, Wu, and Chang, 2010).

Confidentiality

Weng and Hung (2014) discussed that when an organization implements a cloud-based ERP system, it must be ready to lessen the risks surrounding the usage of cloud technologies and work on using tools to prevent unauthorized access of information stored. Johansson (2015) disclosed that organizations are uncertain when keeping their confidential data and information with the third-party service provider where they have not assured direct control of the information stored. Another issue of concern is that the primary organization has no control over the staff of the cloud service provider, thus making it a worry that who could be accessing their data at the third-party end (Johansson, Alajbegovic, Alexopoulo, and Desalermos, 2015).

Integrity

Another major concern experienced is to ensure the uniformity of the information stored. Puthal et al. (2015) informed that the failures and errors that may occur from the side of the cloud provider could easily affect the integrity of data. They also argued that the generally accepted method for data validation in the cloud is via public auditing, wherein the data validation can be done by a third party to check the integrity of the services (Puthal, Sahoo, Mishra, and Swain, 2015). A similar concern was pointed out by Akande et al., that the methods of verification of data and the levels of permission to manipulate the information are of utmost concern (Akande, April, and Van Belle,

2013). Figure: 7 summarizes the primary data security issues involved with cloud-based ERP systems.

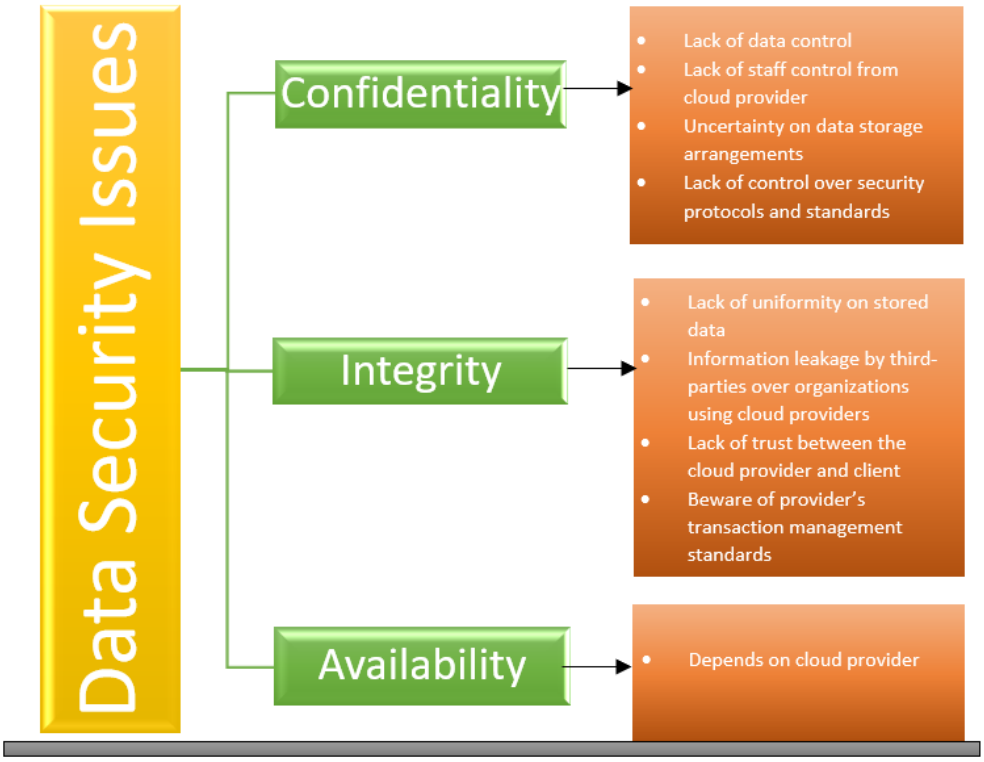


Figure: 2.4: The major data security issues involved with Cloud-based ERP systems.

Cloud technology provides an unruly alternative to the traditional ERP approach by offering advanced ways to maintain organizational value and encourage an upper hand in the competitive environment. The innumerable advantages of cloud-ERP include flexibility, scalability, ease of implementation, and cost savings (Utzig, Holland, Horvath, and Manohar, 2013). The most major obstacles to implementing cloud-ERP are the risk surrounding information security, integrity, and confidentiality of the organizational data.

SaaS model of cloud-ERP is vastly growing in popularity, but the fears surrounding information integrity and confidentiality is needed to be addressed before its implementation by an organization. Furthermore, the literature also highlights that the

implementation rate for cloud-ERP is dependent on the organization type and functions (Clarke, Dawson, Heard, and Manohar, 2014). As ERP system plays a significant role in managing the organization functioning, the obstacles related to the implementation rate of SaaS-based ERP can be negatively impacted.

The literature showcased that the smaller organizations benefit from the cloud-ERP due to their low capital endowments, and the issues surrounding the risks involved in its implementation take a backseat (Wailgum, 2008). Also, since smaller organizations, due to less funding, cannot employ proper IT experts and adapt apt security measures for traditional ERP systems, the cloud-ERP approach helps them outsource these to a third-party vendor, thus saving and efficiently utilizing their resources.

On the contrary, the larger organizations are more concerned with the security issues associated with the cloud-ERP in relation to their sensitive and confidential data, which they have to share with the cloud service provider. They are more concerned regarding the probability of a security breach and its impact on their image amongst the stakeholders. The result of these concerns is that the larger organizations are a bit reluctant in adapting Cloud-ERP systems. A midway approach was suggested by Utzig et al., wherein the process was to approach cloud-ERP with 50 to 60 percent shift over 10 years with side-by-side existence of traditional ERP system.

Recently, a new approach has been gaining popularity amongst the larger organizations, a 2-tire strategy for ERP, also known as the hybrid-cloud-based ERP. Ruivo et al. (2015) maintained that approximately 77 percent of organizations would employ the hybrid-cloud-based ERP system. Still, only 20 percent of such organizations have the plans and structure needed for this implementation (Ruivo, Rodrigues, and Oliveira, 2015). This was supported by Peng and Gala (2014). They also argued that the hybrid ERP system is an efficient solution for the organizations adopting the cloud approach as they can keep their core functioning modules and data on an in-house ERP server and rest, they can share on the cloud-based server before ultimately shifting to the complete cloud-ERP system (Peng, and Gala, 2014).

The hybrid-cloud-based ERP approach is in a true sense a mid-path between the traditional approach and the cloud approach wherein the best qualities of both methods have been combined into one. This approach gives organizations the freedom to choose which data they want to share on the cloud and keep on an on-premise server. Thus, eliminating the risk of leakage of confidential data via the cloud. Clarke et al., 2014, shared that the most significant advantage of the hybrid approach is that it gives organizations the flexibility to reallocate their resources after moving the part of ERP and the associated services to the cloud, enabling them to work more effectively. This approach also allows the organizations to enjoy the benefits of Cloud-ERP while minimally risking the storing of sensitive and confidential data on the cloud (Peng, Gala, 2014).

Due to the wide range of advantages of ERP based on cloud computing, educational institutes are constantly drawing towards employing it in their institutions. This latest available platform overcomes a few of the weaknesses of old-schooled ERP systems. And due to the low-cost investment and scalability of cloud-based ERP systems, even the smaller educational institutions as drawn towards employing this approach.

However, as discussed above in the paper, cloud-based ERP systems have concerns related to integrity and security risks regarding the data available in the system. Due to these large institutions have been a bit reductive in adopting this approach, storing sensitive data on the third-party server being a significant concern. Another concern with third parties being involved is misusing the data and further the security breaches at the third-party servers, making the switch to a cloud-based ERP system slightly more complex.

The takeaway of this review is to suggest mid-path by combining both traditional and cloud-based ERP systems. This type of approach will allow the institutions to store their sensitive information by using an on-ground server and lesser sensitive information on the cloud server of the ERP system. This hybrid approach will ensure the security and scalability of the institution's data with ease of access to the data via the on-premise server and a wide range of access to ERP from different locations of end-users due to the cloud server usage. Also, the cloud-based ERP enables the administration to install

different modules of ERP as per the institution's need as it evolves along with the education policies of the government. The hybrid approach also enhances the mobility of the ERP system; the cloud server provides high system performance and more Customization of the system according to the institution's needs. Hence, the hybrid traditional-cloud-based ERP systems are more suitable for educational institutions to ensure data security and ease of access.

2.17 Research Directions for the foreseeable future

Rather than on post-implementation factors and the organisational impact of ERP systems on users, business processes, and institutional culture, as had been proposed in the previous research, the following research recommendations should be based on post-implementation factors and the organisational impact of ERP systems on users, business processes, and institutional culture. The results of a literature survey indicate that administrators and project managers must be well-versed in a wide range of issues in order to be effective and get the most out of their enterprise resource planning systems.

CHAPTER III

RESEARCH METHODOLOGY

The procedures that were employed to conduct this research study are described in detail in this chapter. In the first section, we explain why we chose the technique we did, and then we go over the quantitative component of the research, including the designing and management of an online research-survey. Qualitative technique that was employed in the second part of the inquiry is fully described in this section of the report. This section of the chapter discusses the purposive sampling approach that was used to choose the institutions, as well as the survey protocols that were implemented. A description of the research procedure adopted for the purposes of collection of data and its validation, and further analysis is included at the end of the chapter, along with the definition of delimitation and restrictions.

3.1 Design of The Study

The following overall research topics were answered using a mixed-method approach in this research study:

1. What are higher education institutions' post-implementation ERP Student Administration module experiences?

2. How post-implementation measures have enhanced, upgraded, or resolved problems that surfaced during the initial implementation or that were not addressed during that implementation?

Patton in 1990, conducted an online-survey in order to evaluate the degree of ERP deployments in public-sector and private-sector United States educational organizations. Responses to quantitative online survey questions, as well as a review of supplemental sources, were used to answer the research objectives and generate additional findings for the study.

3.2 Data Collection and Analysis

For the purpose of gathering information regarding present standing of ERP adaptation by private HEIs, a first online poll was created using Google Forms. The 4 fundamental inquiries, which were previously centred on the attributes of the HEIs' ERP software, have been revised. If they wished to participate for the follow-up conversation about their HEI's post-implementation practice, respondents were also given the option of submitting their contact information.

More than 100 public and private Indian institutes of higher education with more than 800 students took part in the online survey during the Fall 2017-19 academic year, which was conducted in the fall of that year.

The Institutional SRC has given preliminary permission to the survey component of the project. A total of twenty-five administrative and technical staff of a prestigious HEI participated in the survey's early testing. Additionally, the survey was reviewed by three administrators from the university's ERP Support office, who provided feedback and suggested ways to enhance the results. The initial survey was adjusted in response to the feedback and recommendations received, and participants in the first pilot were invited to re-evaluate their experience with it. Once the survey was validated, an online survey was done in the months from January, February, April, and May of the years 2019 and months of January, February for the year 2020. A password-protected spreadsheet was used to store a master institutional directory that included contact information as well as the date of the first e-mail sent. For those universities that responded to the survey on a regular basis throughout the research period, regular updating of the spreadsheet was done by the researcher with the survey response ID and colour codes to reflect the most recent responses. The researcher was able to establish which institutions had completed the study almost immediately after implementing this data monitoring strategy. Only those higher education institutions that had not answered were sent a reminder e-mail. The researcher felt it was appropriate to provide this information as a politeness towards those who gracefully had taken time previously and took the effort for the completion of the research-survey. Approximately one week before the survey's deadline, a reminder e-mail was issued to

all participating institutions to remind them of the survey's existence. A total of 68.3 percent of those who took part in the poll responded, and the poll ended on February 8, 2020. (444 responses were received from a total of 650 questionnaires that were circulated).

In both summary and detailed spreadsheet versions, the final poll results were obtained from Google Forms, which was used to collect them. When it came time to analyse the survey results, each response was allocated a unique respondent ID number, as well as the time it was submitted, in the order "Institution ID Response Category Respondent Number." Throughout the investigation, the researcher kept referring to one particular number. Using an identity that a casual reader or observer would find difficult to associate with the participating institutions was devised by the researcher to ensure a review trail for the entire duration of research.

After this process, 444 survey answers (collectively) were selected for further analysis, bringing the total amount of research survey replies selected for statistical and further analysis to 444 (68.3 percent). Data from a quantitative survey was analysed in order to determine the institution's ERP status and to determine the demographics of the respondent population. A pivot table was utilised to build the summation tables with specific characteristics and to aid in the examination of the information. The conclusions are presented in Chapter IV. Once the survey responses were gathered and analysed, it was possible to establish which institutions carried out qualitative research activities that satisfied the study's selection criteria, which are outlined in the following section. A total of 444 online survey respondents that matched the following requirements for institutional ERP were selected to become the institutions in question: (a) Successful achievement of student-administration module of ERP; (b) this has been achieved within the four years prior to the conduction of the current study.

The successful adaptation of the student-administration module of the ERP was the most important selection factor for the study. Student-Administration module is amongst the three most common ERP modules which are implemented by the HEIs to optimise their operations. The other two modules are Finance and Human Resources, and they all work together to achieve this goal (Kvavik, et al., 2005). Due to the fact

that it is unique to higher education and that there is less research on Student Administration ERPs, it was selected considered to be the most important criteria for HEI selection. Another chief requirement was that this module installation had to be finished of the Student Administration module had to be finished four years prior to the research date, reason being the scholar's personal knowledge with the ERP adaptation at HEI, as well as interactions with three other higher education specialists. Both are now university administrators with extensive experience in higher education administration and the implementation of enterprise resource planning systems; the other has completed two ERP conversions. Identifying institutions who have taken considerable amount of time during the implementation of ERP at their HEI and took effort in developing a post-implementation setting to build-on relevant practices in response to the original deployment before focusing attention and resources on further modifications or upgradation was critical for success of this study. The notion was further extended by taking into account the size of the institution while making a decision on which institution to join. The ERP literature reveals a recurring theme: the size of the organisation has a considerable impact on the implementation experience, and more research is needed on this topic, according to the authors (Esteves & Pastor, 2001; Hawking, et al., 2004).

The pivot table was employed to separate and create data-subsets which were relied on the conditions specified in the survey responses in order to identify the institutions and ensure that they met the selection criteria. A recoding of the input data was performed in order to make the findings available for the purpose of calculation and interpretation. To cite an example, numerical replies were recorded for the range of 1 to 5 so that the textual-value related with each numerical range was displayed instead of the number itself. The response field "No Response" was recoded to indicate a blank or null response.

A pivot table was created based on the replies received for the question number 9, "What is the status of the ERP at your HEI." This table was employed to select the HEIs which were (i) on the stage of planning primary adaptation of ERP, (ii) had already

finished the primary adaptation of ERP, or (iii) were planning to initialize the adaptation of student-administration module

3.2.1 Purposive Sampling

The ultimate selection of the six universities for data collection was made using a technique known as purposive sampling. When conducting research, the researcher will use a technique called purposeful sampling to select instances that are fulfilled with data and are representative of a diverse range of escapades in order to find and investigate specific trends, as well as commonalities, among participants. Purposive sampling method was completed by following up on individual questions generated for different types of respondents: the owner, the instructor, the student, the developer, and the administrator.

For the purpose of assisting in the selection of HEIs which will offer a varied variety of escapades and contribute towards comprehensive database, the researcher developed six different sorts of answer options.

3.2.2 Data Validation

For establishing data quality and dependability, four validity tests have been created in traditional research: construct validity for establishing data quality; internal validity for establishing data dependability; and reliability for establishing data quality and dependability (Yin, 1994). The following terms, which correspond to traditional validity criteria, have been reinterpreted to be more appropriate for qualitative research: (a) confirmability, (b) credibility, (c) transferability, and (d) dependability. The terms confirmability, credibility, transferability, and dependability were originally defined as follows: (Erlandson, et al., 1993; Lincoln & Guba, 2005). These procedures are employed in order to determine the reliability and data quality of the study. Ensure that there is an audit trail for the research, that there are several sources for evidence and that you are aware of researcher bias. You should also have institutional case study informants examine their interview transcripts to ensure that the research is confirmable. A multiple case design with replication logic was used to tackle the problem of transferability. Purposive sampling was utilised to overcome the problem

of transferability. The database was built, the research audit trail was maintained, and the reflexive diary was used to develop the fourth and last test of validity, dependability, which was conducted in the field (Erlandson, et al., 1993).

3.3 Scholar as Research-Tool

The involvement of the researcher in this study must be addressed in detail in the methods portion of the paper. In qualitative research, the researcher serves as the primary research instrument, collecting, synthesising, assessing, and interpreting the information received from the subjects and other participants. Researcher's responsibility in the research process, as well as elements that could jeopardise the process' integrity, must be recognised and acknowledged by the researcher (Lincoln & Guba, 2005; Spradley, 1979).

As he prepared himself for the adopting the procedure designed for the collection of data for the research-study, the scholar was conscious of the fact that his previous engagement with ERP deployments at a large HEIs could result into potential biasness of his conclusions. The author ensured to maintain a thru conscious effort in order not to compare his personal knowledge and understandings while interpreting the observations of the data study; his perceptions and responses remained objective throughout the process. A second purpose of the reflexive notebook was for the researcher to keep track of any effects on the data collection procedure that might have been produced by his unspoken experience and ERP knowledge. The adaptableness, reactivity, & flexibility of researcher are among the most important characteristics that distinguish him or her as the foremost tool in current research. Several new components were included in the research report, including (i) confidentiality of the institution's identity, (ii) repeated assurances that responses would remain confidential, and (iii) discretion of the specific ERP system employed and adopted by the HEI.

CHAPTER IV

RESULT AND DISCUSSION

The conclusions of the research are presented in this chapter. The findings of this study investigation are summarised and discussed in detail. Following a description of the purpose of the study and the research methodologies opted, the findings of the study are shared. This report summarises the ERP features of the institutions that participated in the online survey and provided responses. Instead of referring to the institutions by their full names, A, B, C, D, E, F are used to refer to them. Using institutional anonymity in the survey responses helped to increase participation and responsiveness, which was beneficial to the researcher (Yu, 2005).

As per the methodology adopted, respondents from six Indian higher education institutions were requested to take part in an online research-survey on the ERP of their respective institutions. A total of 444 individual responses were received, with 68.3 percent as the response rate of the survey conducted. Following the validation of the survey data, it was discovered that the valid response rate was 68.3 percent. Table 4.1 lists the different types of respondents and their responses.

Table 4.1: Respondents' Categories

Category No.	Respondent Categories
I	Owner
II	Admin
III	Developer
IV	Faculty
V	Student

Table 4.2 shows the combined number of respondents from all the six HEIs collectively, and Figure: 4.1 is the graphical representation of the same data. Figure: 4.2 represents the number of respondents from each HEI further divided category-wise.

Table 4.2: The total number of respondents (category wise)

Category	Total number of Respondents
Owner	6
Admin	12
Developer	11
Faculty	57
Student	358

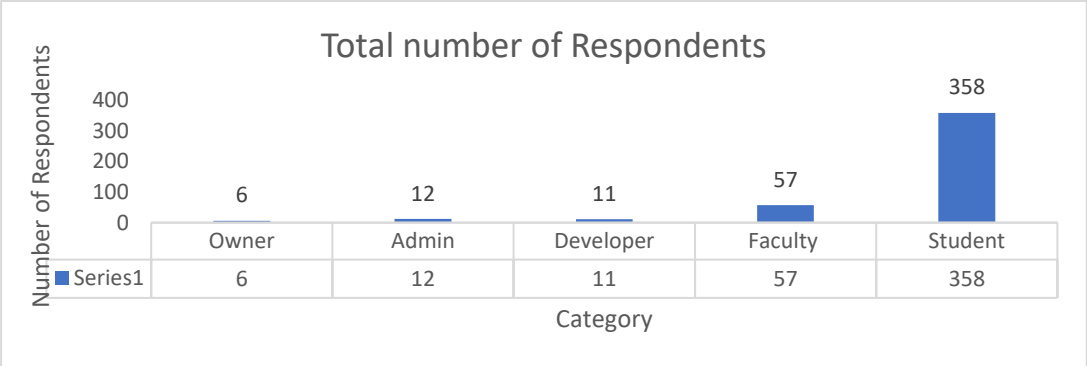


Figure: 4.1: Graphical representation of the total number of respondents category-wise

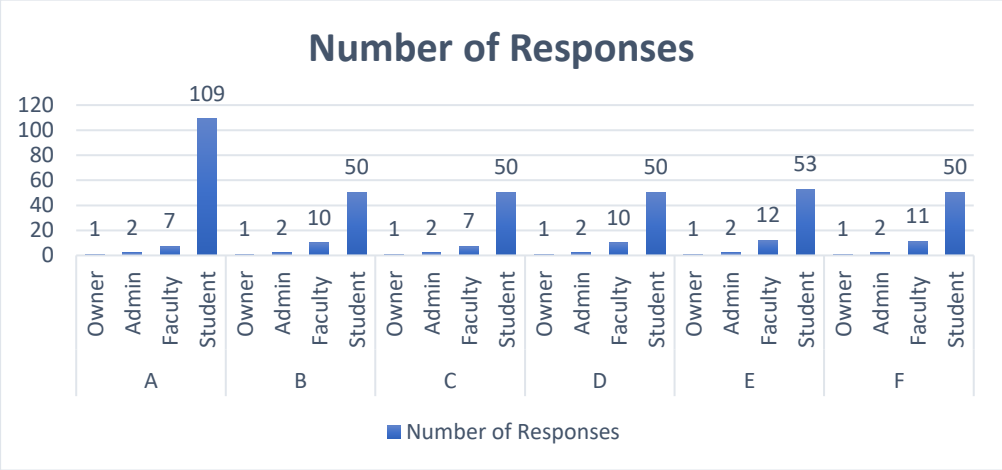


Figure: 4.2: Number of responses (institute-wise, category-wise)

4.1 Research Findings

4.1.1 Students' Perspective

A total number of 358 responses were received from the respondents amongst the six HEIs. Students being one of the major end-users for ERP who frequently use the platform. Also, the vast number of students is responsible for determining the success of ERP implementation in any institution. Another critical success factor addressing the security of data and information is directly related to this category of the respondents. Responding to the survey question to determine whether the respondents have received computer education, 89.7% responded yes, whereas 10.3% have not received the same. This factor highlights the eagerness and acceptance of an e-platform for database management. The direct link is also reflected in the survey question to determine whether the end-users are aware of the ERP platform; 6.4% weren't even aware that the platform they are using is known as ERP. Another linked survey question, "Is the ERP user-friendly" response, was in concordance with being the recipient of the formal computer education, with 69.6% finding it user-friendly and the remaining are in either complete or partial disagreement.

To check the functionality of ERP modules in the HEIs, the survey questions, "it provides all information related to academics & what kind of information it provides you on the system," helped the researcher collect the relevant data. The responses revealed that the ERP modules are 80% functional when it is considered from the end-user–student perspective.

The part of questionnaire dealing with security-related questions revealed that the majority of the end-users (student) does not feel confident with the ERP system security. Another critical factor responsible for the successful implementation of ERP is the post-implementation services rendered, including correcting an error in data entry, login issues, server issues, and, majorly, the time is taken to fix them. From the survey questions, it was evident that 50% of end-users (students) were not satisfied with the services provided.

Another critical success factor is the financial investment made by the HEIs, and since the ERP implementation involves huge investments to be made, it has been observed that the HEIs have distributed their investment into more than one ERP platform, decreasing the dependence on one single platform.

Table 4.3: The total number of respondents (institute-wise)

Institute	Number of Respondents
A	109
B	50
C	50
D	46
E	53
F	50

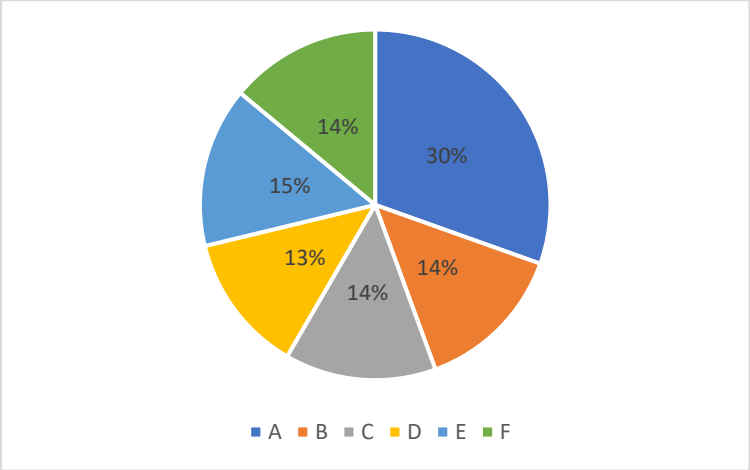


Figure: 4.3: The total number of respondents (institute-wise)

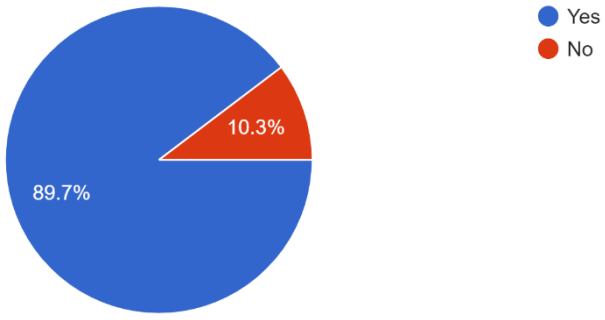


Figure: 4.4: The total number of respondents who have received formal computer education

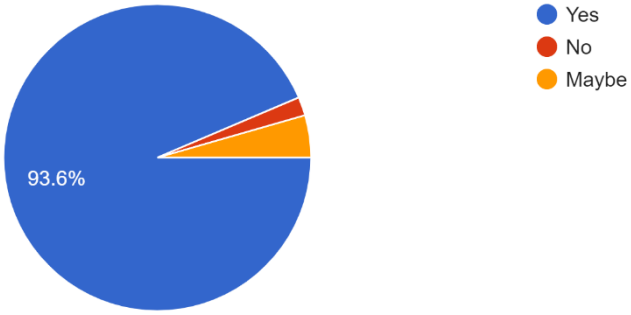


Figure: 4.5: The total number of respondents who are aware of availability of ERP in their HEI.

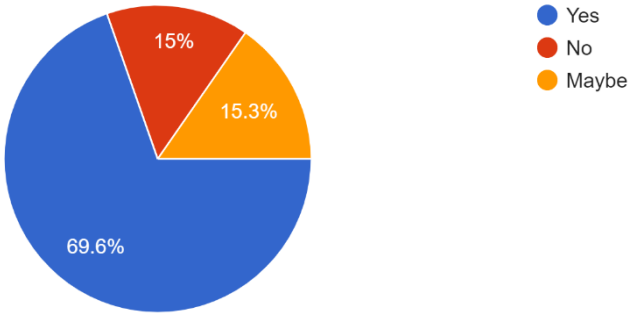


Figure: 4.6: The total number of respondents who are believe the ERP of their HEI Is user-friendly.

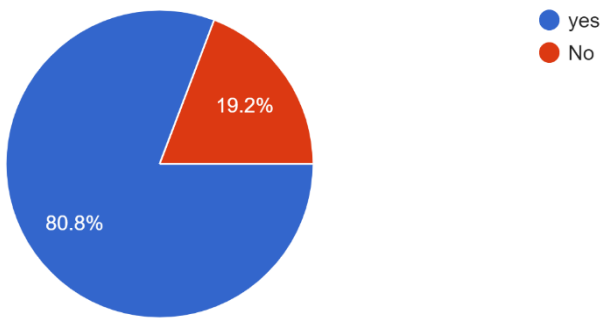


Figure: 4.7: The total number of respondents who are ensured that their ERP provides all academic information

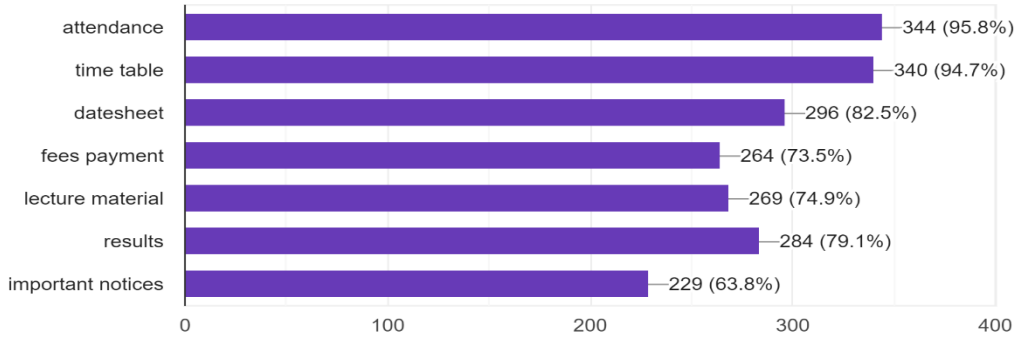


Figure: 4.8: The response to the Question "what kind of information does ERP of their provide"

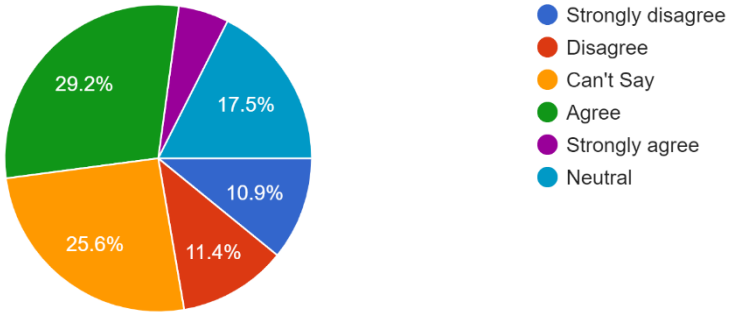


Figure: 4.9: The response to the Question "is the ERP system at their HEI is transparent to all"

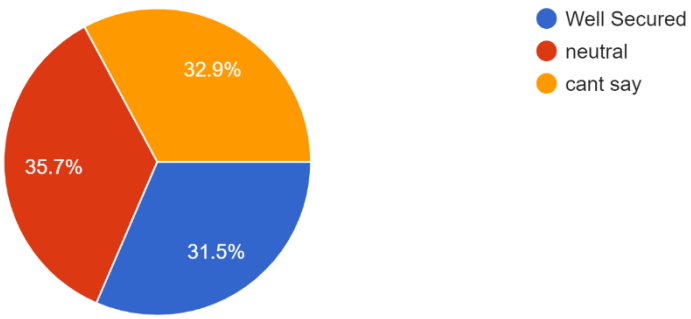


Figure: 4.10: The response to the Question “what about the security of the student’s information”

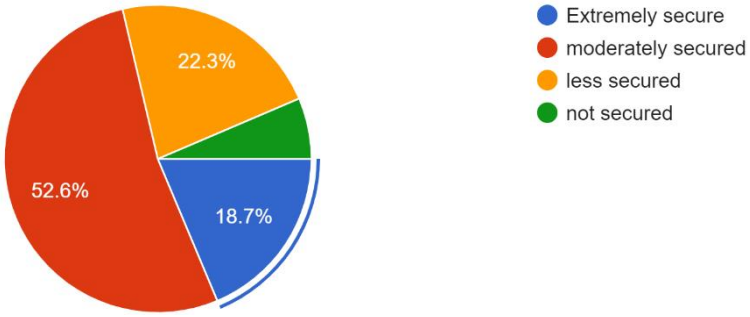


Figure: 4.11: The response to the Question “how will you rate the security of the ERP system”

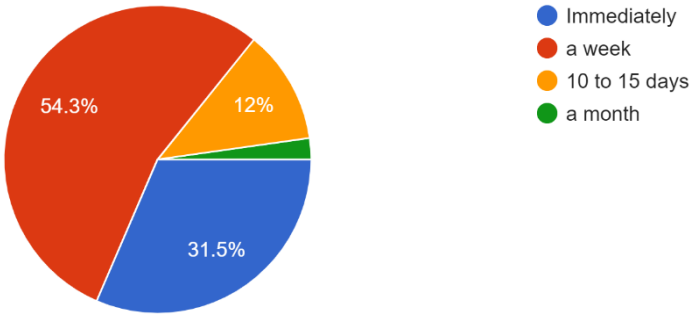


Figure: 4.12: The response to the Question “how long does it take to update your information”

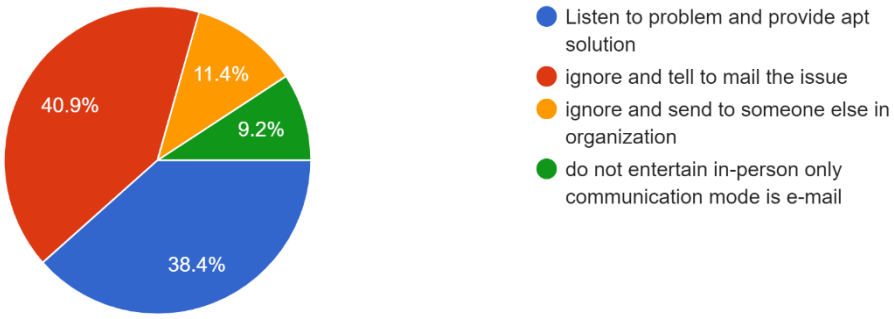


Figure: 4.13: The response to the Question "how people behind the system behave when you face any difficulty"

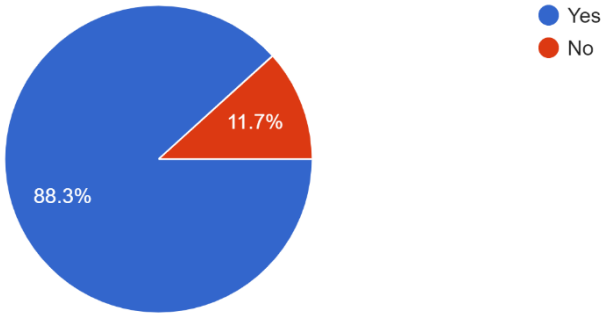


Figure: 4.14: The response to the Question "Does ERP system have an App"

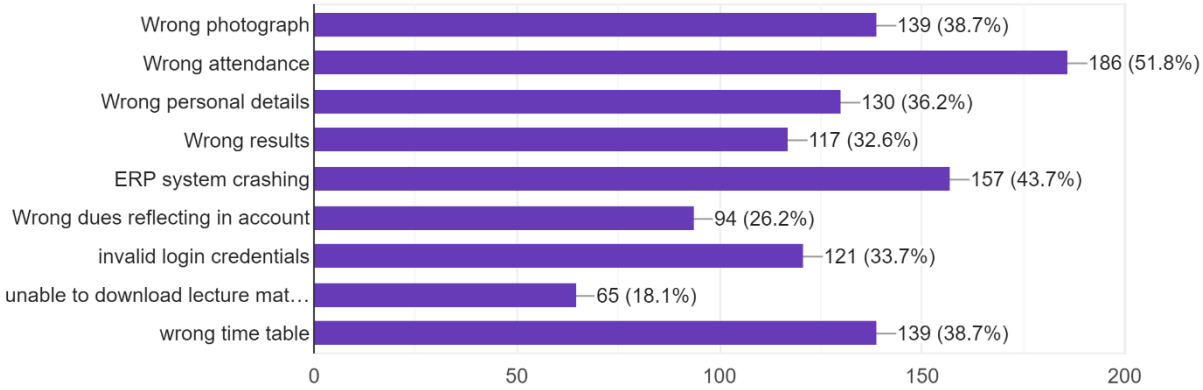


Figure: 4.15: The response to the Question "which problems have you faced while using the ERP at your HEI"

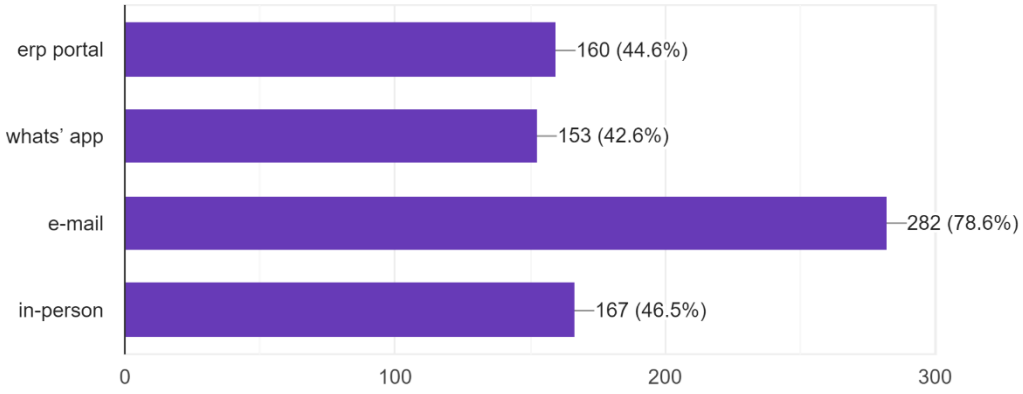


Figure: 4.16: The response to the Question "how problems regarding ERP are reported at your HEI"

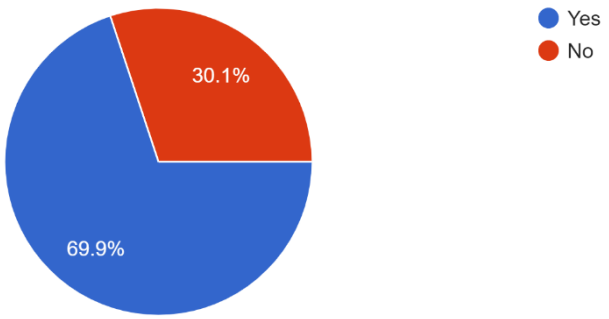


Figure: 4.17: The response to the Question "Can you download your attendance record from ERP at your HEI"

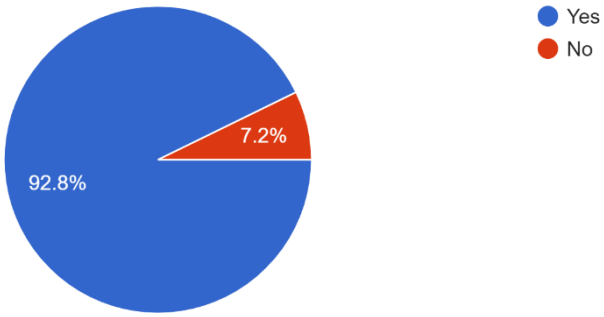


Figure: 4.18: The response to the Question "Does ERP App of your HEI allows you to take a snapshot of the screen"

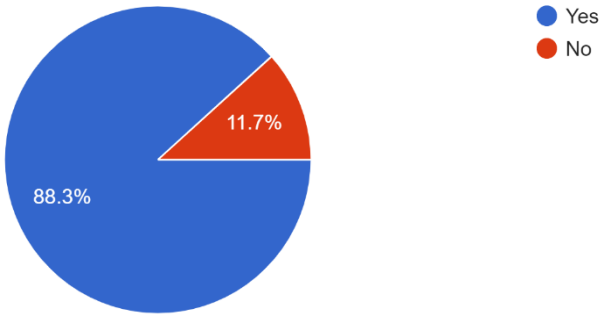


Figure: 4.19: The response to the Question “Can you download class material from ERP at your HEI”

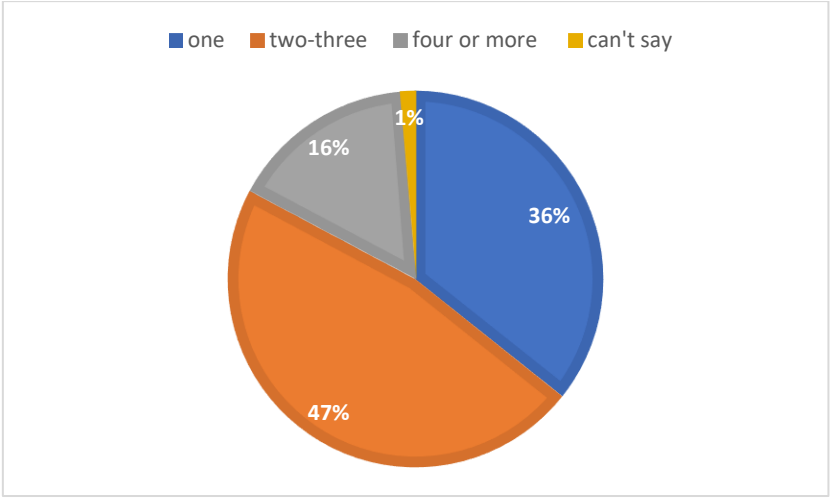


Figure: 4.20: The response to the Question “Number of E-platforms at your HEI”

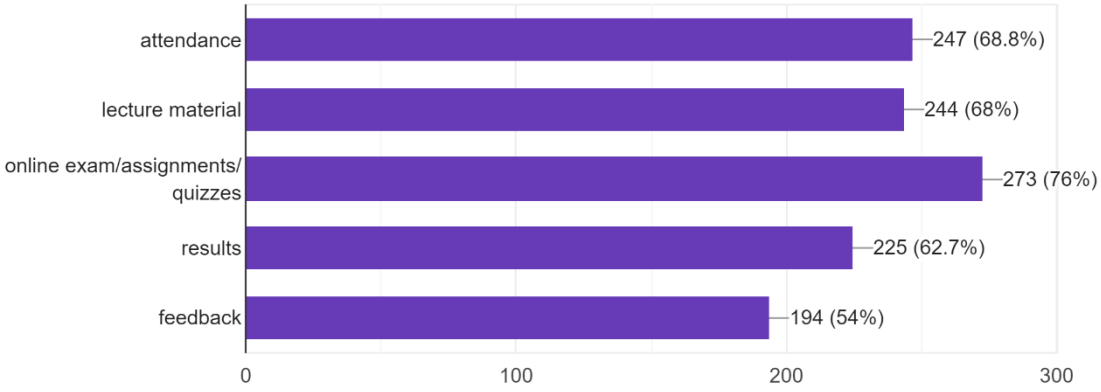


Figure: 4.21: The response to the Question “Purposes of different E-platforms at your HEI”

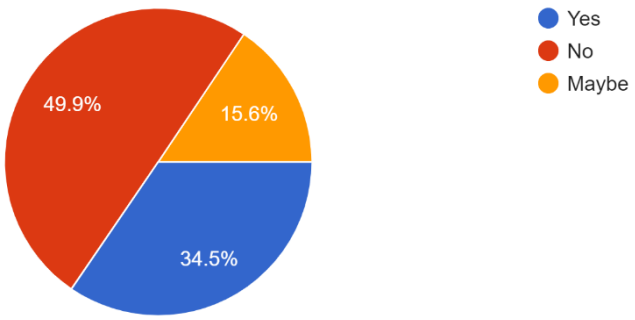


Figure: 4.22: The response to the Question “Does your parents have access to ERP of your HEI”

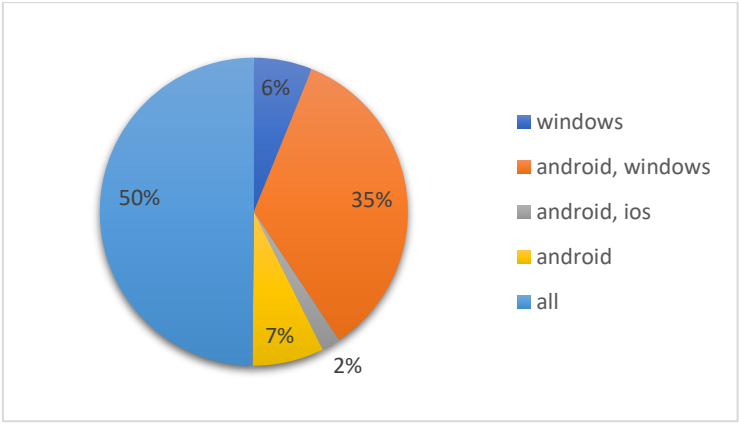


Figure: 4.23: The response to the Question “how many operating systems does ERP at your HEI supports”

4.1.2 Faculty's Perspective

Another significant end-user concerning ERP implementation is the faculty who are using it daily for not only marking the attendance but also sharing the lecture material, conducting assignments/quiz (examinations), uploading the marks obtained by the students, to name a few. Faculty being the prime focus as an end-user, the researcher needs to consider their perspective to check the effectiveness of ERP implementation in any HEI.

In total, 57 respondents participated in the survey questionnaire from the six HEIs under study. The respondents were from all genres of academics – assistant professor, associate professor, and professor, with experience varying from 0 to more than 20

years which help in drafting the apparent effects of ERP implementation in the HEI as the majority of respondents have experienced both the pre-and post- ERP era. The majority of the respondents have received computer education at the school level, and 35% have more than five years of knowledge and experience working in educational ERP.

To answer the question "the purpose of ERP usage," 98% of faculties responded with academic purposes. The respondents answer the user-friendliness of the ERP system they are using; only 12.3% of respondents find it challenging to operate. In contrast, the rest of the respondents find it easy to operate. Despite this, only 64.9% of the respondents preferred using the ERP to maintain their records, whereas 26.3% prefer to store them on their official laptops. Still, 8.8% prefer to keep data using paper.

In response to the question "whether the ERP system their HEI is using is hosted by the university or is out-sourced," only 21% agreed that their own HEI hosts the ERP, whereas 42% agreed that it is out-sourced by their HEI, whereas 36.8% were not aware of the hosting ERP protocol at their HEI indicating the lack of information shared by the HEI which in-turn reflects upon the trust issues of the end-user on the e-platform. Another astonishing result that was obtained was that 89% of responders were aware of the ERP mobile phone application of their HEI, out of which only 82% agreed on using it, and from this, only 45.6% responded to regular usage of this application.

End-user training is another important critical success factor for determining the efficacy of ERP post-implementation; to determine its effectiveness, the researcher asked the question, "How often have you been trained for using ERP?" to which the respondent's answer was Once at the time of joining 15.8%, per semester 17.5%, per session 38.6%, whenever a new feature is added 28.1%. To deduce from here is another important factor that since the training is not periodical, the post-implementation success of the ERP in the said HEI is questionable. Another supporting evidence for this is that the responses received for the question "Are you frequently informed about the modifications made in ERP system?" for which only 56% of the respondents answered in agreement to "Immediately after the change is made." In response to the question "In your experience, is your university well-equipped for ERP system?" only

29.8% of responders were in agreement. In contrast, the rest responded as "No, Maybe, Can't say," pointing towards the ineffectiveness of ERP in HEIs. The stability of service from an e-platform majorly affects its usage by the end-users; in order to check this, the researcher asked the question, "As the end-user, how often do you encounter access issues due to server overload?" for which only 7% responded as never, whereas 93% of the responders have encountered issues with the ERP at their HEI (14% once a week, 43.9% one a month, 19.3% at times of student registrations, 8.8% at times of student examinations, 7% while uploading the marks).

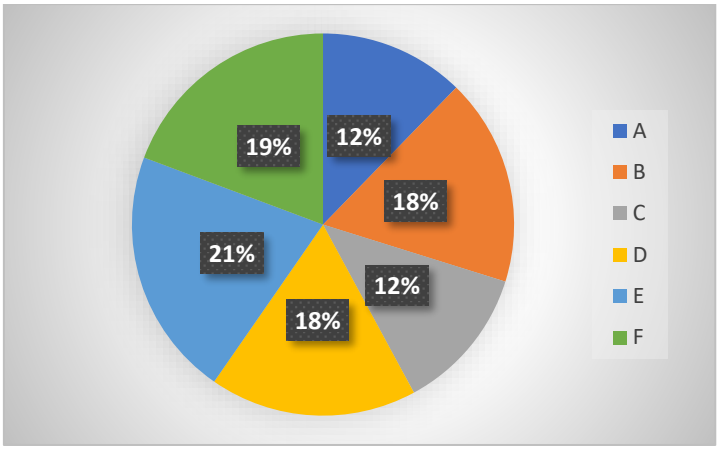


Figure: 4.24: The Number of faculty respondents institute-wise

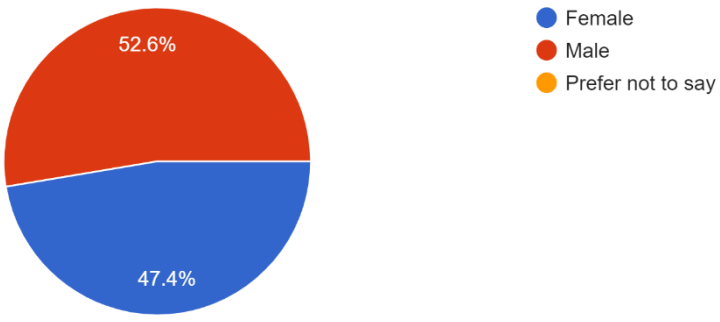


Figure: 4.25: Gender ratio of the respondents

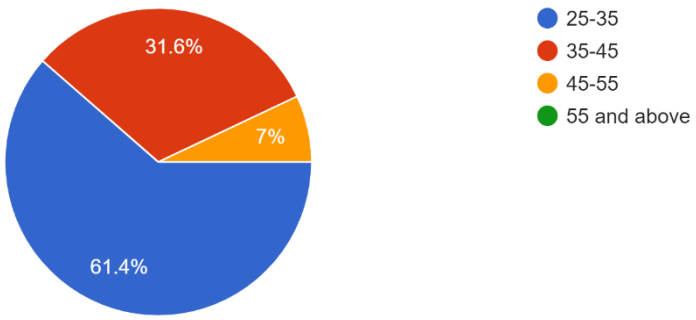


Figure: 4.26: Age ratio of the respondents

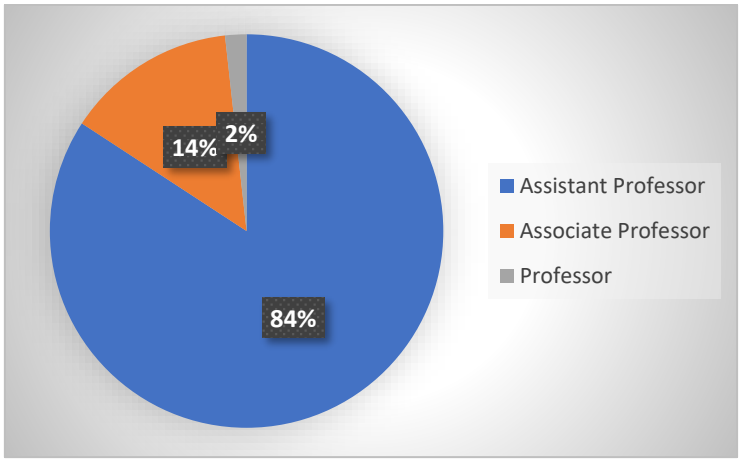


Figure: 4.27: Designation of Faculties respondents

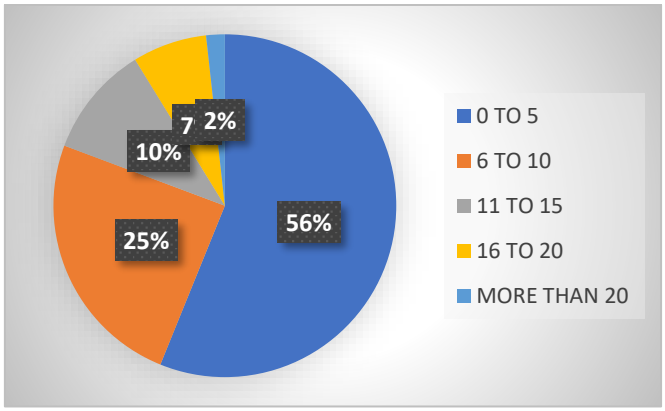


Figure: 4.28: Years of teaching experience of Faculties respondents

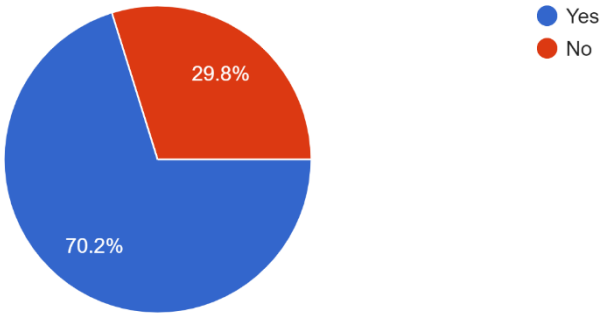


Figure: 4.29: Faculties respondents who have received formal computer education

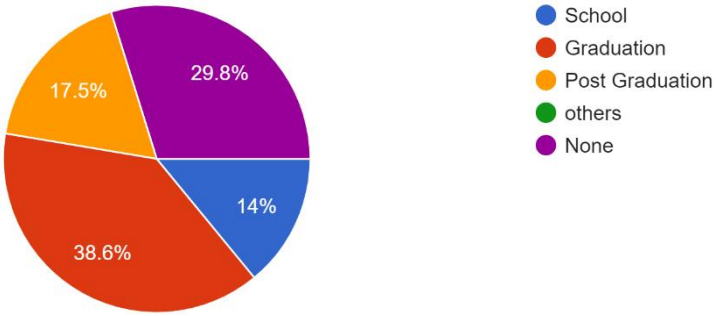


Figure: 4.30: Ratio of at which educational level faculties respondents received formal computer education

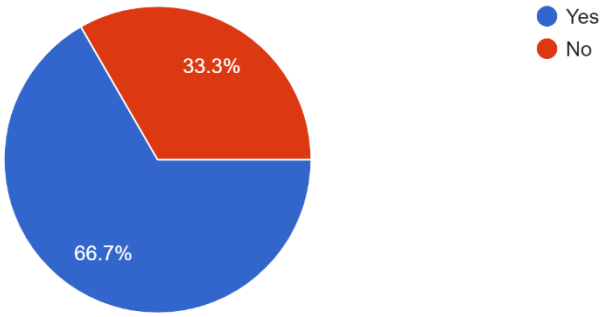


Figure: 4.31: Response to the question “is this your first ERP experience”

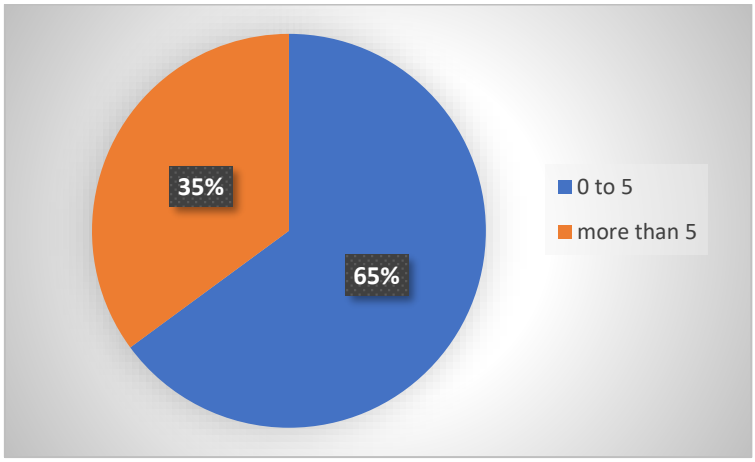


Figure: 4.32: Response to the question “ERP experience in years”

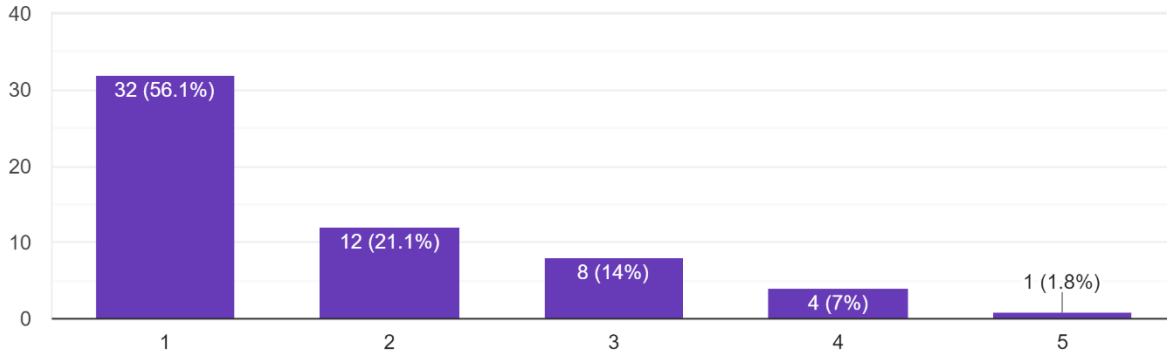


Figure: 4.33: Response to the question “how many ERP system you have worked with”

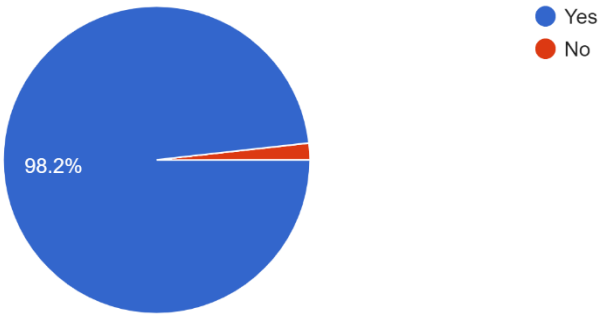


Figure: 4.34: Response to the question “Do you use ERP for academic purpose only”

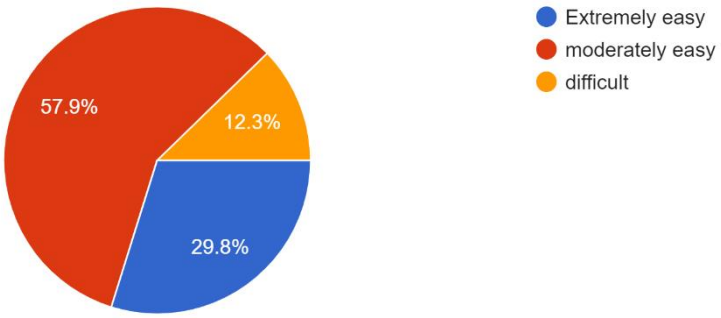


Figure: 4.35: Response to the question "How user-friendly ERP system at your HEI is"

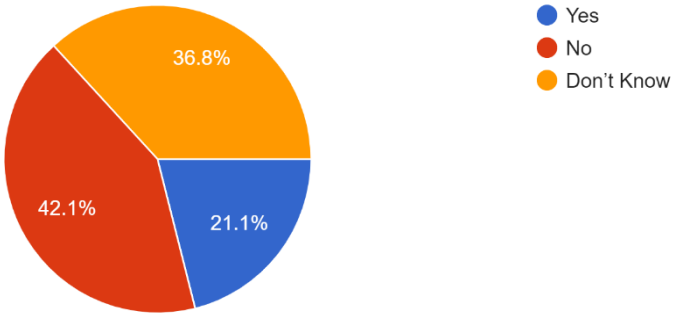


Figure: 4.36: Response to the question "Is the ERP system at your HEI is hosted by it"

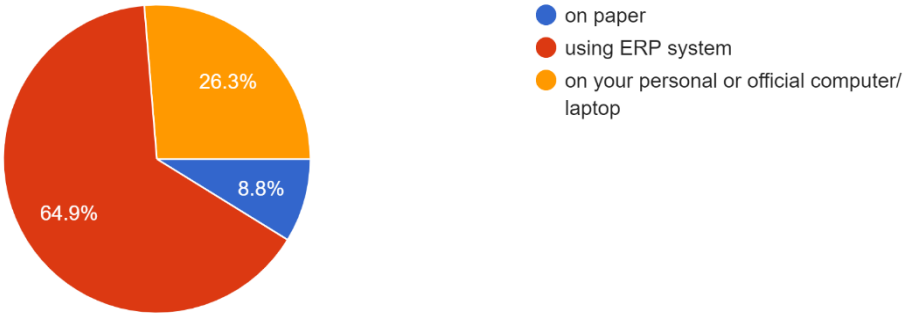


Figure: 4.37: Response to the question "How do you prefer to maintain records"

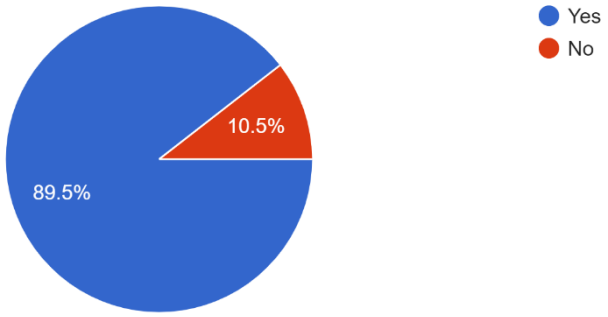


Figure: 4.38: Response to the question “Does ERP at your HEI have an app”

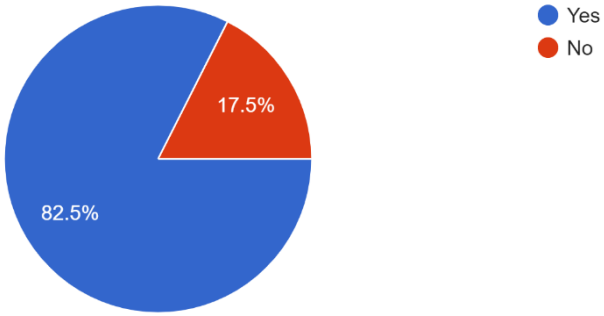


Figure: 4.39: Response to the question “Do you use the ERP app”

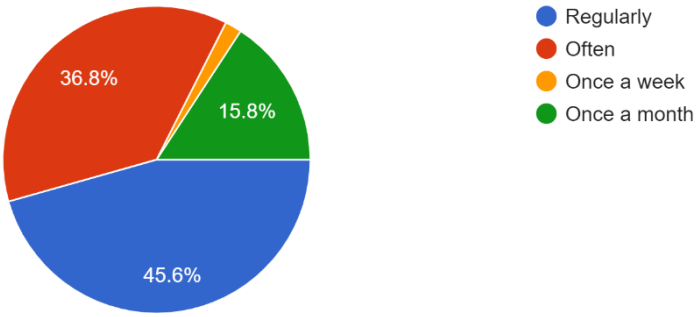


Figure: 4.40: Response to the question “How often do you use the ERP app”

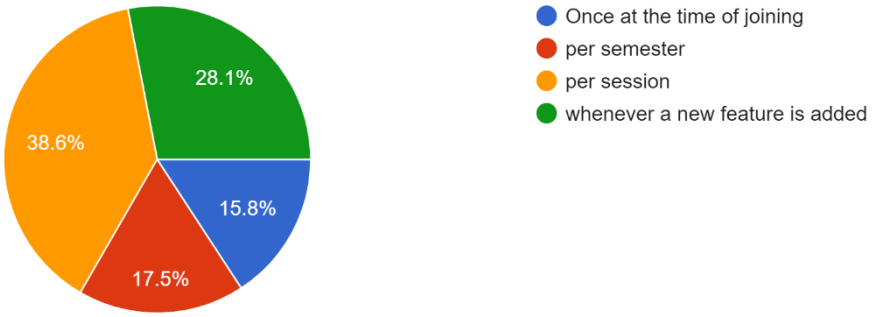


Figure: 4.41: Response to the question "How often have you been trained for using ERP"

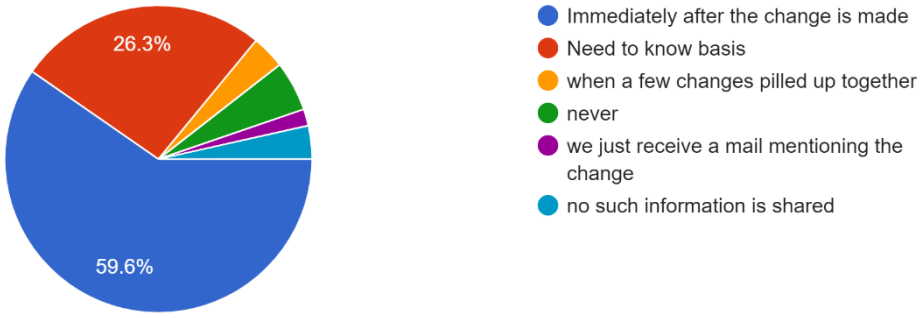


Figure: 4.42: Response to the question "Are you frequently informed about the modifications made in ERP system?

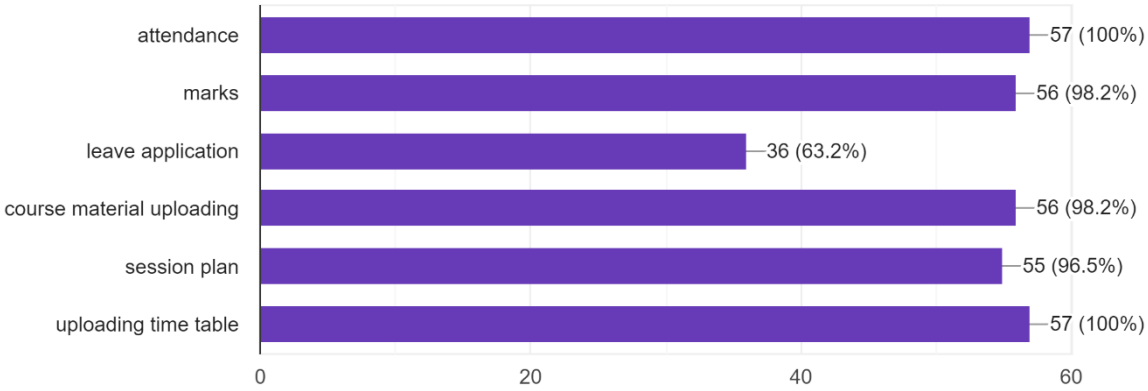


Figure: 4.43: Response to the question "ERP system at your is used for which purpose"

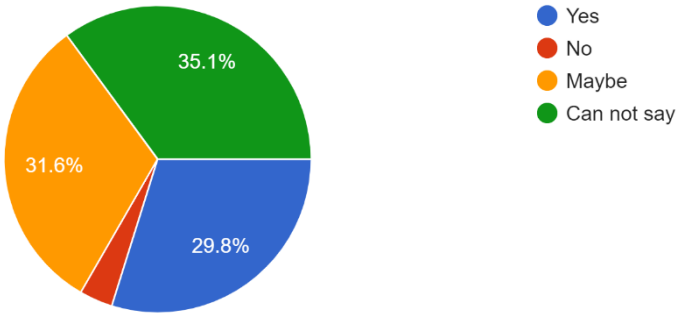


Figure: 4.44: Response to the question "In your experience is your university well-equipped for ERP system"

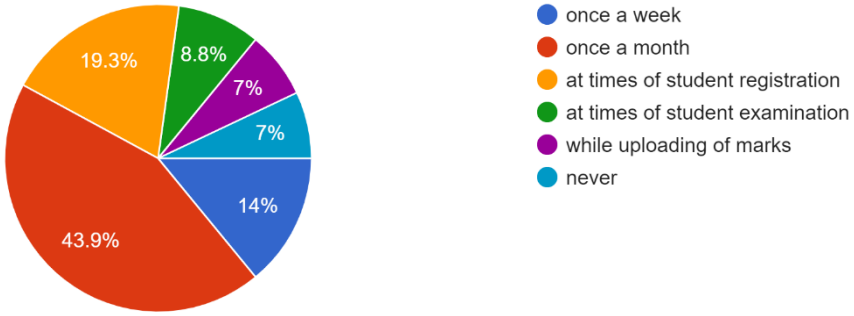


Figure: 4.45: Response to the question "As the end-user how often do you encounter access issue due to server overload"

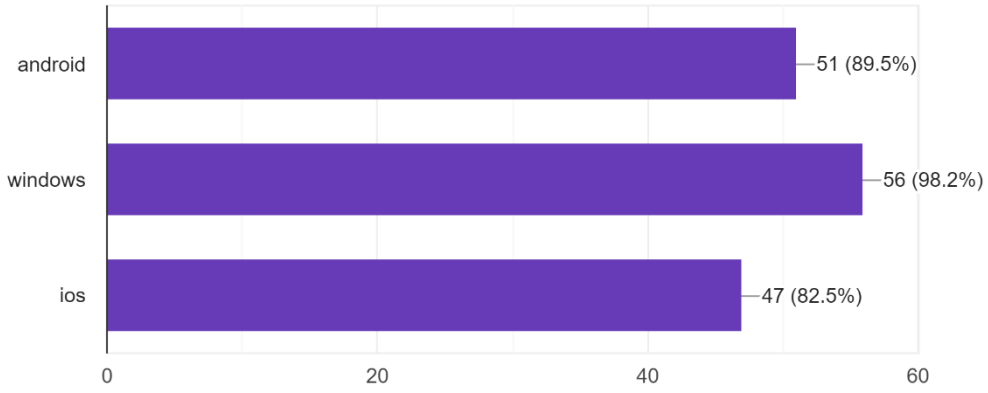


Figure: 4.46: Response to the question "Which operating system does ERP system at your HEI supports"

4.1.3 Administrivia's Perspective

The end-users' administrators play a dual role; they act as the end-users and play an important role as the mediators between other end-users and the developers. The researcher shared the specially designed questionnaire for them and the respondents from the six HEIs who hold the positions of administrators at the HEIs with the experience of handling ERP ranging to more than six years.

When the researcher asked the respondents how secure they consider the ERP database is, 91.7% responded as they considered it secured, whereas the rest responded as maybe. When it was asked that whether they consider the ERP they are handling as user friendly, all the respondents said it is user friendly, which was also in agreement with the response whether the ERP system they are using they handling can be modified as per the need arise for which they all said yes. But on the contrary to the question of how comfortable they are with the current ERP they are using, only 41.7% response was extremely, 50% response was very, and 8.3% response was neutral.

To test the efficacy of the ERP to determine the work efficiency, the question related was asked to the responders, to which 58.3% responded as extremely increased and 41.7% shared their views as up to a certain extend. On the contrary to the faculty responses, administrators claim that they organized training at the beginning of each semester.

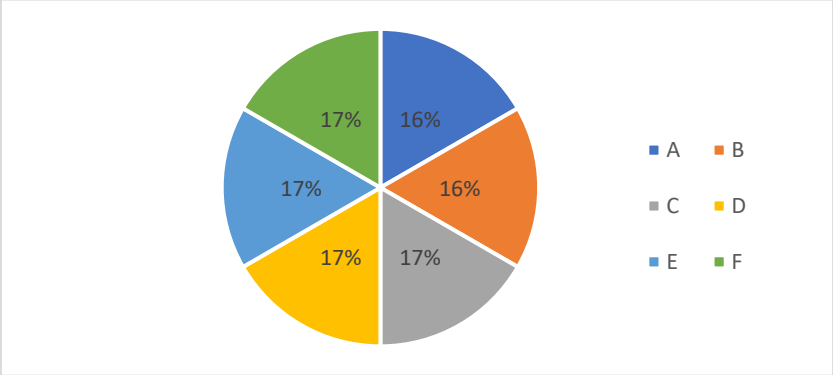


Figure: 4.47: Ratio of the respondents with respect to the institutes

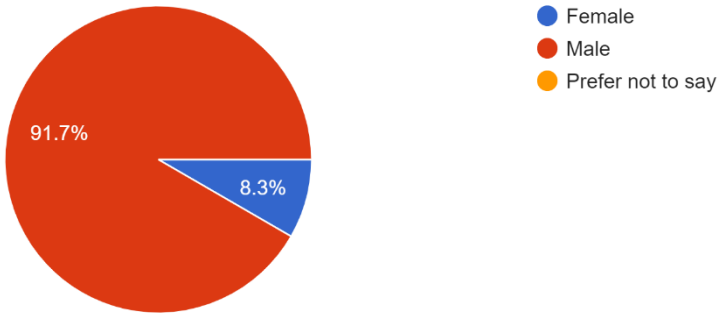


Figure: 4.48: Gender Ratio of the Respondents

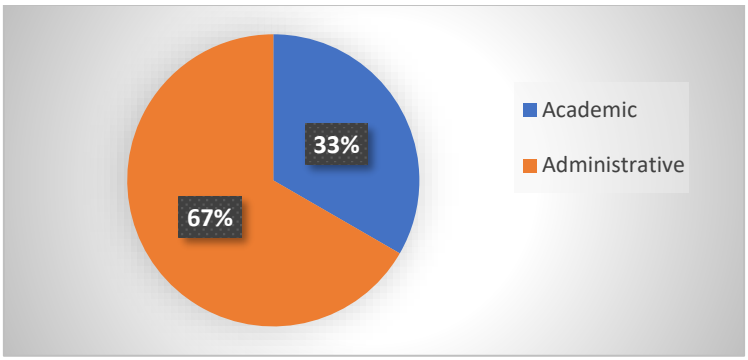


Figure: 4.49: Response to the question "previous position held before ERP implementation"

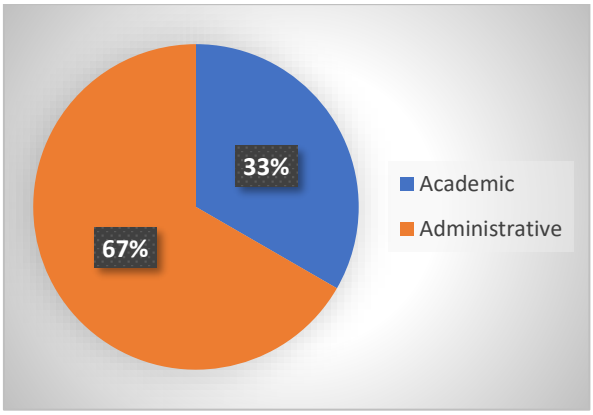


Figure: 4.50: Response to the question "Current position after ERP implementation"

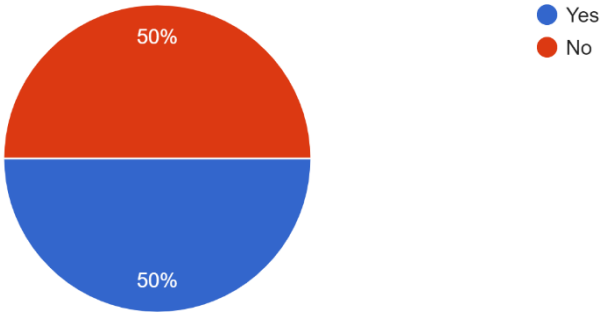


Figure: 4.51: Response to the question “Handling this ERP system is your first experience”

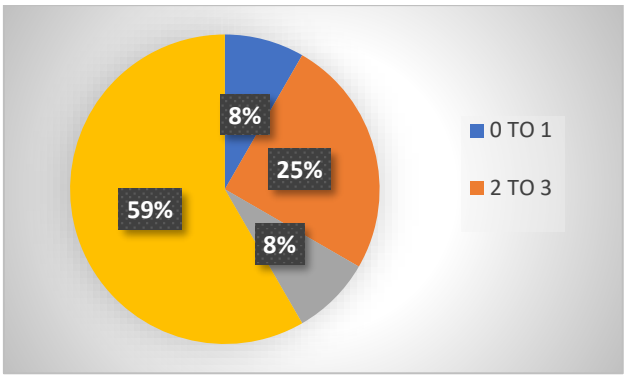


Figure: 4.52: Response to the question “If No, for how many years you are using ERP”

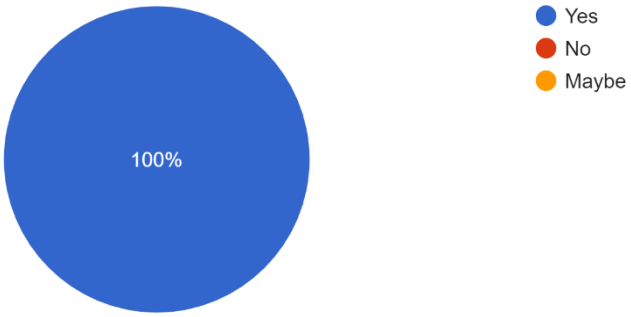


Figure: 4.53: Response to the question “Is the ERP system at your HEI user-friendly”

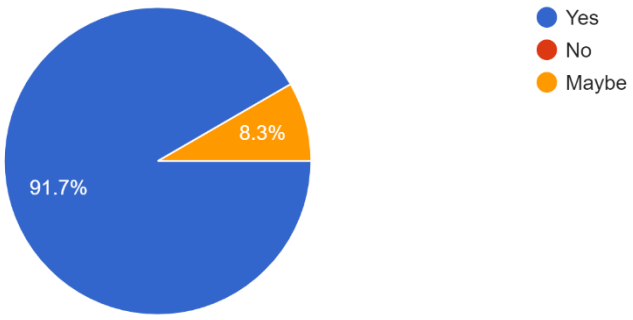


Figure: 4.54: Response to the question “Does the system has secure database”

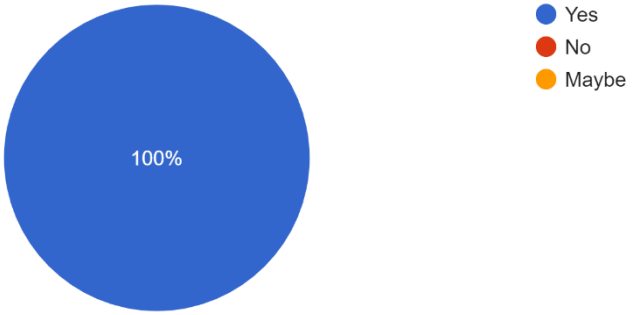


Figure: 4.55: Response to the question “Can update/modification be done easily in ERP at your HEI”

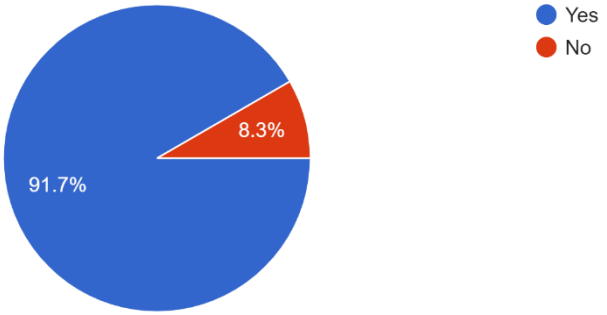


Figure: 4.56: Response to the question “Have you handled any other ERP system before”

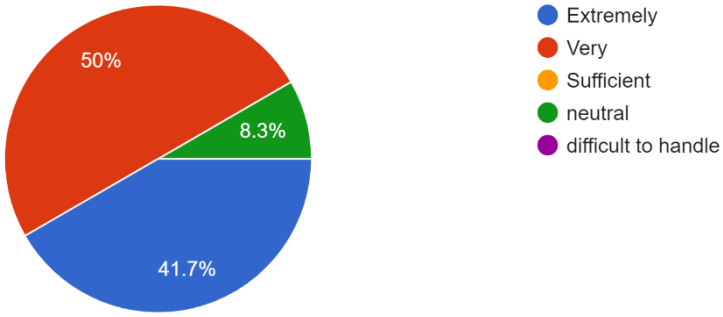


Figure: 4.57: Response to the question "If yes, how much comfortable you are with the current system"

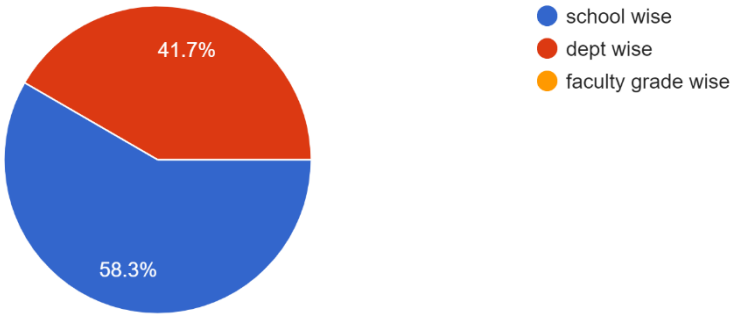


Figure: 4.58: Response to the question "How training processes for faculty was organized"

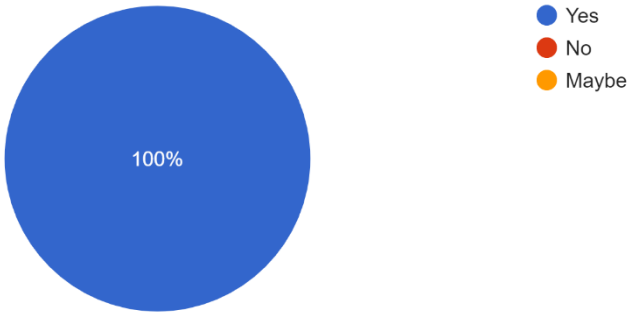


Figure: 4.59: Response to the question "Does your ERP system has a supporting App"

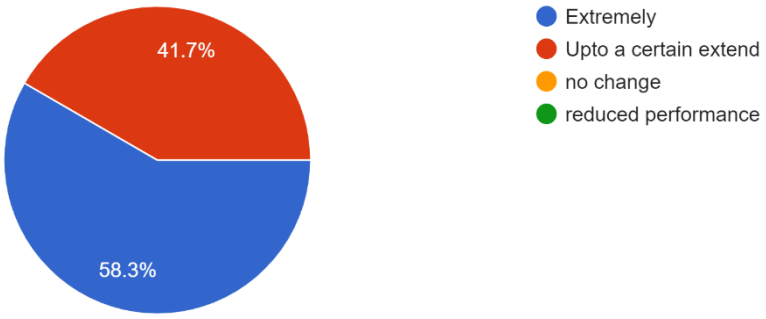


Figure: 4.60: Response to the question "Have the work speed changed"

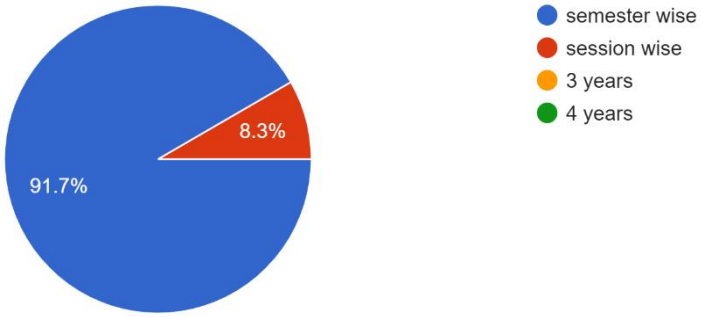


Figure: 4.61: Response to the question "How often does the ERP system modified"

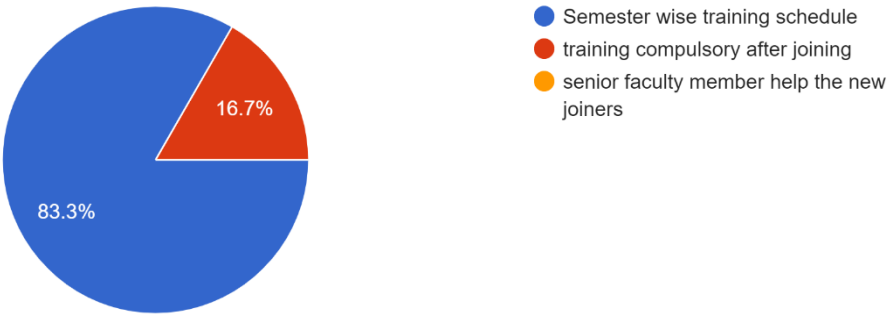


Figure: 4.62: Response to the question "What is your process for training new end-users"

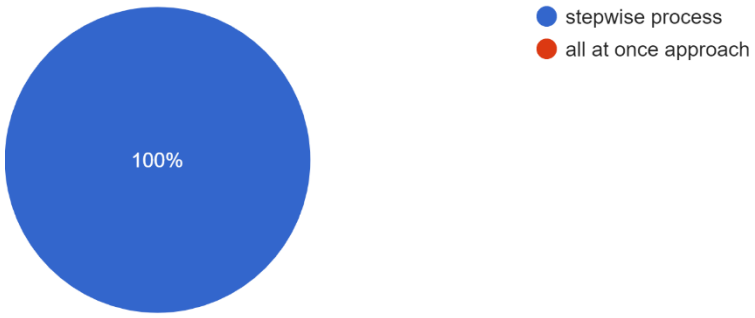


Figure: 4.63: Response to the question “How was ERP implementation done in your HEI”

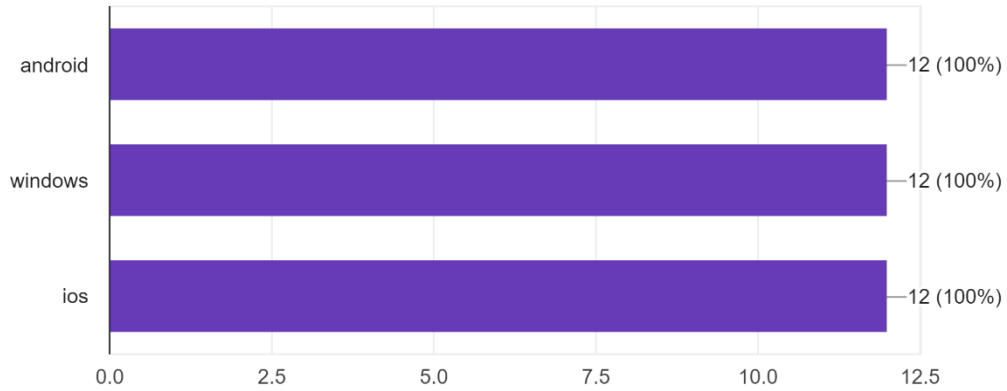


Figure: 4.64: Response to the question “Which operating system does the ERP system at your HEI supports”

4.1.4 Developers' perspective

To understand the story from both sides of the coin, the researcher has focused on collecting data from the developer's perspective. The questionnaire was designed to collect the data. The questionnaire was distributed amongst the companies which develop or out-source the ERP platform to be used by the educational institutions. A total of five ERP developer’s companies participated in the survey. It was evident from the survey that all the companies started developing the ERP in the early 2000s. They have revealed that their experience of working in the educational sector has been satisfactory. Also, it was revealed that the companies prefer providing a dynamic model

of ERP platform which can be modified as according to the need and demands of their client, which majorly didn't affect their cost for the platform.

As per the response received in terms of the client retained by these companies as compared to the number of clients, the data reveals that the success rate is high; also, the companies opine that they provide 100% training to the clients in order to ensure full functionality of the ERP offered.

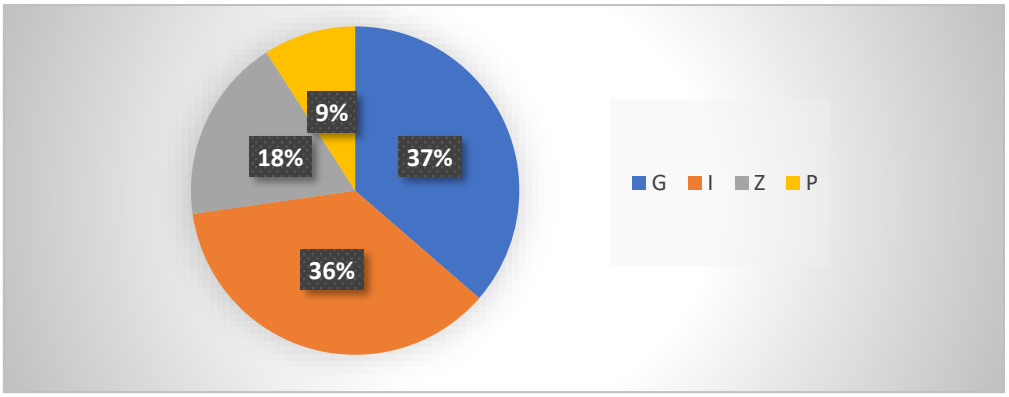


Figure: 4.65: Ratio of the respondents company-wise

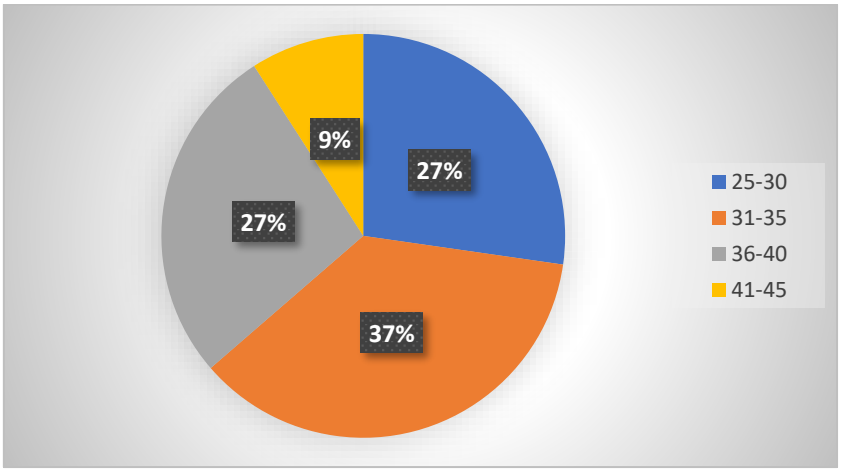


Figure: 4.66: Age Ratio of the respondents

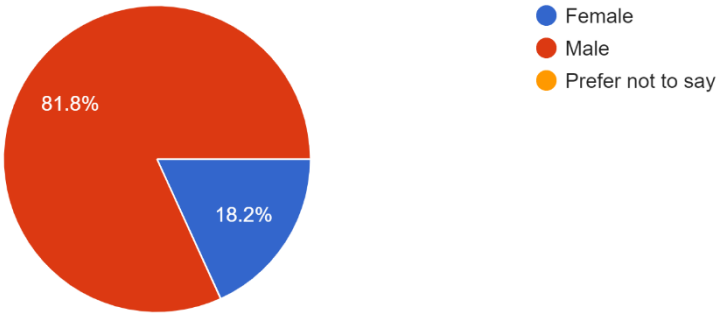


Figure: 4.67: Gender Ratio of the respondents

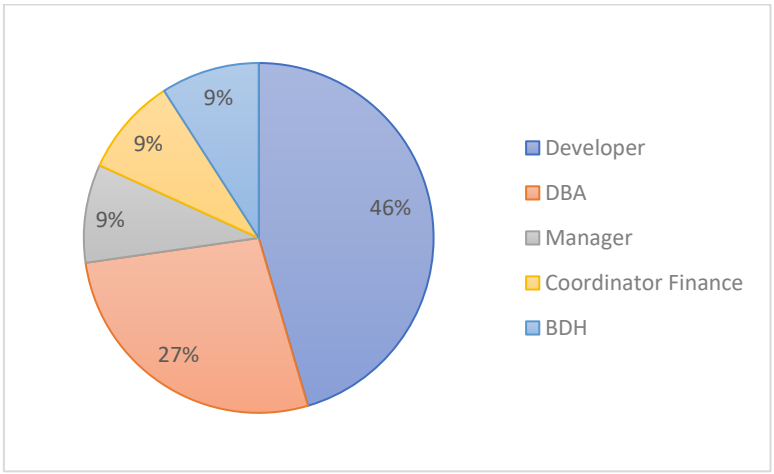


Figure: 4.68: Respondents position at the company

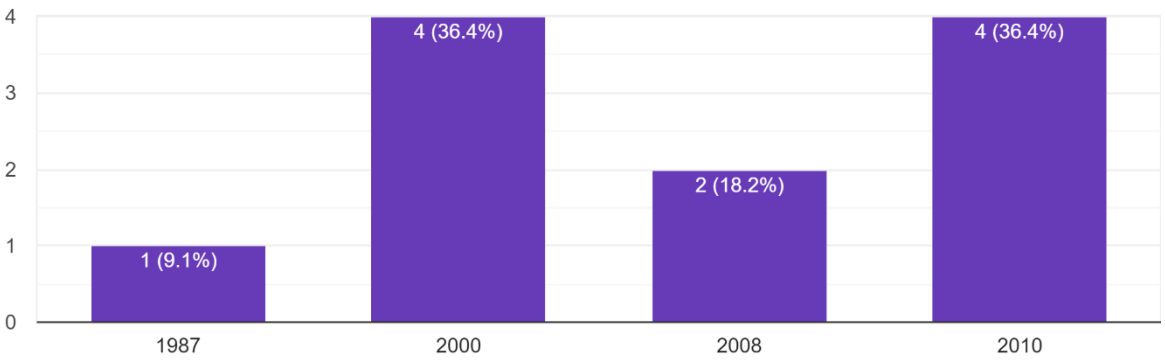


Figure: 4.69: Respondents company's were established in the year

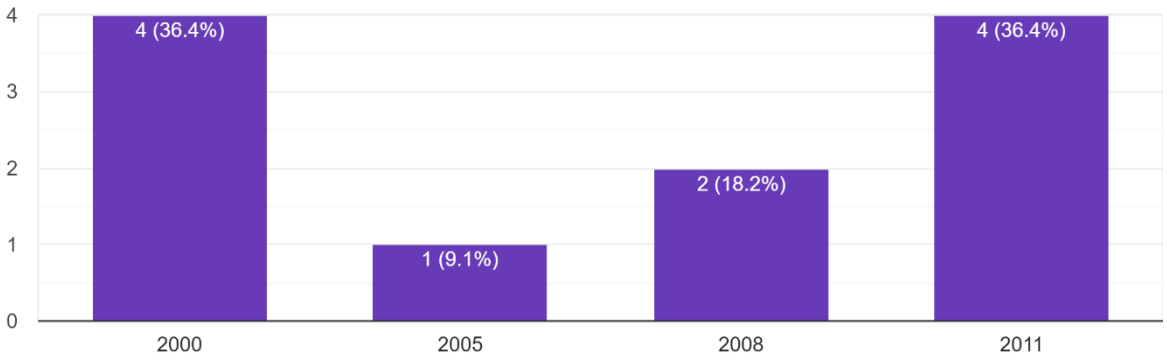


Figure: 4.70: Respondents company's started developing the ERP in the year

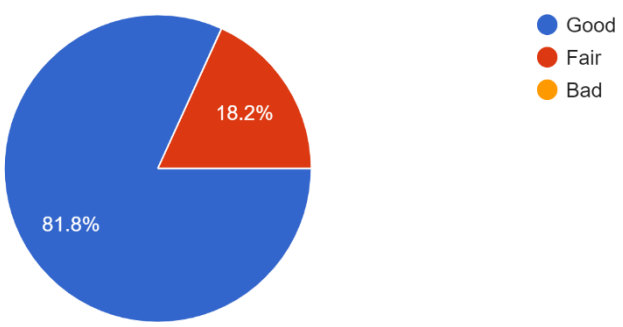


Figure: 4.71: Answer to the question "How was your experience in the development process"

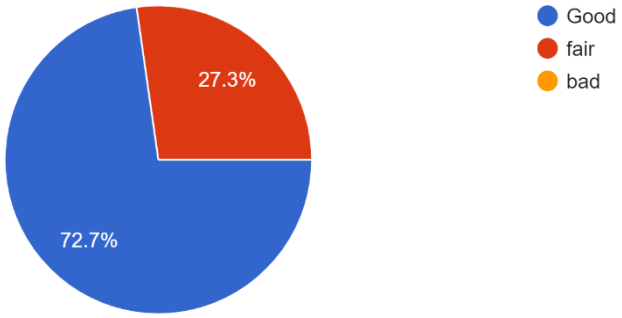


Figure: 4.72: Answer to the question "How was the financial condition of your company while development process"

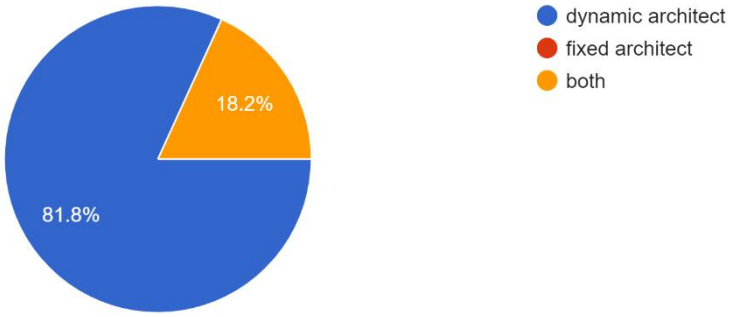


Figure: 4.73: Answer to the question “Do you give a fixed architect or dynamic architect”

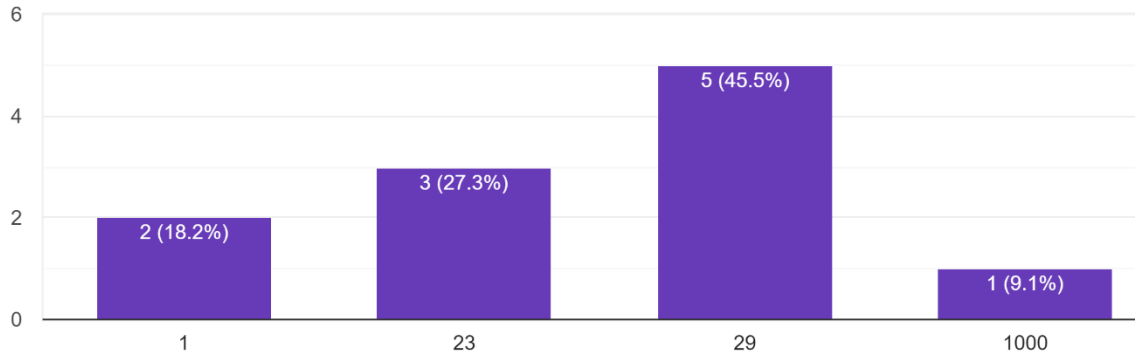


Figure: 4.74: Answer to the question “What is the current number of your clients”

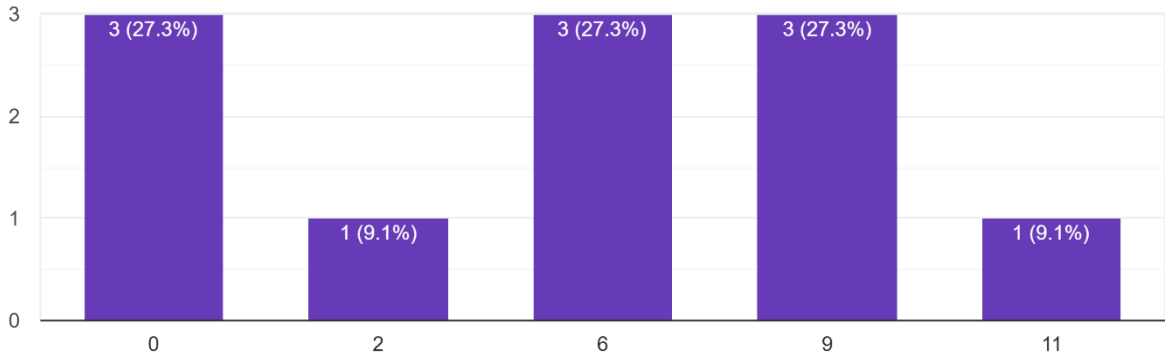


Figure: 4.75: Answer to the question “How many clients have you dropped”

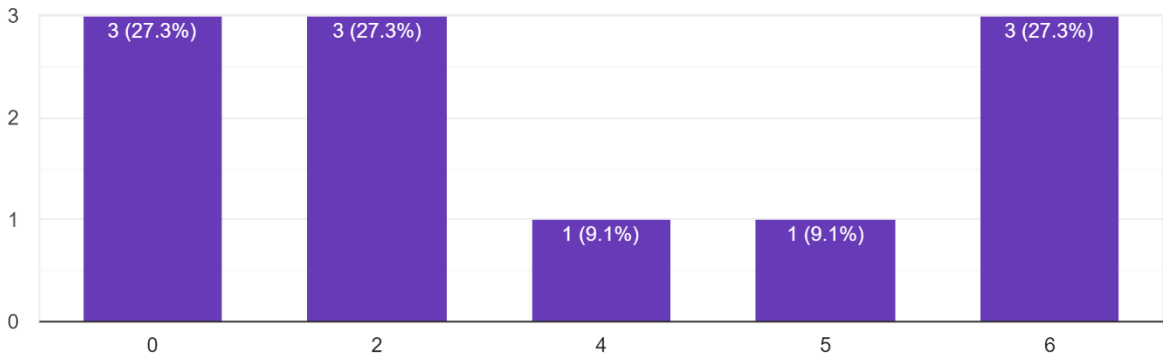


Figure: 4.76: Answer to the question "How many clients dropped you"

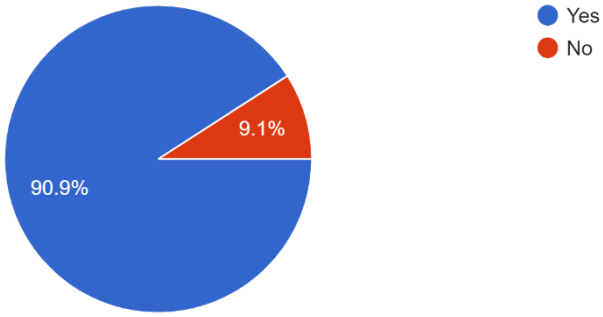


Figure: 4.77: Answer to the question "Is the pricing of the ERP system same if client wants some modification in your current system"

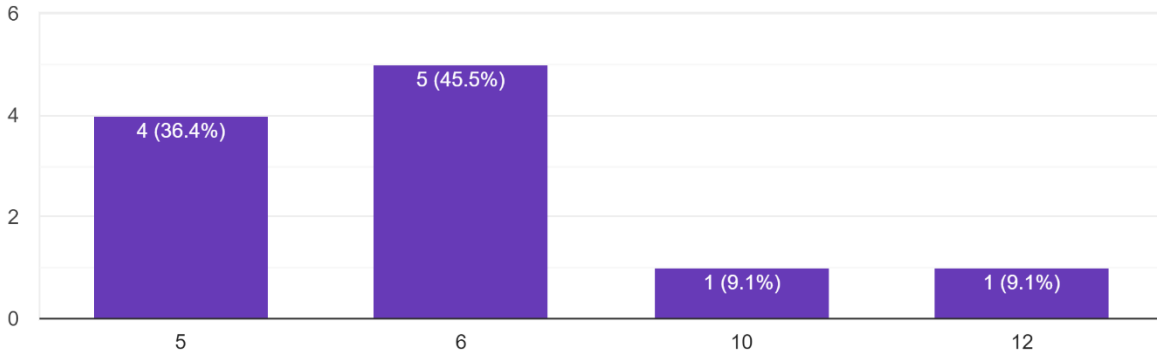


Figure: 4.78: Answer to the question "How many employees do you fix for each client"

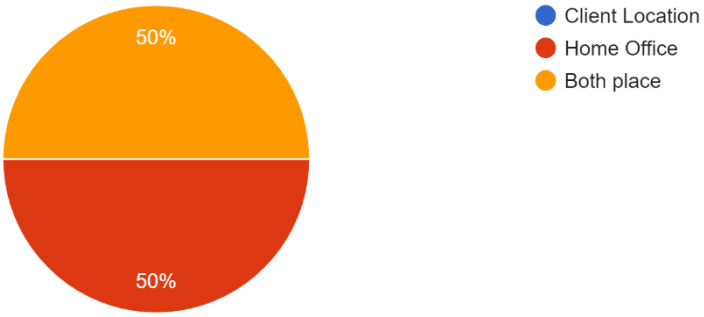


Figure: 4.79: Answer to the question “Does these employees work at your client’s location or at your home office”

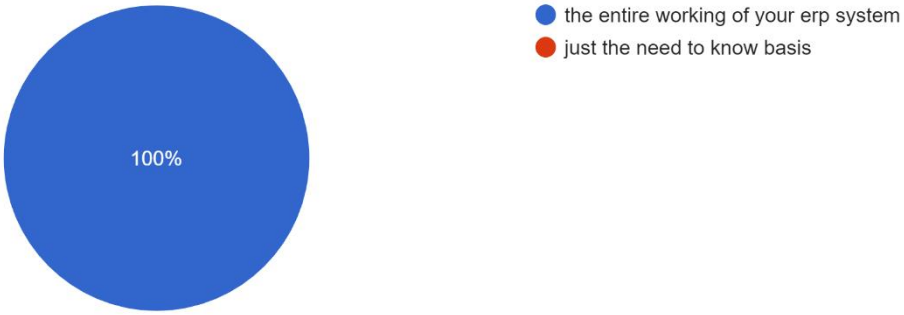


Figure: 4.80: Answer to the question “Do you train the client’s employee with the entire working of your ERP system or just the need-to-know basis”

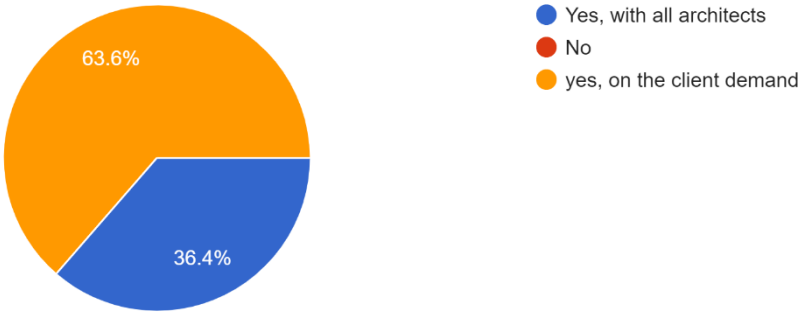


Figure: 4.81: Answer to the question “Does your ERP system comes with embedded biometric system too”

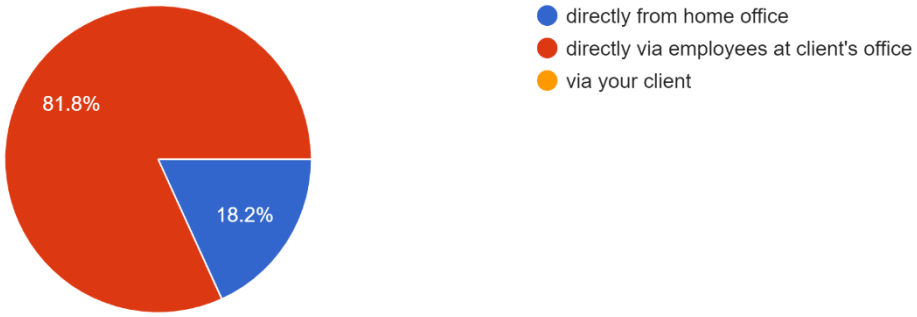


Figure: 4.82: Answer to the question “Do you directly resolve the issues of end-users or via your client”

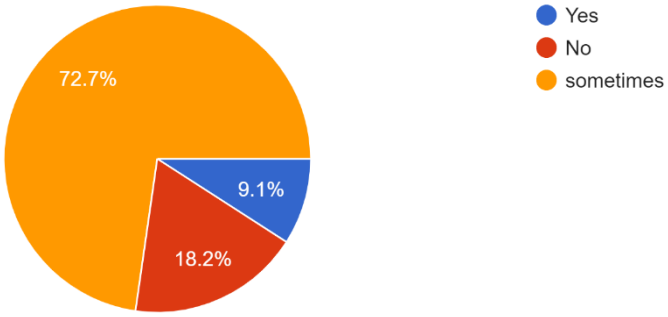


Figure: 4.83: Answer to the question “Have you faced issues with the ERP system based on the operating system of your client or end-user is facing”

4.1.5 Owners' Perspective

The data collected from owners of the HEIs using the questionnaire (Appendix B) highlighted that the HEIs majorly out-sourced the ERP to the developing companies rather than in-house setup (out of 6 HEIs, five out-source their ERP, and one has developed it in-house). In response to the survey question "the mode of implementation of ERP," the 66% response was the direct big bang approach, whereas 33% preferred the hybrid approach i.e., implementing it parallelly along with the previous data management method.

83% of the participating HEIs use the ERP for academic purposes, whereas only 16% use it for academic, non-academic, and administrative purposes. In response to the

question "Please give the sequence of implementation of ERP," it becomes evident that the HEIs have preferred the implementation in the order "(1) Student-(2) Faculty-(3) Non-Academic-(4) Administrative".

In terms of monetary investment, the investments made for pre-implementation cost, implementation cost, post-implementation cost, testing cost, training cost, spending on Maintenance exceeds way more than the tentative budget decided by the HEI.

Table 4.4: Shows the year of HEI established

Institute	Year HEI Setup
A	2011
B	1997
C	2005
D	2009
E	2013
F	2005

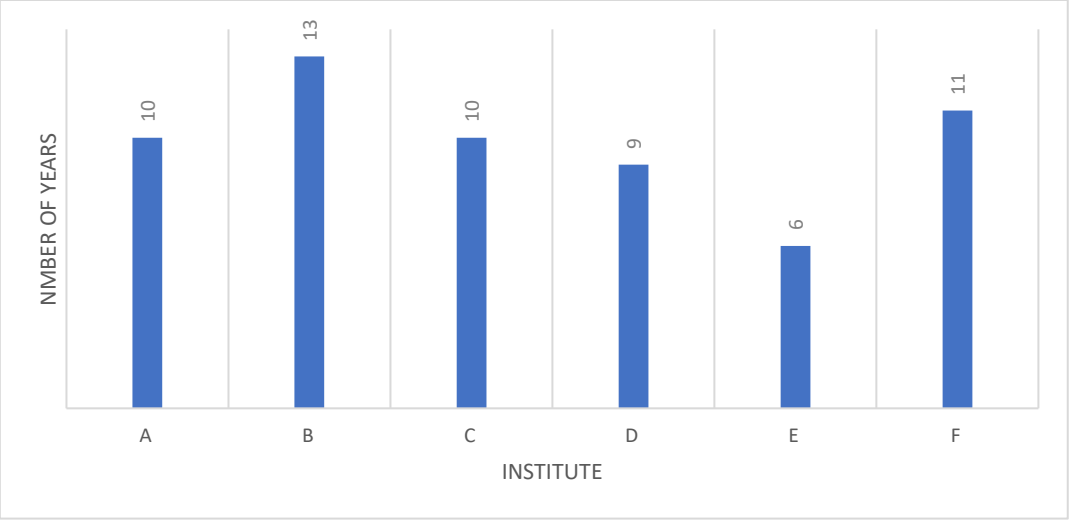


Figure: 4.84: Answer to the question “Number of years ERP is used in the institution”

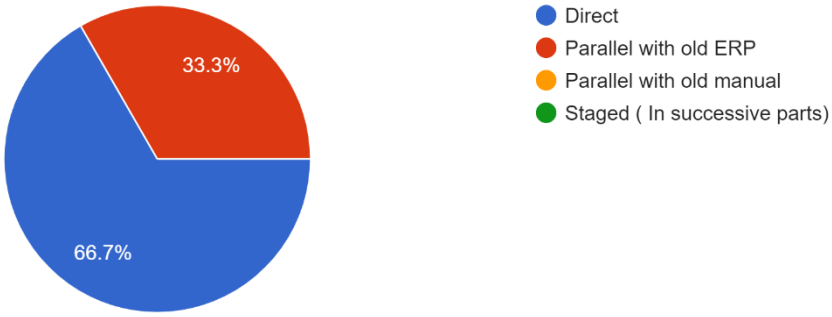


Figure: 4.85: Answer to the question “The mode of implementation of ERP at HEI”

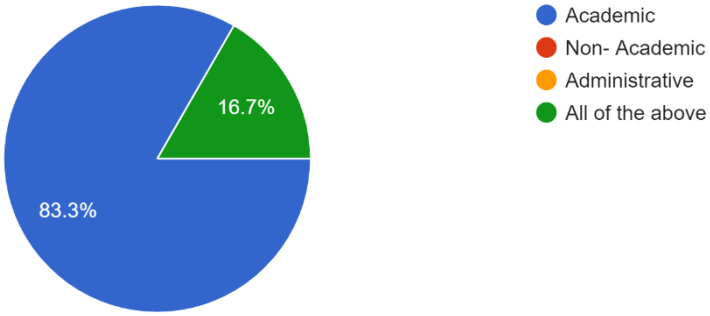


Figure: 4.86: Answer to the question “Main reason to implementation of ERP at HEI”

Figure: 4.87: Answer to the question “Status of implementation of ERP at HEI”

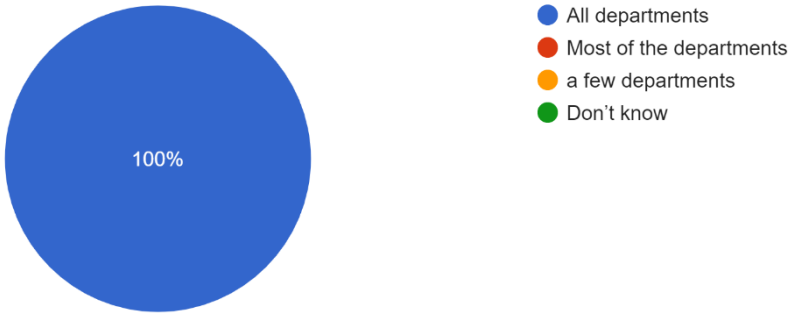


Figure: 4.88: Answer to the question "Level of implementation of ERP at HEI"

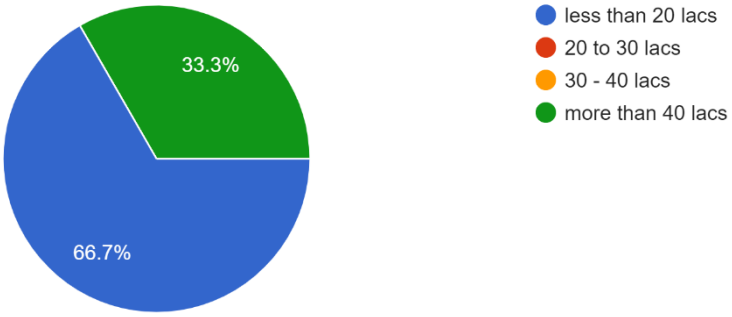


Figure: 4.89: Answer to the question "Tentative budget of complete implementation of ERP cycle at HEI"

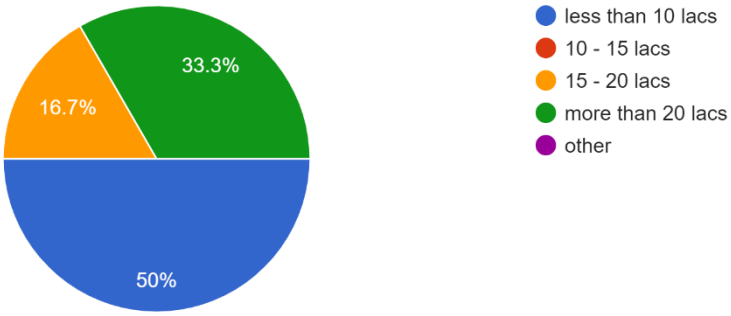


Figure: 4.90: Answer to the question "Spending on Pre-implementation cost of ERP In HEI"

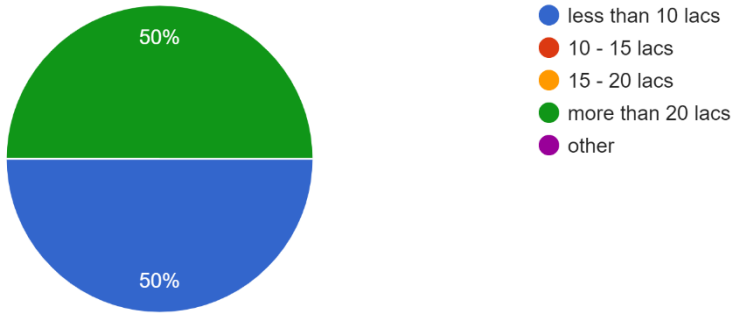


Figure: 4.91: Answer to the question “Spending on implementation cost of ERP In HEI”

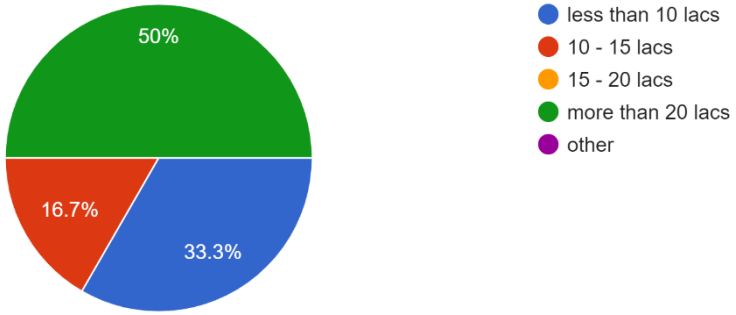


Figure: 4.92: Answer to the question “Spending on post-implementation cost of ERP In HEI”

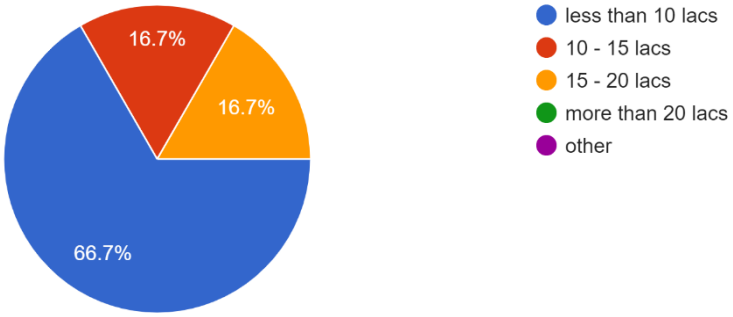


Figure: 4.93: Answer to the question “Spending on testing cost of ERP In HEI”

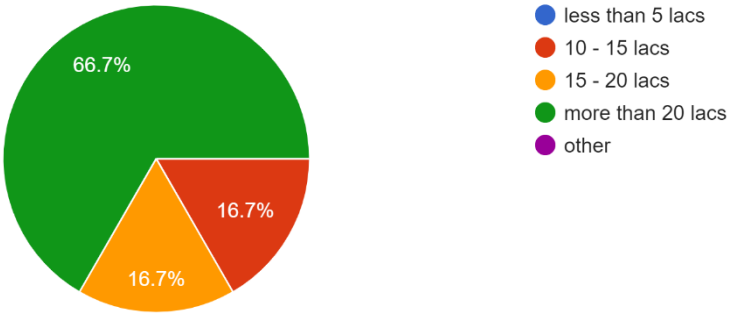


Figure: 4.94: Answer to the question "Spending on maintenance cost of ERP In HEI"

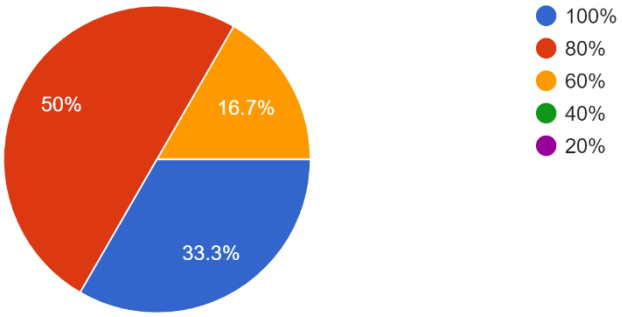


Figure: 4.95: Answer to the question "Functions performed by ERP In HEI"

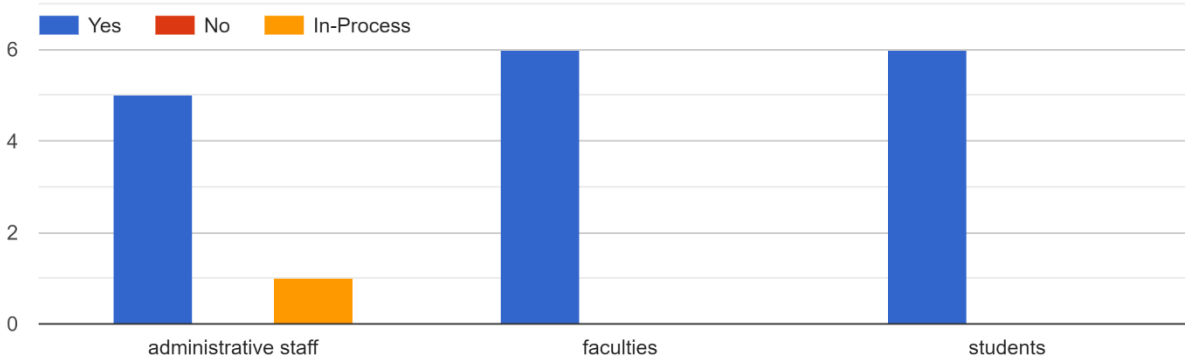


Figure: 4.96: Answer to the question "Has all required modules of ERP in HEI has been implemented"

4.1.6 End-Users Cumulative Responses

Responses of end-users are the determining factors for the success of ERP implementation. Once an ERP system is implemented in an HEI, it's the faculty and students who are the primary stakeholders after the ERP has been implemented. Their action, handling, and usage of the system are responsible for determining whether a system is functional or not. The researcher has asked some of the common questions which are directly linked with the critical success factors of post-ERP implementation. These are discussed under this heading.

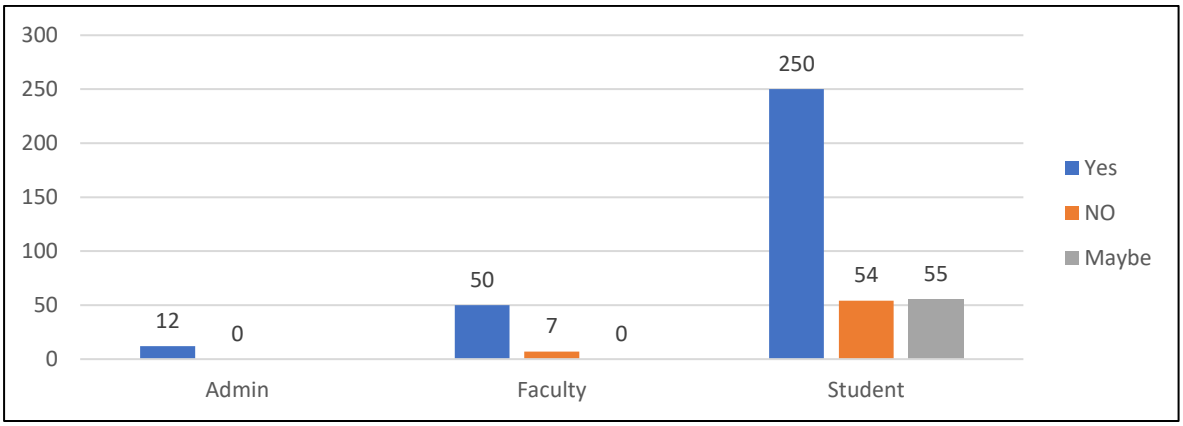


Figure: 4.97: Answer to the question “Is ERP at the respective HEI user-friendly”

In response to this question asked "whether the end-users consider the ERP system implemented in their HEI as user-friendly," the response received was Faculty end-users with prior ERP experience and computer education considered the ERP user-friendly. Still, those who were new to ERP and have not accessed computer education were unable to operate with ease. A similar response was from the students' side too. Those who have enrolled themselves in technical courses found ERP user-friendly, but those in non-technical courses had a mixed opinion from maybe to no. At the same time, the administrative response was in agreement with the question that the platform they have implemented is entirely user-friendly.

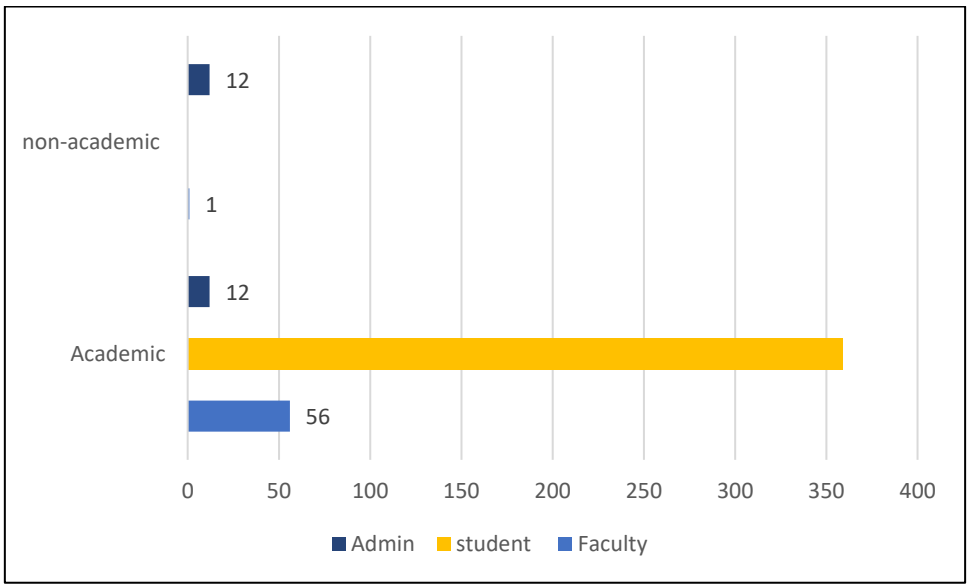


Figure: 4.98: Answer to the question “Purpose of ERP usage at the respective HEI”

The respondents responded in unanimism that the significant usage of ERP is for the academic purposes at their HEIs, which included timetable scheduling, marking of attendance, uploading of lecture material, uploading of marks, datasheets, and downloading those mentioned above too.

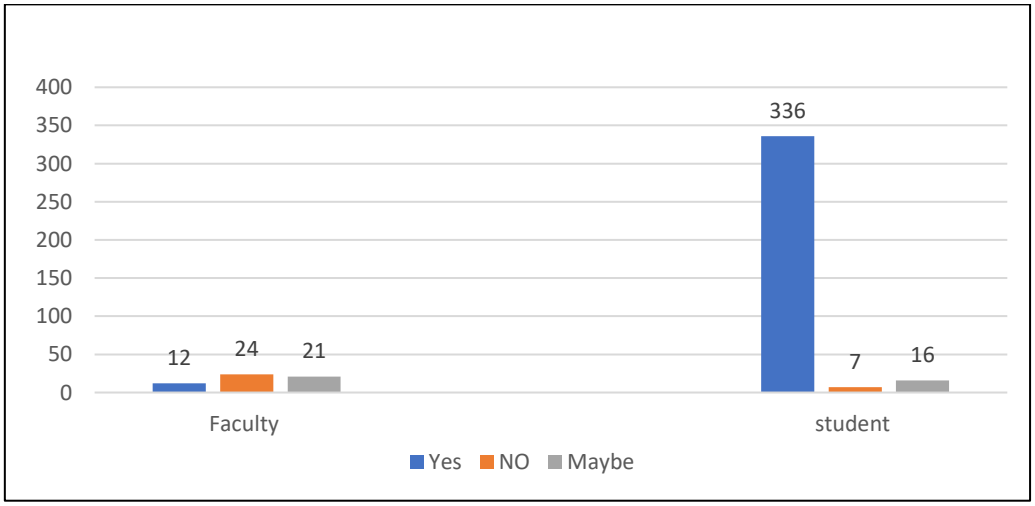
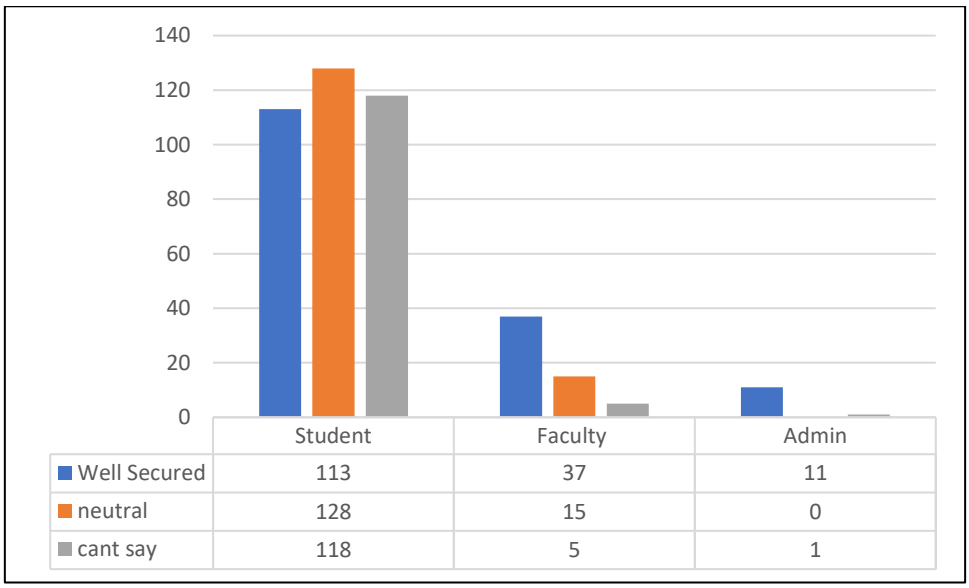


Figure: 4.99: Answer to the question “Is ERP hosted by your HEI”

To determine whether the HEIs have shared the complete information regarding the ERP platform, the researcher asked the end-users whether they are aware of hosting information regarding the ERP they are using. The response received did not comply with responses received from the administrators.



	Student	Faculty	Admin
Well Secured	113	37	11
neutral	128	15	0
cant say	118	5	1

Figure: 4.100: Answer to the question “How secure in your opinion is ERP”

The security issue is an important critical success factor in determining the post-implementation of ERP in HEIs; from the responses received, the security issues need to be explored more when implementing ERP in HEI. As out of 416 responders, only 150 were confident about the secured ERP system rest all were unsure regarding the secured database maintained by the HEI from cyber threats.

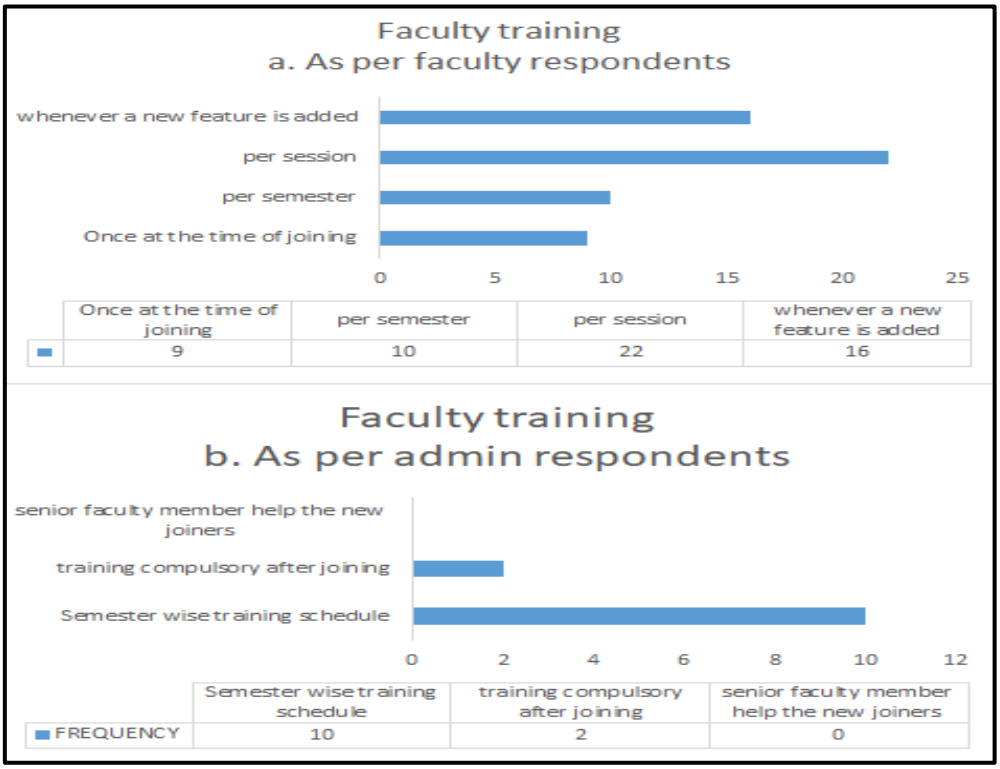


Figure: 4.101: Answer to the question "End-user traininig organized by ERP team of the HEI"

End-user training is another aspect of the post-implementation success of ERP. With more trained end-users, the acceptance and usage of ERP will increase, and fewer issues will be raised from the end-users side. This will help in generating more success to the efficient system of ERP. But as per the responses received regarding end-user training, the results contradict the faculty and administrative respondents. Administrative respondents claim to provide end-user training to the faculty every semester. In contrast, the faculty members majorly are trained at the time of their joining and after that only on the modules for a need-to-know basis.

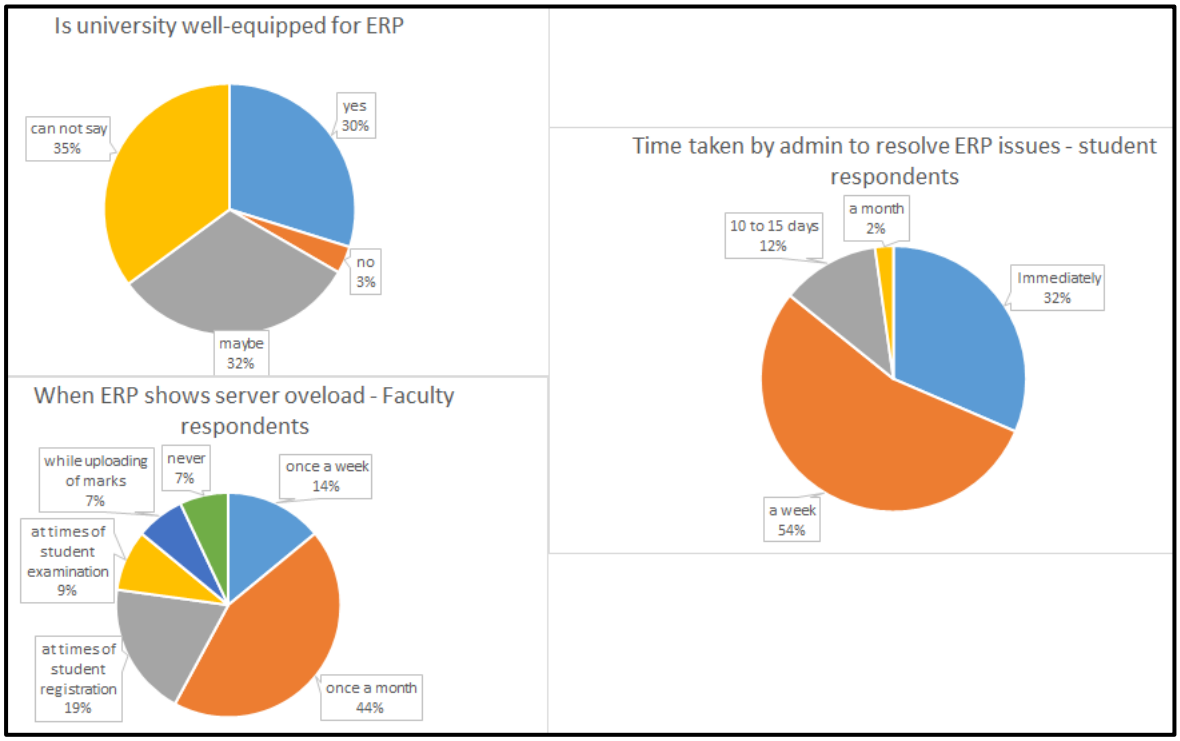


Figure: 4.102: Answer to the question "HEI provides the needed infrastructure and support system required to render the ERP system functional."

Another critical success factor is whether the HEI provides the needed infrastructure and support system required to render the ERP system functional. As per the responses received, the HEIs are needed to spend more on this support system to ensure that the issues related to end-user access and server overload can be reduced and resolved quickly so as to build a trust worthy relationship between the end-user, administration and developer and as a result making the ERP more successful in education sectors.

4.2 Data Validation

The collected data was subjected to statistical analysis and data validation using the z-test. The z-test was performed on the responses collected from – admin, faculty, student and developer. The results obtained are summarised below.

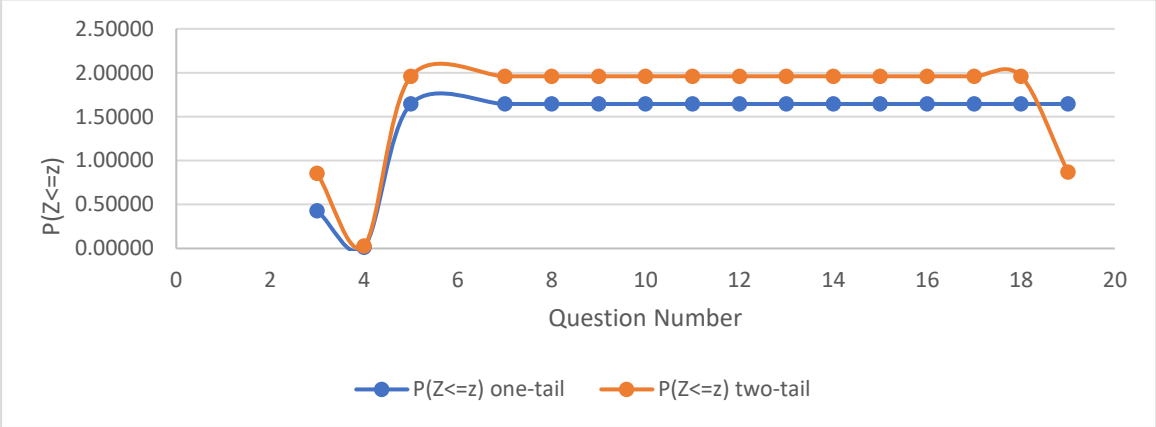


Figure: 4.103: Data Validation - Admin Respondents

The graph generated from the one-tailed and two-tailed z-tests performed confirms that the data collected is consistent and free from errors.

Table 4.5: Shows the P-value of admin respondents

Question no.	P(Z<=z) one-tail	P(Z<=z) two-tail
3	0.42796	0.85592
4	0.01452	0.02905
5	1.64485	1.95996
7	1.64485	1.95996
8	1.64485	1.95996
9	1.64485	1.95996
10	1.64485	1.95996
11	1.64485	1.95996
12	1.64485	1.95996
13	1.64485	1.95996
14	1.64485	1.95996
15	1.64485	1.95996
16	1.64485	1.95996
17	1.64485	1.95996
18	1.64485	1.95996
19	1.64485	0.87057

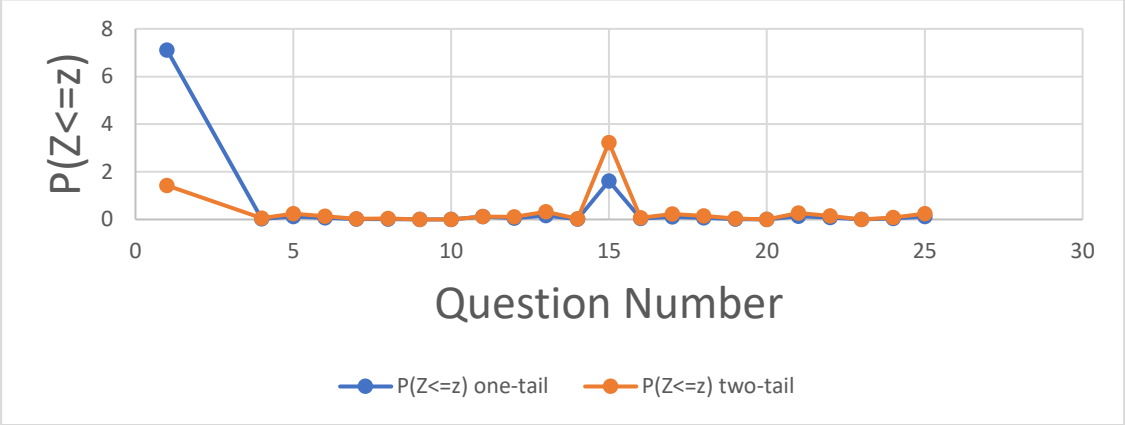


Figure: 4.104: Data Validation - Faculty Respondents

The graph generated from the one-tailed and two-tailed z-tests performed confirms that the data collected is consistent and free from errors and proves the hypothesis.

Table 4.6: Shows the P-value of faculty respondents

Question no.	P(Z<=z) one-tail	P(Z<=z) two-tail
1	7.112	1.422
4	0.029	0.058
5	0.123	0.246
6	0.068	0.135
7	0.011	0.021
8	0.021	0.042
9	0.002	0.005
10	0.001	0.002
11	0.125	0.125
12	0.051	0.103
13	0.163	0.326
14	0.013	0.025
15	1.615	3.229
16	0.036	0.073
17	0.115	0.230
18	0.072	0.145
19	0.020	0.040
20	0.001	0.001
21	0.133	0.267
22	0.078	0.155
23	0.002	0.005
24	0.038	0.076
25	0.119	0.238

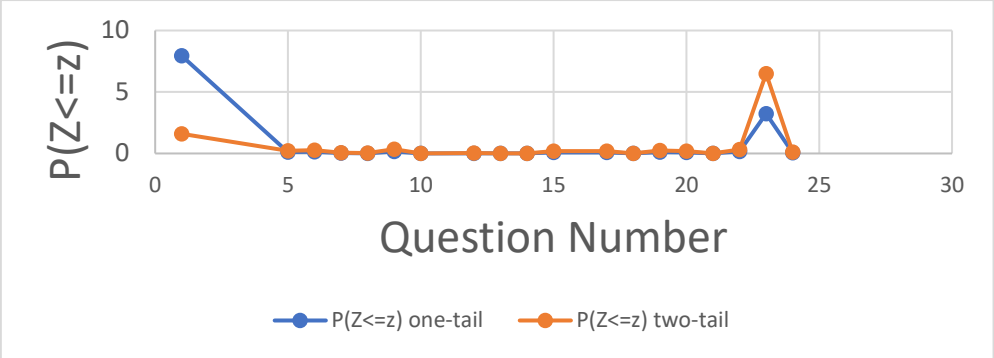


Figure: 4.105: Data Validation - Student Respondents

The graph generated from the one-tailed and two-tailed z-tests performed confirms that the data collected is consistent and free from errors and proves the hypothesis.

Table 4.7: Shows the P-value of student respondents

Question no.	P(Z<=z) one-tail	P(Z<=z) two-tail
1	7.939	1.587
5	0.106	0.213
6	0.138	0.277
7	0.035	0.071
8	0.018	0.036
9	0.169	0.338
10	0.002	0.005
12	0.014	0.027
13	0.004	0.008
14	0.003	0.006
15	0.099	0.198
17	0.091	0.183
18	0.006	0.013
19	0.123	0.246
20	0.098	0.195
21	0.008	0.017
22	0.165	0.331
23	3.244	6.489
24	0.056	0.111

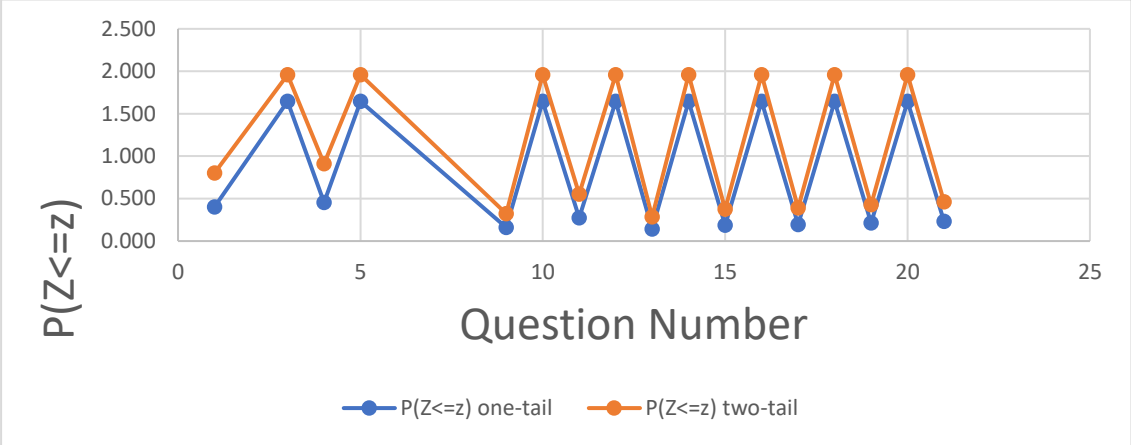


Figure: 4.106: Data Validation - Developer Respondents

The graph generated from the one-tailed and two-tailed z-tests performed confirms that the data collected is consistent and free from errors and proves the hypothesis. The high value is due to the smaller number of respondents.

Table 4.8: Shows the P-value of Developer respondents

Question no.	P(Z<=z) one-tail	P(Z<=z) two-tail
1	0.401	0.801
3	1.645	1.959
4	0.455	0.911
5	1.645	1.959
9	0.162	0.324
10	1.645	1.959
11	0.275	0.551
12	1.645	1.959
13	0.143	0.286
14	1.645	1.959
15	0.188	0.377
16	1.645	1.959
17	0.196	0.391
18	1.645	1.959
19	0.215	0.429
20	1.645	1.959
21	0.230	0.461

4.3 PISF – Post-Implementation Success Factors

ERP implementation is not only a tedious task as well as very expensive investments the risk factor is also very high, and having failure rate of ERP exceed the costs of system significantly. Ensuring successful Enterprise Resource Planning ERP system

implementation in any domain of business need to required considerable research work in the present time and feature also. Although, Post Implementation success/failure critical factors distinctly contrarily defined by different sectors, organizations, units, which have adopted ERP but satisfaction of the operational system with usefulness. In addition to this, usual ERP employment study can be measured as a statistic-factor research, which is unable to elucidate the dynamics of the execution procedure. This study has revealed that the critical success factors for determining the effectiveness of ERP adaptation is greatly dependent on the end-user training, cost input, step-wise implementation rather than the big-bang approach and lastly the technical training of the users.

Using different sets of questionnaires responses were collected from separate sets of end-users – owners, developers, administration employees, faculties and students. The questionnaires were specifically designed for the purpose of data collection in relation with to determining the adequate critical success factors – cost, user-friendly, end-user training, security, work efficiency, ease-of access, database, information availability. On reviewing the data collected it was observed that although the administration vows for the secure database, the other end-users are doubtful towards the security of the data. The end-users who have received technical education consider the ERP user friendly. Those users who have been trained in the ERP holds the same opinion but for others the results vary. It is extremely clear from the data analyzed that the work efficiency of the employees is increased after the adoption of ERP in their organization. In terms of feedback and registering problems in relation with the ERP., the majority of universities are using digital mode of communication for registering the complaints, this also helps in keeping the track of the types of complaints received and the solutions provided which can be centrally monitored by the university administration. Despite of the user-friendliness of the ERP a major number of responders still wants to save the data with themselves as they are concerned about the security and sustainability of the ERP.

CHAPTER V

CONCLUSION

Following an explanation of the conclusions drawn from the analysis of data and interpreting the findings of the research, this current chapter finishes after mentioning the future research prospects.

5.1 Research Summary

The goal of this research was conducting an in-depth study to find out the post-implementation escapades of HEIs after the complete adaptation of Enterprise Resource Planning. The literature review uncovered that there was little research specifically for post-implementation study, with special reference to HEIs' experiences, which was surprising. According to existing research, future studies should investigate post-implementation experiences that are relevant to the industry. The research also aims towards understanding the usage of post-ERP implementation experience of HEIs in order to maximise their functionality after this adaptation, as the effects and benefits of such adaptation typically remains unrecognised pending after the system has been in place for a period of time following its implementation. The following overall research questions served as the basis for the investigation:

1. What has been the experience of higher education institutions with the ERP Student Administration module once it has been implemented?
2. Is it possible to describe how post-implementation efforts have supplemented, enhanced, or solved concerns that have arisen from or were not handled during the first implementation?

5.2 Methodology

The random snowball sampling technique was used to acquire the data for the purposes of the research project. First and foremost, the educational institutions in the Delhi-NCR region that have adopted the ERP system have been identified and contacted. It

was decided to select a total of six such higher educational institutions; all of these HEIs are autonomous, UGC-approved universities with ERP systems from a variety of different suppliers. A questionnaire survey was also sent to the respondents from these colleges, and they were asked to complete it online. The survey was specifically developed to gather information from five sorts of respondents: faculty and students; administrative staff; business owners; and ERP developers. The data collected from academics and students will be used to survey end-users in order to determine post-implementation success, and data collected from administration workers will be used to evaluate the implementation procedure itself. Four hundred forty-four participants from six HEIs comprise the total sample size, which includes all respondents. This method was used to produce the results, which were detailed in full in Chapter IV, along with the results of data validation obtained using the Z-test.

5.3 Concluding Remarks

This research concludes that when higher education institutions adopt ERP as a generic solution with sufficient end-user training and create an easy-to-access user interface, they will have a successful deployment of ERP. Also worth mentioning is the fact that, rather than a one-time implementation of ERP in higher education institutions, a step-by-step strategy should be employed, beginning with the staff and students and progressing to the parents and industry sectors. The use of enterprise resource planning (ERP) in higher education has made it easier for the industry sector to get the appropriate information required. However, there is still work to be done in order to bridge the gap between the flexibility of the university system and the rigidity of the software, which is now unavailable.

ERP implementation is a time-consuming endeavour as well as an expensive financial commitment. The risk factor is also fairly significant, and the failure rate of ERP systems far outweighs the cost of the system. Extensive research is essential at this time and in this feature in order to achieve a successful Enterprise Resource Planning ERP system implementation in any business domain. However, different industries, organisations, and business units that have implemented ERP define critical post-implementation success/failure factors in a variety of ways, such as whether the

operating system is satisfied with its utility or not. The usual ERP employment study may also be described as a statistic-factor investigation, which is incapable of illuminating the dynamics associated with the execution technique. According to the findings of this study, the most important success factors for determining the efficiency of ERP adaption are end-user training, cost input, step-by-step deployment rather than a "big-bang" approach, and finally technical training for users.

Additionally, because the ERP system is integrated with the DBMS system, the integration of all organisational procedures and occupations into a unified database increases the effectiveness of the administration of organisations' units such as monetary, manufacturing, human resource, in an efficient, well-organized, and fruitful manner increases the productivity of the organisation.

ERP, also known as enterprise resource planning, is a type of organisational management software that is used to handle data connected to the operation of an organisation in a more efficient manner. ERP was originally intended for use in the commercial and industrial sectors, but because of its widespread application across a wide range of industries, it has been steadily adopted by organisations in a variety of other fields as well. In the Educational Sector, for example, ERP systems are quickly becoming mainstream, with many educational institutions implementing ERP systems to better manage their resources and student enrolments. ERP systems are primarily based on in-house servers and need a significant financial commitment. As a result, the educational institution has been reported to be apprehensive about deploying the system. A new strategy has been recommended in which the ERP system is cloud-based, meaning that rather than using an in-house server to store data, the cloud is being used to lower the amount of investment required for the system's set-up and implementation. The purpose of this paper is to discuss data security, threats and risk assessments, as well as the concerns of educational institutions when using cloud-based enterprise resource planning systems. Additionally, the researcher proposes a middle-of-the-road method to address these issues and risk factors. - A hybrid ERP system is one that includes both the traditional and cloud-based approaches to enterprise resource planning. Because of the vast range of benefits offered by enterprise resource planning

(ERP) based on cloud computing, educational institutions are increasingly gravitating toward using it in their institutions. This most recent version of the platform overcomes some of the shortcomings of older enterprise resource planning solutions. In addition, because of the low initial investment costs and scalability of cloud-based ERP systems, even smaller educational institutions are being enticed to adopt this method. In contrast, as previously noted, the cloud-based ERP system raises concerns about the integrity and security issues associated with the data that is stored in the system. The adoption of this strategy has been somewhat limited as a result of the vast number of significant institutions involved, with the storage of sensitive data on a third-party server being a key worry. Another issue to be concerned about when third parties are involved is the exploitation of data, as well as security breaches on third-party servers, which makes the transition to cloud-based ERP systems slightly more challenging.

5.4 Limitations of Current Work

The current research faced the major limitation due to COVID-19 which hindered the on-site visit to the universities campuses for one-to-one personal interaction, hence the researchers has to rely on the survey questions answered. As the data was collected from the selected universities only, this acts as another limiting factor for the research a wider approach could have resulted in more reliable data collection.

5.5 Recommendations from Current Work

Takeaway from this work is the recommendation of taking a middle road by merging both traditional and cloud-based ERP solutions. This type of strategy will allow institutions to keep sensitive information on a local server and less sensitive information on the ERP system's cloud server, which will be accessible from anywhere in the world. With the use of a cloud server, this hybrid strategy will protect the security and scalability of the institution's data while also facilitating access to the data via the on-premise server and providing a wide range of access to ERP from a variety of end-user

locations. Furthermore, the cloud-based ERP enables the administration to install different modules of ERP as the institution's requirements change over time in response to changes in government education policy. The mobility of the ERP system is also improved as a result of the hybrid approach. The cloud server delivers excellent system performance as well as more system adaptability to meet the specific needs of the institution. As a result, hybrid traditional-cloud-based ERP systems are more appropriate for educational institutions because they provide more data protection and accessibility.

5.6 Future Prospects

Rather than on post-implementation factors and the organisational impact of ERP systems on users, business processes, and institutional culture, as had been proposed in the previous researches, the following research recommendations should be based on post-implementation factors and the organisational impact of ERP systems on users, business processes, and institutional culture. The results of the current research indicate that administrators and project managers must be well-versed in a wide range of issues in order to be effective and get the most out of their enterprise resource planning systems.

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Annexure I: Pilot Survey Questionnaire

This questionnaire intends to collect for the pilot survey of the research work. The questionnaire is devised to collect the data about the university/institution approval, location and intake.

Q1. Name of the organization ---------

Q2. Year of establishment----------

Q3. Organizational Setup: □ University □ Deemed University □ UG & PG Institution

□ Other

Q4. State: ----------

Q5. Use of ERP: □ Yes □ No

Q5a. If yes, for how many years ERP is used in the institution

□ 0-5 Years □ 6-10 Years □> 10 years □ Don't know

Q6. Type of ERP

□ In-house □ Outsourced

Q6a. If, Outsourced, please mention the name of the vendor_____

Q7. Main reason to implement ERP

□Academic □Non- Academic □Administrative

Q8. Please order as per the sequence of implementation, in numbers 1, 2, 3 ,4

□Academic □Faculty

□Student

□Non-Academic

□Administrative

Q9. Status of ERP implementation

□Complete □Half complete □Incomplete □Don’t know

Q10. Level of ERP Implemented

□All departments □Most of the departments □a few departments □Don’t know

Q11. Has all required modules of ERP has been implemented?

- 100%
- 80%
- 60%
- 40%
- 20%

Q12. Has the training for the following fraternity members has been done

- administrative staff
- faculties
- students

Q13. Does ERP system works with: 1 android, 2 windows, 3 ios

Annexure II: Owners' Perspective Questionnaire

These questionnaires intend to collect the data about the university/institution provided resources by the university/institution to the developer/company and the user.

Q1. Name of the organization ---------

Q2. Year of establishment----------

Q3. Organizational Setup: □ University □ Deemed University □ UG & PG Institution

□ Other

Q4. Use of ERP: □ Yes □ No

Q4a .If Yes, for how many years ERP is used in the institution

□ 0-5 Years 6-10 Years > 10 years Don't know

Q5. Type of ERP

In-house Outsourced

Q5a. If, Outsourced, Please mention the name of the vendor_____

Q6. The mode of implementation of ERP

Direct Parallel with old ERP Parallel with old manual Staged (In successive parts)

Q7. Version of ERP

New/Version 1 Revised/Version2 Revised/Version 3 Other

Q8. Main reason to implement ERP

Academic Non- Academic Administrative

Q9. Please order as per the sequence of implementation, in numbers 1, 2, 3 ,4

Academic Faculty

Student

Non-Academic

Administrative

Q10. Status of ERP implementation

Complete Half complete Incomplete Don't know

Q11. Level of ERP Implemented

All departments Most of the departments a few departments Don't know

Q12. Support from Higher management

Yes No Can't say

Q13. Tentative Budget of complete ERP implementation cycle

<50 lacs …….

Q14. Please give spending on Pre-implementation cost

Implementation cost

Post implementation cost

Testing Cost

Training cost

Maintenance cost…….

Q15. Please rank the function performed by ERP on the basis of following scale

1 to 3

1 – strongly agree

2- agree

3- neutral

4- disagree

5- strongly disagree

Ease creating new entry of data

Ease getting the information from the records

ease in usage

ease in implementation in university

acceptance by admin staff

acceptance by faculty

acceptance by students

ERP system benefited your organization workings

Q16. Has all required modules of ERP has been implemented?

100%

80%

60%

40%

20%

Q17. Has the training for the following fraternity members has been done

administrative staff

faculties

students

Q18. Does ERP system works with: 1 android, 2 windows, 3 ios

Annexure III: Administrator Perspective Questionnaire

These questionnaires intend to collect the data about the university/institution administrative responsibilities of the university/institution ERP administrators.

Q1. Name of the organization ---------

Q2. Name of Employee

Q3. Gender: Male, Female Others Do not want to specify

Q4. Previous position held before ERP implementation _____

Q5. Current position after ERP implementation _____

Q6. Handling this ERP System is your first experience: Yes/No

Q6a. If No, for how many years you are using ERP _____

Q7. Is the current ERP system is user friendly? Yes/No

Q8. Does System has secure database? Yes/No

Q9. Can update/modification can be done easily? Yes/No

Q10. Have you handle before any other ERP system? Yes/No

Q10a. If yes, how much comfortable you are with the current system? Extremely, Very, Sufficient, neutral, difficult to handle

Q11. How training process for faculty was organized: school wise, dept wise, faculty grade wise

Q12. Does your ERP system has a support app too? Yes/No

Q13. Have the work speed changed? Extremely, Upto a certain extend, no change, reduced performance

Q14. How often does the ERP system modified? semester wise, session wise, 3 years, 4 years

Q15. What is your process for training new end users? 1. Semester wise training schedule, training compulsory after joining, senior faculty member help the new joiners

Q16. How was ERP implementation done in your university/institution: stepwise process, all at once approach

Q17. Does ERP system works with 1 android, 2 windows, 3 ios

Annexure IV: Faculty Perspective Questionnaire

These questionnaires intend to collect the data about the responsibilities of university/institution faculties of the university/institution ERP faculties

Q1. Name of Organization

Q2. Name of respondent

Q3. Gender: Male Female Others Prefer not to say

Q4. Age: 25-35, 35-45, 45-55, 55 and above

Q5. Designation: _____

Q6. Years of teaching experience: _____

Q7. Have you received any formal computer education? Yes/No

Q7a. If yes, at which level: School, Graduation, Post Graduation, others (please specify)

Q8. Is this your first experience with ERP system? Yes/No

Q9. Experience with ERP in years

Q10. How many ERP systems have you worked on

Q11. Which among them will you consider most user friendly (name preferred of company/organization where you used it)

Q12. Do you use ERP system for academic purposes only? Yes/No

Q13. How user friendly you find the current system? Extremely easy, moderately easy, difficult

Q13. Is the ERP system hosted by your university? Yes/No/Don't Know

Q14. Which you will prefer maintaining records: on paper or using ERP system

Q15. Does your ERP system have an app? Yes/No

Q15a. Do you use this app? Yes/No

Q16. How often do you use the app? Regularly, Often, Once a week, Once a month

Q17. How often have you been trained for using ERP? Once at the time of joining, per semester, per session, whenever a new feature is added

Q18. Are you frequently informed about the modifications made in ERP system? Immediately after the change is made, Need to know basis, when a few changes pilled up together, never, we just receive a mail mentioning the change, never, no such information is shared

Q19. You use ERP system for: (select those which are applicable) attendance, marks, leave application, course uploading, session plan, uploading time table

Q20. In your experience is your university well-equipped for ERP system? Yes/No/Can not say

Q21. As the end-user how often do you encounter access issue due to server overload? once a week, once a month, at times of student registration, at times of student examination, while uploading of marks, never

Q22. Does ERP system works with: android, windows, ios

Annexure V: Student Perspective Questionnaire

These questionnaires intend to collect the data about the university/institution ERP working from the university/institution ERP students.

Q1. Name of organization

Q2. Respondent name

Q3. Pursuing which course

Q4. Currently in which semester/year

Q5. Have you received any formal computer education? Yes/No

Q6. Is there any ERP system available in your college/University? Yes/No

Q6a. If yes how it help to your academics? Check your attendance, time table, datesheet, fees payment, lecture material, results, important notices (select those which are applicable)

Q7. Is it user friendly? Yes/No

Q8. It provides all information related to your academics? Yes/No

Q9. What kind of information it provide you on the system: attendance, time table, datesheet, fees payment, lecture material, results, important notices (select those which are applicable)

Q10. Is it transparent to all? Yes/No

Q11. What about of security of the student's information? Well Secured, neutral, cant say

Q12. How long it take to update your information? Immediately, a week, 10 to 15 days, a month

Q13. How the people behind the system behave when you face any difficulty? Listen to problem and provide apt solution, ignore and tell to mail the issue, ignore and send

to someone else in organization, don not entertain in-person, only communication mode is e-mail

Q14. Does the ERP system has an app? Yes/No

Q15. Will you consider the ERP system as user friendly? Extremely, Moderately, difficult, needs improvement

Q16. Have you encounter problems such as (select those which are applicable)

a. Wrong photograph

b. Wrong attendance

c. Wrong personal details

d. Wrong results

e. ERP system crashing

f. Wrong dues reflecting in account

g. invalid login credentials

h. unable to download lecture material

i. wrong time table

Q17. How do you report the issues/problem you encounter regarding ERP: via ERP portal, whats'app, e-mail, in-person

Q18. Can you download your attendance record? Yes/No

Q19. Does your ERP app allows you to take snap shot of screen? Yes/No

Q20. Can you download the class material from the ERP system? Yes/No

Q21. How many e-platforms are used in your university?

Q21a. If more than 1 select their purposes: attendance, lecture material, online exam, results, feedback

Q22. Does your parents have ERP access? Yes/No

Q23. How will you rate the security of the ERP system? Extremely secure, moderately secured, less secured, not secured

Q24. Does ERP system works with: android, windows, ios

Annexure VI: Developer Perspective Questionnaire

These questionnaires intend to collect the data about the university/institution requirements from the company offering ERP platforms.

Q1. Name of Company

Q2. Name of respondent

Q3. Age

Q4. Gender

Q5. Position held

Q6. Domain of Company

Q7. When your company is stabilized?

Q8. When did your company started developing ERP system?

Q9. How was your experience in the development process? Good, Fair, Bad

Q10. How was the financial condition of your company while development process? Good, fair, bad

Q11. Do you give a fixed architect or dynamic architect

Q12. What is the current number of your clients

Q13. How many clients have you dropped

Q14. How many clients dropped you

Q15. Is the pricing of the ERP system same if client wants some modification in your current system

Q16. How many employees do you fix for each client

Q17. Does these employee work at your clients location or at your home office

Q18. Do you train the clients' employee with the entire working of your ERP system or just the need to know basis

Q19. Does your ERP system comes with embedded biometric system too

Q20. Do you directly resolve the issues of end users or via your client

Q21. Have you faced issues with the ERP system based on the operating system of your client or end –user is facing

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