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Measuring Journey of ERP System and its Benefits for Indian Companies

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Abstract: In order to successfully implement an Enterprise Resource Planning (ERP) system, certain essential technical and non-technical commitments from multiple companies must be made in the future. When it comes to achieving a successful, efficient, and effective ERP deployment, there is little room for mistake. It is necessary for a software system to offer an organisation with capability for at least two different systems in order to be termed ERP. While certain ERP programmes are available that only cover two tasks for an organisation, the vast majority of ERP systems include a variety of functions for a company. This article assesses the criteria that determine the value of an ERP system in Indian businesses. It draws attention to the history of ERP and the characteristics that are most significant in a company's ERP system up to this point. Furthermore, the majority of replies agree that all of the advantages associated with the adoption of ERP software in chosen firms are essential.

Keywords: *ERP, Life Journey.*

I. INTRODUCTION

Enterprise Resource Planning (ERP) is an enterprise-wide information system designed to coordinate all the resources, information, and activities needed to complete business processes such as order fulfillment or billing. An ERP solution is characterized by supporting a variety of business functions such as manufacturing, supply chain management, financials, projects, human resources and customer relationship management from a shared data store.

An ERP system is based on a common database and a modular software design. The common database can allow every department of a business to store and retrieve information in real-time. The information should be reliable, accessible, and easily shared. The modular software design should mean a business can select the modules they need, mix and match modules from different vendors, and add new modules of their own to improve business performance.

Ideally, the data for the various business functions are integrated. In practice the ERP system may comprise a set of discrete applications, each maintaining a discrete data store within one physical database. As we mentioned before ERP system is a packaged business software system that allows a company to automate & integrate the majority of its business processes, and share common data and practices across the entire enterprise further defined the concept of ERP in an easy-understood way. It can be viewed from a variety of perspectives. First, and most obviously, ERP is a commodity, a product in the form of computer software. Second, and fundamentally, ERP can be seen as a development objective of mapping all processes and data of an enterprise into a comprehensive integrative structure. Third, it can be identified as a key element of an infrastructure that delivers a solution to business. This concept indicates that ERP is not only an IT solution, but also a strategic business solution. As an IT solution, ERP system, if implemented fully across an entire enterprise, connects various components of the enterprise through a logical transmission and sharing of data. When customers and suppliers request information that have been fully integrated throughout the value chain or when executives require integrated strategies and tactics in areas such as manufacturing, inventory, procurement and accounting, ERP systems collect the data for analysis and transform the data into useful information that companies can use to support business decision-making. They allow companies to focus on core and truly value-added activities. These activities cover accounting and financial management, human resources management, manufacturing and logistics, sales and marketing, and customer relationship management.

As a strategic business solution, it will greatly improve integration across functional departments, emphasize on core business processes, and enhance overall competitiveness. In implementing an ERP solution, an organization can quickly upgrade its business processes to industry standards, taking advantage of the many years of business systems reengineering and integration experience of the major ERP vendors (Myerson, 2002). ERP systems are important tools to help organizations change business and gain sustained competitive advantages via their opponents.

CRM (Customer Relationship Management) and SCM (Supply Chain Management) are two other categories of enterprise software that are widely implemented in corporations and non-profit organizations. While the primary goal of ERP is to improve and streamline internal business processes, CRM attempts to enhance the relationship with customers and SCM aims to facilitate the collaboration between the organization, its suppliers, the manufacturers, the distributors and the partners..

The Components of an ERP System - The components of an ERP system are the common components of a Management Information System (MIS).

- **ERP Software** - Module based ERP software is the core of an ERP system. Each software module automates business activities of a functional area within an organization. Common ERP software modules include product planning, parts purchasing, inventory control, product distribution, order tracking, finance, accounting and human resources aspects of an organization.
- **Business Processes** - Business processes within an organization falls into three levels - strategic planning, management control and operational control. ERP has been promoted as solutions for supporting or streamlining business processes at all levels. Much of ERP success, however, has been limited to the integration of various functional departments.

- **ERP Users** - The users of ERP systems are employees of the organization at all levels, from workers, supervisors, mid-level managers to executives.
- **Hardware and Operating Systems** - Many large ERP systems are UNIX based. Windows NT and Linux are other popular operating systems to run ERP software. Legacy ERP systems may use other operating systems.

The Boundary of an ERP System - The boundary of an ERP system is usually small than the boundary of the organization that implements the ERP system. In contrast, the boundary of supply chain systems and ecommerce systems extends to the organization's suppliers, distributors, partners and customers. In practice, however, many ERP implementations involve the integration of ERP with external information systems.

Evolution of ERP as Enterprise Solution

In a typical manufacturing environment, the master production schedule (MPS) specifies the quantity of each finished product required in each planning period; it is a set of time-phased requirements for end items. The firm, however, also needs a set of time-phased requirements for the parts and raw materials that make up those end items. Therefore, MRP is a production planning and control technique in which the MPS is used to create production and purchase orders for lower-level components. In the 1970s, manufacturers began to use techniques such as MRP in recognition of the importance of the distinction between independent- and dependent-demand items.

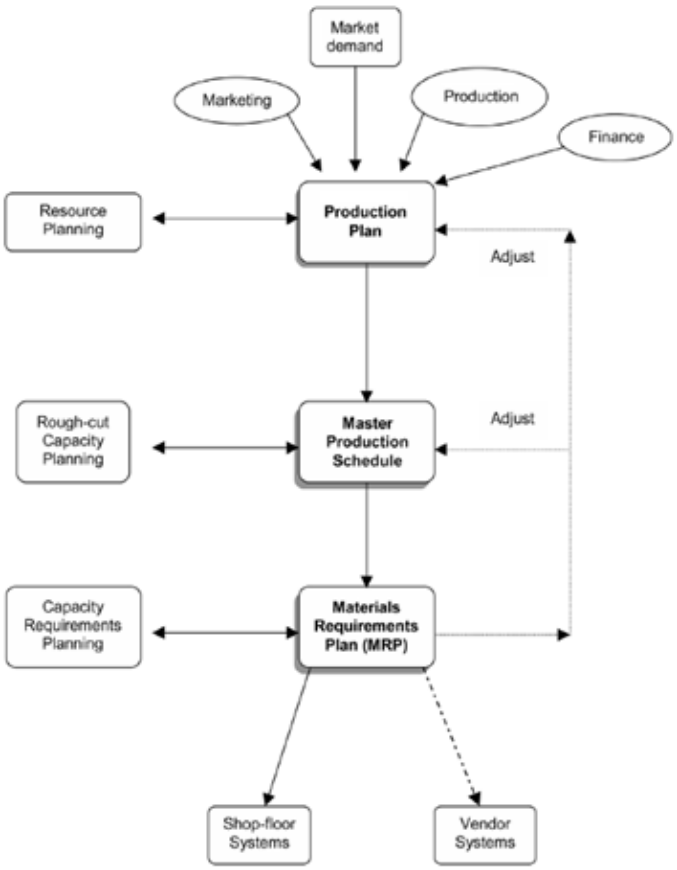

Figure 1: Overview of MRPII

MRP is continually evolving and expanding to include more business functions. In the early 1980s, MRP expanded from a material planning and control system to a company-wide system capable of planning and controlling virtually all the firm's resources. This expanded approach was so fundamentally different from the original concepts of MRP that coined the term MRP II, which refers to manufacturing resource planning. A major purpose of MRP II is to integrate primary functions (i.e. production, marketing, and finance) and other functions such as personnel, engineering, and purchasing into the planning process. Since it is a company-wide system, MRP II often has a built-in simulation capability that allows the firm to ask "what-if" questions. An overview of MRP II is provided in Figure 1.

In the 1990s, MRP II was further expanded into ERP, a term coined by the Gartner Group of Stamford, Connecticut, USA. It is intended to improve resource planning by extending the scope of planning to include more of the supply chain than MRP II. Thus, a key difference between MRP II and ERP is that while MRP II has traditionally focused on the planning and scheduling of *internal* resources, ERP strives to plan and schedule *supplier* resources as well, based on the dynamic *customer* demands and schedules.

The popularity of ERP systems started to soar in 1994 when SAP, a German-based company, released its next-generation software known as R/3. In the following years, companies began to pour billions into ERP systems offered by SAP and its major competitors such as Oracle, Baan, J.D. Edwards, etc. By the late 1990s, industry prognosticators were forecasting that the ERP market would sustain an industry growth rate of 30 to 40 %, and that the market would exceed $50 billion by 2002. An overview of ERP systems including some of the most popular functions within each module is presented in Figure 2. While the names and numbers of modules in an ERP system provided by various software vendors may differ, a typical system integrates all these functions by allowing its modules to share and transfer information freely and centralizing all information in a single database accessible by all modules.

In summary, traditional MRP and MRP II applications may not be up to the challenge presented by manufacturers seeking to capitalize on the competitive advantage offered by an integrated supply chain. ERP, therefore, has evolved from its predecessors to play an integrated supporting role in the creation of a value chain.

ERP – Technology Evolution

Some hints about ERP can be found by examining the evolution of ERP in the 1990s from MRP in the 1970s.

MRP

Material Requirements Planning (MRP) is the heart of an MRPII system. Studying MRP is the first logical step toward understanding MRPII, because the MRPII system encompasses MRP. The primary inputs and outputs of the Orlicky's MRP system (Orlicky, 1975) are reflected in Figure 2

According to Orlicky's definition, MRP consists of a set of logically related procedures, decision rules, and records (alternatively, records may be viewed as inputs to the system) designed to translate a master production schedule (MPS) into time-phased net requirements, and the planned coverage of each requirement, for each component inventory item needed to implement this schedule.

In the task characteristics, MRP has been introduced as a high level scheduling, priority, and capacity management system for the use of plant managers and their supervisory staff. Cooper and Zmud suggest that MRP and Optimized Production Technology (OPT) have been developed to replace traditional order-based information systems that support production

planning and control (Cooper and Zmud, 1990). Maskell argues that the MRP system can be used to improve manufacturing with other leading production systems such as a just-in-time inventory method (Maskell, 1993).

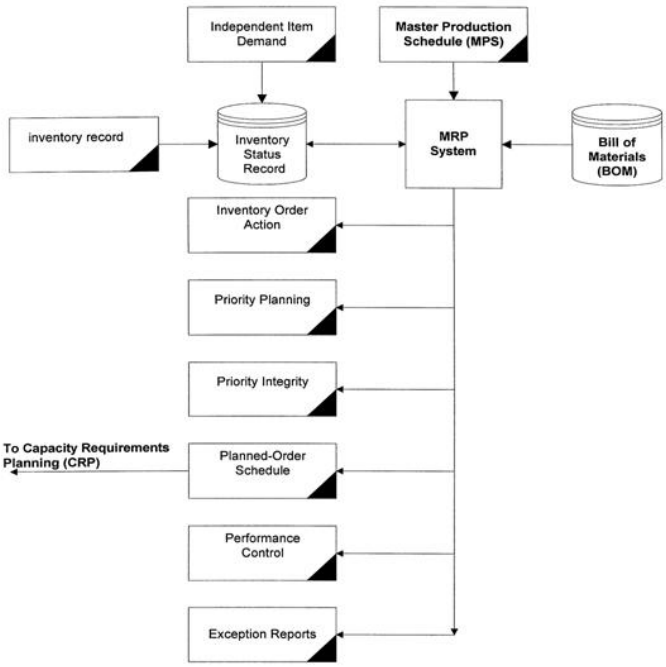

Figure 2: MRP system input-output relationships, Orlicky (1975)

In the technology characteristics, MRP lacks technical capabilities in integration with tasks (Maskell, 1993). The MRP system was originally run on the IBM mainframe. It reflects centralized computing, and limited interaction between users and data, and rigid functions with low level integration in a firm. MRP needs to be integrated with major functions in the firm so that business data are stored only once, are up-to-date and reliable, and can be shared by a wide range of users.

MRPII

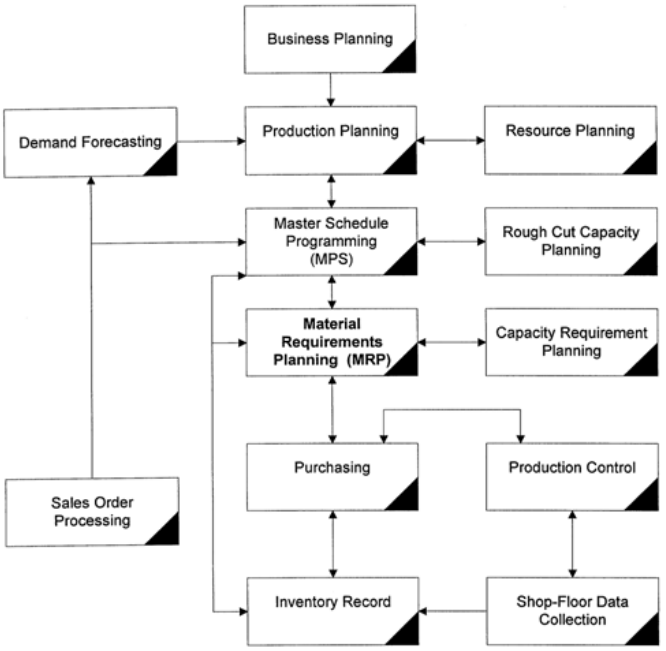

Figure 3: Standard MRPII system and its functionality

MRPII means manufacturing resource planning .Since, 1975, the MRP system has been expanded from MRP to the standard MRPII In the 1980s MRPII became the application of information and manufacturing technology, plans and resources to improve the efficiency of a manufacturing enterprise through integration effort. The standard MRPII system and its functionality are reflected in Figure 3.

In the task characteristics, MRPII could be the vehicle to use not only for materials and parts to production, but also for manufacturing plans and schedules. MRPII follows a simple backward scheduling logic with explosion of the BOM process. All of the lead time elements, shop routing, and process times are assumed to be deterministic. Linking other activities such as purchasing, inventory control and sales is performed in isolated planning and scheduling by simply retrieving, storing, and interchanging data in the system only when needed. While maintaining this simplicity of the system for the last two decades, no changes have been made in the basic calculation procedure in order to address changing requirements in manufacturing. The isolated integration of MRPII represents inadequate business solutions.

It is believed that the MRPII standard system is not a business blueprint. The system combines planning and scheduling with assumption of infinite capacity. One of the most common reasons for MRPII adoption failure is that the firm is unable to develop a realistic MPS, which is likely a compromise between the demand of the customers and the supply of production. MPS is the top level plan that sets out which products the company will make and when the company is planning to make them. MRPII does not have the ability to establish mechanisms for managing the realistic MPS plan without overloading available CRP and disrupting the existing workload.

In technology characteristics, unlike MRP of the 1970s the MRPII system could be installed on a variety of IT platforms (Peteroff, 1993). MRPII is likely to operate within a multi-user network and is considered as two-tier architecture. A trend has been for MRPII to be run on PCs, while the organization's IT is based around a mainframe computer. Typically, MRPII systems have been procured separately and without regard for the need to communicate across the traditional functional areas. This has been one of the major causes for the great deal of reporting on MRPII as "islands of automation" that are maintained by the multiple and frequently incompatible computer systems in manufacturing organizations (Wight, 1981). Even without the computer hardware differences, there are other problems that arise because of different operating systems, incompatible protocols, and other software-related obstacles to integration.

It is suggested that MRPII does not provide functionality and integration to reflect the contemporary manufacturing reality. While the demands of the consumer market have grown more sophisticated in the 1990s, MRPII has remained essentially the same for the last two decades.

ERP

Regarding the task characteristics, the observed limitations of MRP and MRPII have been likely addressed with solutions in the ERP system. ERP has packaged processes for best business practices in the form of a business blueprint. This blueprint could guide firms from the beginning phase of product engineering, including evaluation and analysis, to the final stages of product implementation. The ERP system could support continuous business engineering, which combines the innovations of IT with business process re-engineering (BPR) for the firm. The functionality of the system consists of steering corporation, manufacturing applications, supporting

applications and specialized configurations. ERP's manufacturing applications are similar to the functionality of MRPII. In addition, ERP encompasses human resources, decision support applications, distribution, maintenance support, quality and regulatory control, and health and safety compliance. Since the manufacturing modules and data are integrated with other systems within a firm, all potential problems, such as data reliability and consistency with MPS and CRP in both MRP and MRPII, likely no longer exist with an ERP system.

Regarding the technology characteristics, most ERP systems have three distinct features in their architecture. These integrated features could facilitate compatibility between task and technology in the ERP system. The first is their data dictionary, which specifies thousands of domains that are associated with supporting fields and arranged in numerous tables. This data dictionary could be used across all functional areas within an organization. Once data are entered into the ERP system, it could be shared across an entire value chain in the firm. The second is a middleware, which could make distributed systems possible by allowing users to set up application modules and databases at different locations. Data could be moved from a central system to a remote system, permitting applications to exchange information between them. The middleware not only routes data, but also knows what data are needed in a given situation. The third is the repository. This is the foundation of the business framework, because the repository captures all semantics in the business processes, business objects, and organization model. It contains a comprehensive description of the ERP applications, including all meta information about models, technical programming objects, and business objects. The ERP repository is able to exchange information via application programming interfaces (API). These three technology features are used to coordinate marketing, manufacturing, distribution, and human resources tasks in the firm.

With an integrated ERP platform in place, a firm could build whole enterprise applications on top of it. These applications could provide a timely feedback to enable optimal responses to changing conditions of customer demand and manufacturing capacity.

ERP II

ERP gave businesses a vehicle to manage information and use it to their advantage. It organized customer data in ways that helped individual departments operate more efficiently, and it created streamlined processes that helped manufacturing operations cut costs and move products along more quickly. But traditional ERP systems failed to complete the task they ultimately set out to accomplish: to unify the enterprise and turn it into one smoothly running machine. ERP-II promises to bridge this gap. New software tools are available that link departmental communications, work processes, customer data and supplier capabilities into a centrally functioning system—all focused on driving the enterprise forward.

ERP-II is the next step in extended ERP. It's a solution that includes the traditional materials planning, distribution, and order-entry functionality strengthened by capabilities like Customer Relationship Management (CRM), Human Resources Management (HRM), Document/Knowledge Management (KM) and Workflow Management. Such a system can quickly, accurately and consistently operate an entire organization. It delivers information in an instant to the people who need it. It manages the access to that information by establishing security roles and ratings that define which employees can use certain pieces of information. It also addresses the issue of multiple office locations by making the solution web-based, so employees can access the system no matter where they may be. Businesses are utilizing the Internet more and more. It is no longer just a tool for email, research and single-transaction commerce. It is quickly becoming a tool for globalizing a business—a tool that allows an organization to tie together its employees, its suppliers and its customers. It enables the free flow of information, and the next generation of solutions will be built upon it.

The following table summarizes the evolution of ERP from 1960s to 2000s.

Table 1: Evolution of ERP

Timeline	System	Description
1960s	Inventory Management & Control	Inventory Management and control is the combination of information technology and business processes of maintaining the appropriate level of stock in a warehouse. The activities of inventory management include identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status.
1970s	Material Requirement Planning (MRP)	Materials Requirement Planning (MRP) utilizes software applications for scheduling production processes. MRP generates schedules for the operations and raw material purchases based on the production requirements of finished goods, the structure of the production system, the current inventories levels and the lot sizing procedure for each operation.
1980s	Manufacturing Requirements Planning (MRP II)	Manufacturing Requirements Planning or MRP utilizes software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution.
1990s	Enterprise Resource Planning (ERP)	Enterprise Resource Planning or ERP uses multi-module application software for improving the performance of the internal business processes. ERP systems often integrate business activities across functional departments, from product planning, parts purchasing, inventory control, product distribution, fulfillment, to order tracking. ERP software

		systems may include application modules for supporting marketing, finance, accounting and human resources.
2000 onwards	ERP II	Structuring the enterprise applications to suit to the latest technicalities. ERPII believed in restructuring ERP rather than restructuring the business process in the name of business process engineering or others. ERP II comes with comprehensive features that are exclusively suited industry wise.

CRITICAL SUCCESS FACTORS FOR ERP IMPLEMENTATION

Success definition & measurement

One of the most enduring research topics in the field of information systems is that of system success. Prior research has addressed the measurement of success, the antecedents of success, and the explanation of success and failure. However, with many new types of information technology emerge, the question of success comes up again. In ERP systems, success takes on special urgency since the cost and risk of these valuable technology investment rivals the potential payoffs. Optimal success refers to the best outcomes the organizations could possibly achieve with enterprise systems, concerning with its business situation, measured against a portfolio of project, early operational and long-term business metrics. Optimal success can be dynamic, in a sense that what is possible for an organization to achieve may change overtime, as business conditions also may change.

The definition and measurement of success are pointed. Success depends on the point of view from which you measure it. People often meant different things when talking about ERP success. Project managers and ERP consultants often defined success in terms of completing the project plan on time and within budget. But people whose job was to adopt ERP system and use them tended to emphasize having a smooth operation with ERP system and achieving business improvements We adopt both perspectives, from project managers/consultants' perspective to customers/companies' perspective, because we would like to be balance in our judgment by considering from both sides, and it is also considered with our further empirical research that is to investigate on the CSFs from customers, consultants, and vendors point of view.

An important issue in the measurement of success concerns when one measures it. Because project managers and implementers can afford to declare success in the short run but executives and investors are in it for the long haul. Companies that adopted ERP systems needed to be concerned with the success not just at the point of adoption, but also further down the road.

ERP PACKAGES

Nowadays information technology has become inseparable part of any activity. The integration of IT is delivering several identifiable and several others hidden benefits to businesses, hospitals, Software Industries, Banking, Higher Educational Institute or Universities etc. The unlimited and untapped benefits of information technology could only be derived from a complete and practical platform implementation. The counter of this issue is ERP (Enterprise Resource Planning).

ERP is an information technology solution that integrates enterprise functions such as planning, financials, sales, purchasing, human resources, logistics, customer service, and manufacturing. ERP is the, "Commercial software package that enables the integration of transaction oriented data and business processes throughout an organization"**.** ERP is a system which consists of several integrated module that share data in organization in order to provide connectivity. Some expert in the field emphasized on the combination of all the processes and their control by one operation which is ERP software system. Thus, ERP has the potential to provide an effective solution for smooth operations of an organization and the underlying processes in its various departments by integrating all the departments and functions for maximum utilization of available resources.

While ERP originated from manufacturing and production planning systems used in the manufacturing industry, ERP expanded its scope in the 1990's to other "back-office" functions such as human resources, finance and production planning. Moreover, in recent years ERP has incorporated other business extensions such as supply chain management and customer relationship management to become more competitive. ERP allows different departments with diverse needs to communicate with each other by sharing the same information in a single system. ERP thus increases cooperation and interaction between all business units in an organization on this basis. ERP solution is designed and defined to increase the operating efficiency by improving and decreasing cost for the several department and units of organizations like Supply Chain Management, Customer Relationship Management, Enterprise Performance Management, Human Capital Management, Sales Force Automation, Electronic Commerce, Business Information Warehousing and Educational Students Systems and viral Learning Environment.

The continuous development in the field of ERP had developed a complete solution even for the educational institutions also. This solution is delivering several advantages to educational institutions like Library Management, Online Integration of Library, Attendance Monitoring, Report card Making, Teaching and Non-Teaching Staff attendance monitoring, Fees Management, Accounts and Inventory Management, Marks Assessment and Evaluation System, Online Journal and Blogging, Laboratory management, Syllabus Monitoring etc. and many more other advantage are also there. The basic aim of ERP solutions is to enhance the efficiency, capabilities and flow of data in the several department of the organization whether it is an educational institution or University or a big corporate. So with intention to derive the information technology associated benefits several Universities and Institutions had already been started implementing the enterprise solution or replacing the legacy system with ERP.

Many goals, expectations, and opportunities exist for ERP implementations in higher educational organizations. These goals, expectations, and opportunities frequently are very different from institution to institution; however, each of the goals, expectations, and opportunities are quite relevant to the way each institution of higher education conducts its business. Goals, expectations, and opportunities can range from being very specific in nature to global generalities.

Apart of the several Benefits associated with ERP solution for an educational organization, the biggest question arose that is whether institute will receive value of the expected potential

benefits or not. Just as there are benefits from an ERP implementation to the organization, there are some potential obstacles to any ERP implementation. Because individual organizations are unique, any one organization may be impacted differently by the many various drawbacks, pitfalls, and shortcomings of an ERP implementation. The potential negative impacts to the overall success of an ERP implementation project include, but are not limited to, the following:

1. Consequences and unplanned misalignments between ERP system features and the organization requirements.
2. Failure to rely on best practices of the ERP system, which are the results of vendor contact with existing customers.
3. Lack of preparation for the organizational and cultural transformation and change that comes with ERP implementation projects.
4. Costs associated with training, consultants, back-filling of resources, add-ons, and contracted services.
5. No emphasis over the reengineering approaches of business processes.
6. Ignorance of true cost involved in complete implementation, and on ongoing basis.
7. Lack of true knowledge and understanding of core processes.
8. Difficulty in changing, modifying and maintaining an ERP system.

An ERP system is based on a common database and a modular software design. The common database can allow every department of a business to store and retrieve information in real-time. The information should be reliable, accessible, and easily shared. The modular software design should mean a business can select the modules they need, mix and match modules from different vendors, and add new modules of their own to improve business performance.Ideally, the data for the various business functions are integrated. In practice the ERP system may comprise a set of discrete applications, each maintaining a discrete data store within one physical database.

The term ERP originally referred to how a large organization planned to use organizational wide resources. In the past, ERP systems were used in larger more industrial types of companies. However, the use of ERP has changed and is extremely comprehensive, today the term can refer to any type of company, no matter what industry it falls in. In fact, ERP systems are used in almost any type of organization – large or small.In order for a software system to be considered ERP, it must provide an organization with functionality for two or more systems. While some ERP packages exist that only cover two functions for an organization (QuickBooks: Payroll & Accounting), most ERP systems cover several functions.

Today's ERP systems can cover a wide range of functions and integrate them into one unified database. For instance, functions such as Human Resources, Supply Chain Management, Customer Relations Management, Financials, Manufacturing functions and Warehouse Management functions were all once standalone software applications, usually housed with their own database and network, today, they can all fit under one umbrella – the ERP system. ERP is widely used in Educational institutes, corporate, banking and insurance, shopping malls, showrooms, inventory management etc. ERP provides flexibility and quick access of information any time anywhere.

Implementation of ERP system continues to involve several critical technical and non-technical commitments various organizations. There is little room for error in order to achieve a successful, efficient, and effective ERP implementation.Any knowledge and information pertaining to the ERP implementation process with special reference to database flexibility and simulation, that can be obtained from the experience of other higher education institutions can be of great value and benefit for institutions that have not gone through the process. Therefore, conducting a multiple case study qualitative and quantitative research project on several higher education institutions has the ability and opportunity to provide and share experiences, lessons learned, and other valuable information to those entities yet to embark upon an ERP implementation project.

The major features of qualitative research are naturalistic, descriptive data, concern with process, inductive, and perspective of the participants. Implementation of these components into a structured methodology provides an opportunity to learn what it takes to install an ERP. Information generated from the open-ended data collected from the various sources of the ERP implementation projects can be used to create more appropriate theories and methodologies that in turn are available for utilization by other institutions and organizations to successfully implement their own ERP system.

Investigating the database flexibility and simulation and related advantage of both the patterns to reduce the risk of failure in implementation process would definitely contribute in development of news structure of ERP implementation with more viabilityof database and human factor integration. A combination of qualitative and quantitative research in this respect strives for depth of understanding. In essence, quantitative research is about numbers and objective hard data. According to **Fowler (2004)**, "Quantitative research designs involve the collection and statistical analysis of numerical data". Quantitative research involves the use of structured questions that include predefined response options.

All ERP packages contain many modules. The number and features of the modules varywith the ERP packages. Some of the most common modules available in almost all packages are:

1. Finance
2. Plant Maintenance
3. Quality Management
4. Material Management, etc
5. Inventory Management
6. Manufacturing and production planning
7. Sales and distribution

Some packages will have a subset of this, and some will have more modules and / or features.

CONCLUSION

The Journey of ERP is very interesting and motivated. The way it has improved its version and added new module it has built as the major business service provider. the characteristic of ERP are most important, all the benefits from use of the ERP software in selected companies are important, managerial problems faced during or after the ERP implementation in selected companies are equal in all companies. Further it can be revealed that insignificant differences in the organisational critical success factors were resulted as to be considered as important for ERP implementation and Significant differences in the functional critical success factors were resulted as to be

considered as important for ERP implementationas the characteristic of current system is most important in company's current ERP System

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