A Course Material on

ENTERPRISE RESOURCE PLANNING

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UNIT I INTRODUCTION

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to be consider in planning design and implementation of cross functional integrated ERP systems.

1.1.1. Introduction

ERP is an acronym that stands for Enterprise Resource Planning. ERP software saw phenomenal interest from the corporate sector during the period 1995-2000. The ERP market is estimated to be in excess of USD 80 Billion in the year 2000 Many analysts feel that today's global business environment - products and services customized to suit the individual needs of millions of customers, delivered over multiple timelines in a 24X7 basis - would have been impossible without such enterprise software. Undoubtedly ERP represents one of the most complex and demanding application software in the corporate environment.

1.1.2   What is ERP?

ERP is a package software solution that addresses the enterprise needs of an organization by tightly integrating the various functions of an organization using a process view of the organization.

A. ERP software is ready-made generic software; it is not custom-made for a specific firm. ERP software understands the needs of any organization within a specific industry segment. Many of the processes implemented in an ERP software are core processes such as order processing, order fulfillment, shipping, invoicing, production planning, BOM (Bill of Material), purchase order, general ledger, etc., that are common to all industry segments.

B. ERP does not merely address the needs of a single function such as finance, marketing, production or HR; rather it addresses the entire needs of an enterprise that cuts across these functions to meaningfully execute any of the core processes.

C. ERP integrates the functional modules tightly. It is not merely the import and export of data across the functional modules. The integration ensures that the logic of a process that cuts across the function is captured genuinely. This in turn implies that data once entered in any of the functional modules (whichever of the module owns the data) is made available to every other module that needs this data. This leads to significant improvements by way of improved consistency and integrity of data.

D. ERP uses the process view of the organization in the place of function view, which dominated the enterprise software before the advent of ERP.

1.1.3. Why ERP?

In spite of heavy investments involved in ERP implementation, many organizations around the world have gone in for ERP solutions. A properly implemented ERP solution would pay for the heavy investments handsomely and often reasonably fast. Since ERP solutions address the entire organizational needs, and not selected islands of the organization, ERP introduction brings a new culture, cohesion and vigor to the organization. After ERP introduction the line managers would no longer have to chase information, check compliance to rules or conformance to budget. What is striking is that a well-implemented ERP can guarantee these benefits even if the organization is a multi-plant, multi- location global operation spanning the continents.

In a sense ERP systems can be compared to the "fly-by-wire" operation of an aircraft. ERP systems similarly would relieve operating managers of routine decisions and leave them with lots of time to think, plan and execute vital long-term decisions of an organization. Just as "fly-by-wire" operation brings in amazing fuel efficiency to the aircraft operation by continuous monitoring of the airplane operation, ERP systems lead to significant cost savings by continuously monitoring the organizational health. The seemingly high initial investments become insignificant in the face of hefty long-term returns.

At another level, organizations today face the twin challenges of globalization and shortened product life cycle. Globalization has led to unprecedented levels of competition. To face such a competition successful corporations should follow the best business practices in the industry. Shortened life cycles call for continuous design improvement, manufacturing flexibility and super efficient logistics control; in short a better management of the entire supply chain. This in turn presupposes faster access to accurate information both inside the organization and from the entire supply chain outside. The organizational units such as Finance, Marketing, Production and HRD need to operate with a very high level of integration without losing flexibility. ERP systems with an organizational wide view of business processes, business needs of information and flexibility meet these demands admirably.

1.1.4 Need for Enterprise Resource Planning

Organizations today face twin challenges of globalization and shortened product life cycle. Globalization has led to unprecedented levels of competition. To face such competitions, successful corporations should follow the best business practices in the industry. Shortened life cycles call for continuous design improvements, manufacturing flexibility, super-efficient logistics control and better management of the entire supply chain. All these need faster access to accurate information, both inside the organization and the entire supply chain outside. The organizational units such as finance, marketing,

production, human resource development etc. need to operate with a very high level of integration without losing flexibility. ERP system with an organization-wide view of business processes, business need of information and flexibility meet these demands admirably. One of the developments in computing and communication channels is providing tighter integration among them.

1.1.5 Definition of ERP

Researchers and practitioners have defined ERP in many different ways.

Minahan (1998) defines ERP as a complex software system that ties together and automates the basic processes of a business. ERP has been defined by various authors but with few differences.

Kumar et al. (2000) define enterprise resource planning (ERP) systems as "configurable information systems packages that integrate information and information-based processes within and across functional areas in an organization"

Al-Mashari and Zairi (2000) states that ERP represent an optimal enterprise-wide technology infrastructure. The basic architecture of an ERP system builds on one database, one application, and a unified interface across the entire enterprise.

Nah et al. (2001) defines ERP as "An enterprise resource planning (ERP) system is typically defined as a packaged business software system that facilitates a corporation to manage the efficient and effective use of resources (materials, human resources, finance, etc.) by providing a total integrated solution for the organization's information-processing requests, through a process-oriented view consistent across the company."

1.4 Evolution of Enterprise Resource Planning

Enterprise resource planning (ERP) has evolved as a strategic tool, an outcome of over four decades. This is because of continuous improvements done to the then available techniques to manage business more efficiently and also with developments and inventions in information technology field.

1.2.1 Pre Material Requirement Planning (MRP) stage

Prior to 1960s businesses generally relied on traditional ways of managing inventories to ensure smooth functioning of the organizations. These theories are popularly known as '*Classical Inventory Management or Scientific Inventory Control Methods*'. Most

popularly used among them were Economic Order Quantity (EOQ); Bill of Material (BOM) etc. However these systems had very limited scope.

ERP system has evolved from the Material Planning System of 1980's. There are various phases through which this evolution process has gone through. The various phases of development of resource planning system in relation to time and evolution of concept of ERP.

Figure 1.1

Stages of ERP Evolution

1970s	• Material Requirement Planning (MRP)
1980s	• Manufacturing Resource Planning (MRPII)
1990s	• Enterprise Resource Planning (ERP)
2000	• Extended ERP (E-ERP)
	• Enterprise Resource Planning II (ERP II)

1.2.2. Material Requirement Planning (MRP)

MRP was the fundamental concept of production management and control in the mid-

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1970s and considered as the first stage in evolution of ERP. Assembly operations involving thousands of parts such as automobile manufacture led to large inventories. The need to bring down the large inventory levels associated with these industries led to the early MRP systems that planned the order releases. Such planned order releases ensured proper time phrasing and accurate planning of the sub-assembly items, taking into account complex sub-assembly to assembly relationships characterized by the Bill of Materials.

Example:

A typical example is a bicycle manufacture. To manufacture 100 units of bicycles, one needs 200 wheels, 100 foot-pedals, and several thousands of spokes. On a given day, a plant may have 40 units of complete bicycles in stock, 57 units of wheels, 43 units of foot-pedals and 879 units of spokes. If the plant is to assemble 20 units of bicycles for the next 4 days of production, wheels and spokes-is a non trivial problem. If the independent demand of the spare parts is also to be taken into account, one can visualize the complexity of it.

A typical automobile plant with hundreds, if not thousands of parts, has to face problems that are in order of magnitude even more difficult. MRP systems address this need. Using the processing power of computers, databases to store lead-times and order quantities and algorithms to implement Bill-of-Material (BOM) explosion, MRP systems brought considerable order into the chaotic process of material planning in a discrete manufacturing operation.

Essentially MRP addresses a single task in manufacturing alone. Material requirement planning (MRP) system was adopted by firms for creation and maintenance of master data and bill of material across all products and part within an organization. MRP on the other hand was an outgrowth of bill of material (BOM) processing, which is purchase order management that utilizes parts list management and parts development.

1.2.3 Manufacturing Resources Planning II (MRP- II)

A natural evolution from the first generation MRP systems was the manufacturing planning systems MRP II that addressed the entire manufacturing function and not just a single task within the manufacturing function. MRP II went beyond computations of the materials requirement to include loading and scheduling. MRP II systems could determine whether a given schedule of production was feasible, not merely from material availability but also from other resource point of view.

Typically, the resources considered from MRP II systems would include production facilities, machine capacities and precedence sequences. The increased functionality enabled MRP II systems provided a way to run the system in a loop. First it was used to check the feasibility of a production schedule taking into account the constraints; second to adjust the loading of the resources, if possible, to meet the production schedules; third

to plan the materials using the traditional MRP II systems. Both MRP system and MRP II systems were fairly successful in industry. Due to the power of information systems-databases, algorithms and their integration, organizations did find real support for efficiently managing the manufacturing function in the eighties.

1.2.4 Enterprise Resource Planning (ERP)

The nineties saw unprecedented global competition, customer focus and shortened product life cycles. To respond to these demands corporations had to move towards agile (quick moving) manufacturing of products, continuous improvements of process and business process reengineering. This called for integration of manufacturing with other functional areas including accounting, marketing, finance and human resource development.

Activity-based costing would not be possible without the integration of manufacturing and accounting. Mass customization of manufacturing needed integration of marketing and manufacturing. Flexible manufacturing with people empowerment necessitated integration of manufacturing with the HRD function. In a sense the 1990s truly called integration of all the functions of management. ERP systems are such integrated information systems build to meet the information and decision needs of an enterprise spanning all the functions of management[4].

1.2.5 Extended ERP (E-ERP)

Further developments in the enterprise resource planning system concept have led to evolution of extended ERP (E- ERP) or web - enabled ERP. With globalization on one hand and massive development in the internet technology on the other, need for web based IT solution was felt. Thus E- ERP is development in the field of ERP which involves the technology of Internet and World Wide Web (WWW) to facilitate the functions of an organization around the web.

1.2.6 Enterprise Resource Planning II (ERP- II)

ERP II is the advanced step of E-ERP. It is the software package which has strengthened the original ERP package by included capabilities like customer relationship management, knowledge management, workflow management and human resource management. It is a web friendly application and thus addresses the issue of multiple office locations.

1.2.7 ERP – A Manufacturing Perspective

ERP systems evolved out of MRP and MRP II systems. MRP systems addressed the single task of materials requirements planning. MRP II extended the scope to the entire manufacturing function. The manufacturing industry traditionally had a better climate to use computers. First of all the manufacturing community being dominated by engineers had no computer phobia. Second the extensive use of Computer Aided Drafting (CAD), Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) had prepared the manufacturing function to use computers well, in fact exceptionally well. In fact manufacturing engineers contributed significantly to the theoretical computer science by way of contributions in the areas of graphics, computational geometry, significant visualization, feature recognition etc.

Large corporations like General Motors (GM), Ford, Hewlett Packard (HP), and Digital primarily viewed themselves as manufacturing companies until the 1980s. Naturally complex MRP systems were considered the ultimate in enterprise information systems. The investments in hardware and software to manage such complex manufacturing solutions gave these systems a visibility unparalleled in the industry. Compared to these systems accounting systems, financial systems or personnel information systems were relatively inconsequential to the organization.

With the globalization of operations and the proliferation of computer networks, it was important that the manufacturing organizations extend their information system across the supply chain. The supplier's information system spread across continents with complex combinations of hardware and software need to be integrated. Similarly the dealer-distributor network had to be integrated with the manufacturing information systems. The reduction in product life cycle necessitated a quick response manufacturing system that had its ears tuned to the market.

This forced manufacturing information systems to have a tighter integration with marketing information systems. The manufacturing flexibility had translated into mass customization calling for further integration of information systems. The opening up of several world economies including that of the Asian giants like China and India, the emergence of trade blocks and consolidated markets such as European Union paved the need for accounting and finance functions to be tightly integrated with manufacturing functions. It was not sufficient anymore just to manufacture and sell but organizations had to arrange for finance, comply with complex trade restrictions, barriers, and quotas.

The balance sheets needed to account for multiple currencies, multiple export import rules and regulations, multiple accounting codes, practices, accounting periods. This necessitated further

integration of accounting and financial information systems with manufacturing systems. In fact with large capacities built around the world particularly in Asian countries, outsourcing and contract manufacturing became viable alternative even in the high-tech industries like semi conductor manufacturing.

Suddenly the need was for an Enterprise Information System that looks beyond the manufacturing function to address inbound logistics, outbound logistics, manufacturing, materials managements, project management, quality management, accounting, finance, sales and personnel management. It was nearly impossible to integrate individual modules of information systems. What was necessary was a system that addressed the enterprise needs from the design stage. ERP systems were the natural choice in this changed scenario.

1.3 Benefits of ERP:

(a) **Business integration:** The first and the most important advantage lie in the promotion of integration. The reason ERP packages are called integrated is the automatic data up gradation between related business components, since conventional company information systems were aimed at the optimization of independent business functions in business units, almost all were weak in terms of the communication and integration of information that transcended the different business functions in the case of large companies in particular, the timing of system structure and directives differs from each product and department / functions and sometimes they are disconnected.
For this reason, it has become an obstacle in the shift to new product and business classification. In the case of ERP packages the data of related business functions is also automatically updated at the time a transaction occurs. For this reason, one is able to grasp business details in real time, and carry out various types of management decisions in a timely manner based o that information.

(b) **Flexibility:** The second advantage of ERP packages is their flexibility. Diverse multi functional environments such as language, currency, accounting standards and so on are covered in one system and functions that comprehensively managed multiple locations that span a company are packaged and can be implemented automatically. To cope with company globalization and system unification, this flexibility is essential, and one could say that it has major advantages, not simply for development and maintenance, but also in terms of management.

(c) **Better analysis and planning capabilities:** Yet another advantage is the boosting of planning type functions. By enabling the comprehensive and unified management of related business and its data, it becomes possible to fully utilize many types of decision support

systems and stimulation systems. Furthermore, since it becomes possible to carry out flexibility and in real time the feeling and analysis of data from a variety of dimensions, one is able to give decision makers the information they want, thus enabling them to make better and informed decisions.

(d) **Use of latest technology:** The fourth advantage is the utilization of latest developments in information technology (IT). The ERP vendors were very quick to realize that in order to grow and to sustain that growth: they have to embrace the latest developments in the field of information technology. So they quickly adopted their systems to take advantages of the latest technologies like open systems, client server technology, internet/ intranet, computer aided acquisition and logistics support, electronic commerce etc. It is this quick adaptation to the latest changes in information technology that makes the flexible adaptation to changes to future business environments possible. It is this flexibility that makes the incorporation of the latest technology possible during the system customization, maintenance and expansion phases.

(e) **Reduced inventory and inventory carrying cost:** The manufacturing nature of many ERP users makes the issue of process and material costs savings paramount. The main factor behind these savings is that implementation of the ERP system allows customers to obtain information on cost, revenues and margins, which allow it to better, manage its overall material cost structure. This ability to manage costs is best seen in savings that organizations can obtain in their inventory systems. Customers can perform a more complete inventory planning and status checking with the ERP system.

These checks and plans reveal existing surpluses or shortages in supplies. Improved planning and scheduling practices typically lead to inventory reductions to the order of 20 per cent or better. This provides not only a one time reduction in assets (cost of the material stocked), but also provides ongoing savings of the inventory carrying costs. The cost of carrying inventory includes not only interest but also the costs of warehousing, handling, obsolescence, insurance, taxes, damage and shrinkage.

(f) **Reduced manpower cost:** Improved manufacturing practices lead to fever shortages and interruptions and to less rework and overtime. Typical labor savings from a successful ERP system are a 10 per cent reduction in direct and indirect labor costs. By minimizing rush jobs and parts shortages, less time is needed for expediting, material handling, extra setups, disruptions and tracking splits lots odd jobs that have been set aside. Production supervisors have better visibility of required work and can adjust capacity or loads to meet schedules. Supervisors have more time for managing, directing and training people. Production personnel have more time to develop better methods and improve quality.

(g) **Reduced material costs:** Improves procurement practices lead to better vendor negotiations

for prices, typically resulting in cost reductions of 5 per cent or better. Valid schedules permit purchasing people to focus on vendor negotiations and quality improvements rather than spending their time on shortages and getting material at premium prices. ERP systems provide negotiation information, such as projected material requirements by commodity group and vendor performance statistics. Giving suppliers better visibility of future requirements help them achieve efficiencies that can be passed on as lower material costs.

(h) **Improves sales and customer service:** Improved coordination of sales and production leads to better customer service and increased sales. Improvements in managing customer contacts, making and meeting delivery promises, and shorter order to ship lead times, lead to higher customer satisfaction, goodwill and repeat orders. Sales people can focus on selling instead of verifying or apologizing for late deliveries. In custom product environment, configurations can be quickly identified and prices, often by sales personnel or even the customer rather than the technical staff.

Taken together, these improvements in customer service can lead to fewer lost sales and actual increase in sales, typically 10 per cent or more. ERP systems also provide the ability to react to changes in demand and to diagnose delivery problems. Corrective actions can be taken early such as determining shipment priorities, notifying customers of changes to promise delivery dates, or altering production schedules to satisfy demand.

(i) **Efficient financial management:** Improves collection procedures can reduce the number of days of outstanding receivables, thereby providing additional available cash. Underlying these improvements is fast, accurate invoice creation directly from shipment transactions, timely customer statements and follows through on delinquent accounts. Credit checking during order entry and improved handling of customer inquires further reduces the number of problem accounts. Improved credit management and receivable practices typically reduce the days of outstanding receivables by 18 per cent or better. Trade credit can also be maximized by taking advantage by supplier discounts and cash planning, and paying only those invoices with matching recipients. This can lead to lower requirements for cash-on-hand.

The benefits from ERP come in three different forms i.e. in the short-term, medium-term and long-term. When initially implemented, in a year of the organization going live with ERP, it helps in streamlining the operational areas such as purchase, production, inventory control, finance and accounts, maintenance, quality control, sales and distribution, etc. This benefit is in form of 'automating' the transactions which promises accuracy, reliability, availability and consistency of data.

1.3.1. RISK IMPLEMENTATION:

Even in a single site, implementing ERP means "Early Retirement Probably." An ERP package is so complex and vast that it takes several years and millions of dollars to roll it out. It also requires many far-flung outposts of a company to follow exactly the same business processes. In fact, implementing any integrated ERP solution is not as much a technological exercise but an "organizational revolution." Extensive preparation before implementation is the key to success. Implementations carried out without patience and careful planning will turn out to be corporate root canals, not competitive advantage. Several issues must be addressed when dealing with a vast ERP system, and the following sections discuss each of them in detail.

Top *Management* Commitment

Implementing an ERP system is not a matter of changing software*systems*, rather it is a matter of repositioning the company and transforming the business practices. Due to enormous impact on the competitive advantage of the company, top *management* must consider the strategic implications of implementing an ERP solution.

Management must ask several questions before embarking on the project. Does the ERP system strengthen the company's competitive position? How might it erode the company's competitive position? How does ERP affect the organizational structure and the culture? What is the scope of the ERP implementation -- only a few functional units or the entire organization? Are there any alternatives that meet the company's needs better than an ERP system? If it is a multinational corporation, the *management* should be concerned about whether it would be better to roll the system out globally or restrict it to certain regional units?

Management must be involved in every step of the ERP implementation. Some companies make the grave mistake of handing over the responsibility of ERP implementation to the technology department. This would risk the entire company's survival because of the ERP system's profound business implications.

It is often said that ERP implementation is about people, not processes or technology. An organization goes through a major transformation, and the *management* of this change must be carefully planned (from a strategic viewpoint) and meticulously implemented. Many parts of the business that used to work in silos now have to be tightly integrated for ERP to work effectively. Cutting corners in planning and implementation is detrimental to a company.

The top *management* must not only fund the project but also take an active role in leading the change. A review of successful ERP implementations has shown that the key to a smooth rollout is the effective change*management* from top. Intervention from *management* is often necessary to resolve conflicts and bring everybody to the same thinking, and to build cooperation among the diverse groups in the organization, often times across the national borders.

Top *management* needs to constantly monitor the progress of the project and provide direction to the implementation teams.

The success of a major project like an ERP implementation completely hinges on the strong, sustained commitment of top *management*. This commitment when percolated down through the organizational levels results in an overall organizational commitment. An overall organizational commitment that is very visible, well defined, and felt is a sure way to ensure a successful implementation.

Reengineering

Implementing an ERP system involves reengineering the existing business processes to the best business process standard. ERP *systems* are built on best practices that are followed in the industry. One major benefit of ERP comes from reengineering the company's existing way of doing business. All the processes in a company must conform to the ERP model. The cost and benefits of aligning with an ERP model could be very high. This is especially true if the company plans to roll out the system worldwide. It is not very easy to get everyone to agree to the same process. Sometimes business processes are so unique that they need to be preserved, and appropriate steps need to be taken to customize those business processes.

An organization has to change its processes to conform to the ERP package, customize the software to suit its needs, or not be concerned about meeting the balance 30 percent. If the package cannot adapt to the organization, then organization has to adapt to the package and change its procedures. When an organization customizes the software to suit its needs, the total cost of implementation rises. The more the customization, the greater the implementation costs. Companies should keep their *systems* "as is" as much as possible to reduce the costs of customization and future maintenance and upgrade expenses.

Integration

There is a strong trend toward a single ERP solution for an entire company. Most companies feel that having a single vendor means a "common view" necessary to serve their customers efficiently and the ease of maintaining the system in future. Unfortunately, no single application can do everything a company needs.

Companies may have to use other specialized software products that best meet their unique needs. These products have to be integrated along with all the homegrown *systems* with the ERP suite. In this case, ERP serves as a backbone, and all the different software are bolted on to the

ERP software. There are thirdparty software, called middleware, which can be used to integrate software applications from several vendors to the ERP backbone.

Unfortunately, middleware is not available for all the different software products that are available in the market. Middleware vendors concentrate only on the most popular packaged applications and tend to focus on the technical aspects of application interoperability rather than linking business processes.

Many times, organizations have to develop their own interfaces for commercial software applications and the homegrown applications. Integration software also poses other kinds of problems when it comes to maintenance. It is a nightmare for IS personnel to manage this software whenever there are changes and upgrades to either ERP software or other software that is integrated with the ERP system. For every change, the IT department will be concerned about which link is going to fail this time.

 Integration problems would be severe if the middleware links the ERP package of a company to its vendor companies in the supply chain. Maintaining the integration patchwork requires an inordinate and ongoing expenditure of resources. Organizations spend up to 50 percent of their IT budgets on application integration? It is also estimated that the integration market (products and services) equals the size of the entire ERP market.When companies choose bolt-on *systems*, it is advisable to contact the ERP vendor for a list of certified third-party vendors. Each year, all the major ERP vendors publish a list of certified third-party vendors. There are several advantages to choosing this option, including continuous maintenance and upgrade support.

One of the major benefits of ERP solutions is the integration they bring into an organization. Organizations need to understand the nature of integration and how it affects the entire business. Before integration, the functional departments used work in silos and were slow to experience the consequences of the mistakes other departments committed. The *information* flow was rather slow, and the departments that made the mistakes had ample time to correct them before the errors started affecting the other departments. However, with tight integration the ripple effect of mistakes made in one part of the business unit pass onto the other departments in real time. Also, the original mistakes get magnified as they flow through the value chain of the company.

For example, the errors that the production department of a company made in its bill of materials could affect not only the operations in the production department but also the inventory department, accounting department, and others. The impact of these errors could be detrimental to a company. For example, price errors on purchase orders could mislead financial analysts by giving a distorted view of how much the company is spending on materials.

Companies must be aware of the potential risks of the errors and take proper steps, such as monitoring the transactions and taking immediate steps to rectify the problems should they

occur. They must also have a formal plan of action describing the steps to be taken if an error is detected. A proper means to communicate to all the parties who are victims of the errors as soon as the errors are detected is extremely important. Consider the recent example of a manufacturing company that implemented an ERP package. It suddenly started experiencing a shortage of manufacturing materials. Production workers noticed that it was due to incorrect bills of materials, and they made necessary adjustments because they knew the correct number of parts needed to manufacturer.

However, the company did not have any procedures to notify others in case any errors were found in the data. The domino effect of the errors started affecting other areas of business. Inventory managers thought the company had more material than what was on the shelves, and material shortages occurred. Now the company has mandatory training classes to educate employees about how transactions flow through the system and how errors affect the activities in a value chain. It took almost eight weeks to clean up the incorrect bills of materials in the database.

Companies implementing electronic supply chains face different kinds of problems with integration of *information* across the supply chain companies. The major challenge is the impact automation has on the business process. Automation changes the way companies deal with one another, from planning to purchase to paying. Sharing and control of *information* seem to be major concerns. Companies are concerned about how much *information* they need to share with their customers and suppliers and how to control the *information*. Suppliers do not want their competitors to see their prices or order volumes.

The general fear is that sharing too much *information* hurts their business. Regarding controlling *information*, companies are aware that it is difficult to control what they own let alone control what they do not own. Companies need to trust their partners and must coordinate with each other in the chain. The whole chain suffers if one link is slow to provide *information* or access. The *management* also must be concerned about the stress an automated supply chain brings within each organization. For instance, a sales department may be unhappy that electronic ordering has cut it out of the loop, while manufacturing may have to adjust to getting one week's notice to order changes and accommodate those changes into its production orders.

ERP Consultants

Because the ERP market has grown so big so fast, there has been a shortage of competent consultants. The skill shortage is so deep that it cannot be filled immediately. Finding the right people and keeping them through the implementation is a major challenge. ERP implementation demands multiple skills -- functional, technical, and interpersonal skills. Again, consultants with

specific industry knowledge are fewer in number. There are not many consultants with all the required skills.

One might find a consultant with a stellar reputation in some areas, but he may lack expertise in the specific area a company is looking for. Hiring a consultant is just the tip of the iceberg. Managing a consulting firm and its employees is even more challenging. The success or failure of the project depends on how well you meet this challenge.

Implementation Time

ERP *systems* come in modular fashion and do not have to be implemented entirely at once. Several companies follow a phase-in approach in which one module is implemented at a time.

For example, SAP R/3 is composed of several "complete" modules that could be chosen and implemented, depending on an organization's needs. Some of the most commonly installed modules are sales and distribution (SD), materials *management* (MM), production and planning, (PP), and finance and controlling (FI) modules.

The average length of time for a "typical" implementation is about 14 months and can take as much as 150 consultants. Corning, Inc. plans to roll out ERP in ten of its diversified manufacturing divisions, and it expects the rollout to last five to eight years. The length of implementation is affected to a great extent by the number of modules being implemented, the scope of the implementation (different functional units or across multiple units spread out globally), the extent of customization, and the number of interfaces with other applications.

The more the number of units, the longer implementation. Also, as the scope of implementation grows from a single business unit to multiple units spread out globally, the duration of implementation increases. A global implementation team has to be formed to prepare common requirements that do not violate the individual unit's specific requirements. This involves extensive travel and increases the length of implementation.

1.4 Fundamental Technology of ERP:

When it comes time for your organization to evaluate ERP systems, whether you are replacing a small business accounting package or an aging ERP, It is important to clarify the components. Each piece (often called module) of the ERP system delivers different value for your organization. To get the most from the full system, make sure your evaluation team understands the fundamentals.

Financial Management

At the core of ERP are the financial modules, including general ledger, accounts receivable, accounts payable, billing and fixed asset management. If your organization is considering the move to an ERP system to support expansion into global markets, make sure that multiple currencies and languages are supported.

Other functionality in the financial management modules will include budgets, cash-flow, expense and tax reporting. The evaluation team should focus on areas that are most important to support the strategic plans for your organization.

Business Intelligence

Business Intelligence (BI) has become a standard component of most ERP packages. In general, BI tools allow users to share and analyze the data collected across the enterprise and centralized in the ERP database. BI can come in the form of dashboards, automated reporting and analysis tools used to monitor the organization business performance. BI supports informed decision making by everyone, from executives to line managers and accountants.

Supply Chain Management

Supply Chain Management (SCM), sometimes referred to as logistics, improves the flow of materials through an organization by managing planning, scheduling, procurement, and fulfillment, to maximize customer satisfaction and profitability. Sub modules in SCM often include production scheduling, demand management, distribution management, inventory management, warehouse management, and procurement and order management.

Any company dealing with products, from manufacturers to distributors, needs to clearly define their SCM requirements to properly evaluate an ERP solution.

Human Resource Management

Human resource management ERP modules should enhance the employee experience – from initial recruitment to time tracking. Â Sub modules can include payroll, performance management, time tracking, benefits, compensation and workforce planning. Self-service tools that allow managers and employees to enter time and attendance, choose benefits and manage PTO are available in many ERP solutions.

Manufacturing Operations

Manufacturing modules make manufacturing operations more efficient through product configuration, job costing and bill of materials management. ERP manufacturing modules often

include Capacity Requirements Planning, Materials Requirements Planning, forecasting, Master Production Scheduling, work-order management and shop-floor control.

Integration

Key to the value of an ERP package is the integration between modules, so that all of the core business functions are connected. Information should flow across the organization so that BI reports on organization-wide results.

1.5 Issues to be consider in planning design and implementation of cross functional integrated ERP systems:

The problem with ERP packages is that they are very general and need to be configured to a specific type of business. This customization takes a long time, depending on the specific requirements of the business. The extent of customization determines the length of the implementation. The more customization needed, the longer it will take to roll the software out and the more it will cost to keep it up-to-date.

For small companies, SAP recently launched Ready-to-Run, a scaled-down suite of R/3 programs preloaded on a computer server. ERP vendors are now offering industry-specific applications to cut the implementation time down. SAP has recently outlined a comprehensive plan to offer 17 industry-specific solutions, including chemical, aerospace and defense, insurance, retail, media, and utilities industries. Even though these specific solutions would able to substantially reduce the time to implement an application, organizations still have to customize the product for their specific requirements.

Implementation Costs

Even though the price of prewritten software is cheap compared with in-house development, the total cost of implementation could be three to five times the purchase price of the software. The implementation costs would increase as the degree of customization increases. The cost of hiring consultants and all that goes with it can consume up to 30 percent of the overall budget for the implementation.

Once the selected employees are trained after investing a huge sum of money, it is a challenge to retain them, especially in a market that is hungry for skilled SAP consultants. Employees could double or triple their salaries by accepting other positions. Retention strategies such as bonus programs, company perks, salary increases, continual training and education, and appeals to company loyalty could work. Other intangible strategies such as flexible work hours, telecommuting options, and opportunities to work with leading-edge technologies are also being used. Many companies simply strive to complete the projects quickly for fear of poaching by head-hunting agencies and other companies.

ERP Vendors

As there are about 500 ERP applications available and there is some company consolidation going on, it is all the more important that the software partner be financially well off. Selecting a suitable product is extremely important. Gartner Group has BuySmart program, which has more than 1700 questions to help a company choose a suitable ERP package. Top *management* input is very important when selecting a suitable vendor. *Management* needs to ask questions about the vendor, such as its market focus (for example, midsize or large organization), track record with customers, vision of the future, and with whom the vendor is strategically aligned.

For a global ERP rollout, companies need to be concerned about if the ERP software is designed to work in different countries. Also, the *management* must make sure the ERP vendor has the same version of the software available in all the countries the company is implementing the system. Vendor claims regarding global readiness may not be true, and the implementation team may need to cross-check with subsidiary representatives regarding the availability of the software. Vendors also may not have substantial presence in the subsidiary countries. It is important to evaluate if the vendor staffers in these countries are knowledgeable and available. If there is a shortage of skilled staff, bringing people from outside could solve the problem, but it would increase the costs of implementation.

Selecting the Right Employees

Companies intending to implement an ERP system must be willing to dedicate some of their best employees to the project for a successful implementation. Often companies do not realize the impact of choosing the internal employees with the right skill set. The importance of this aspect cannot be overemphasized. Internal resources of a company should not only be experts in the company's processes but also be aware of the best business practices in the industry. Internal resources on the project should exhibit the ability to understand the overall needs of the company and should play an important role in guiding the project efforts in the right direction.

Most of the consulting organizations do provide comprehensive guidelines for selecting internal resources for the project. Companies should take this exercise seriously and make the right choices. Lack of proper understanding of the project needs and the inability to provide leadership and guidance to the project by the company's internal resources is a major reason for the failure of ERP projects. Because of the complexities involved in the day-to-day running of an organization, it is not uncommon to find functional departments unwilling to sacrifice their best resources toward ERP project needs. However, considering that ERP system implementation can be a critical step in forging an organization's future, companies are better off dedicating their best internal resources to the project.

Training Employees

Training and updating employees on ERP is a major challenge. People are one of the hidden costs of ERP implementation. Without proper training, about 30 percent to 40 percent of front-line workers will not be able to handle the demands of the new system. The people at the keyboard are now making important decisions about buying and selling -- important commitments of the company. They need to understand how their data affects the rest of company. Some of the decisions front-line people make with an ERP system were the responsibility of a manager earlier. It is important for managers to understand this change in their job and encourage the front-line people to be able to make those decisions themselves.

Training employees on ERP is not as simple as Excel training in which you give them a few weeks of training, put them on the job, and they blunder their way through. ERP *systems* are extremely complex and demand rigorous training. It is difficult for trainers or consultants to pass on the knowledge to the employees in a short period of time. This "knowledge transfer" gets hard if the employees lack computer literacy or have computer phobia. In addition to being taught ERP technology, the employees now have to be taught their new responsibilities. With ERP *systems* you are continuously being trained. Companies should provide opportunities to enhance the skills of the employees by providing training opportunities on a continuous basis to meet the changing needs of the business and employees.

Employee Morale

Employees working on an ERP implementation project put in long hours (as much as 20 hours per day) including seven-day weeks and even holidays. Even though the experience is valuable for their career growth, the stress of implementation coupled with regular job duties (many times employees still spend 25 to 50 percent of their time on regular job duties) could decrease their morale rapidly. Leadership from upper *management* and support and caring acts of project leaders would certainly boost the morale of the team members. Other strategies, such as taking the employees on field trips, could help reduce the stress and improve the morale.

UNITII ERP SOLUTIONS AND FUNCTIONAL MODULES   10
Overview of ERP software solutions- Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

2.1 Overview of ERP software solutions:

Enterprise resource planning is now gaining lots of importance among the business economy. It is now being seen as an important tool for managing resources of a company both internally and externally. It is being used both for many business applications and also for many manufacturing industries.

Previously, enterprise resource planning was used only of large business companies. It required lots of money to be invested. Small scale and medium sized companies were not ready to invest a large amount for buying software and employing staffs for managing ERP software.

Keeping this in mind, ERP vendors started diversifying their enterprise resource planning software by releasing many versions of the software which could assist small companies too.

Also, small sized companies might not require all the tools and customizations available for the big companies. The ERP software got tailored particularly to meet the small sized companies and for increasing the productivity. After this, small sized business people also started buying ERP software which matched their investment amount.

From the early 1990's ERP helped the companies in driving down their cost and also helped them in operating more efficiently. Effective data management also helped streamlining the business process effectively. Planning, manufacturing, marketing, sales and quoting services kept on improving. Stock control, financial tracking and customer service also got better with ERP. Many time consuming and labor related processes were eliminated by the small business with the usage of enterprise resource planning software.

Figure 2.1: ERP FUNCTION:
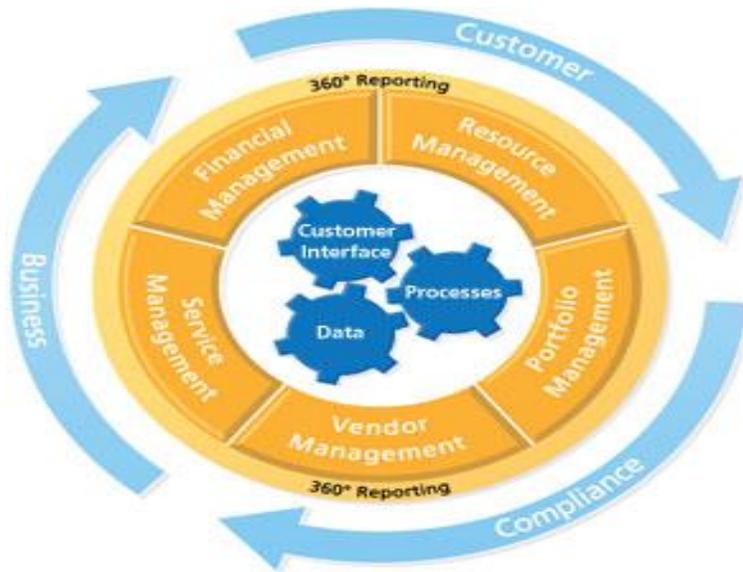
2.2 SMALL, MEDIUM AND LARGE ENTERPRISE VENDOR SOLUTIONS:

The flexibility which ERP offers is definitely a very big advantage which interests the small business. Flexibility and the real time control over the price and the jobs are the key features for a small sized company. Concise reporting is also a main factor which decides the quality of the company.

Based on these needs, ERP vendors have made installation of the related software as very less complex with much less manual job needed. The user friendliness of the applications also got improved. Adding more users or customers will no way affect the functionality of ERP.

Many small businesses are already enjoying the benefits after successful ERP implementation. The profit of the company has certainly increased after the usage of ERP provided the implementation procedures are followed perfectly. Business which implemented ERP successfully saw their business profit increasing within one year itself.

A good ERP system comes with essential features that will provide the functionality of comparing the hours of working of the professionals and the actual hours of work which was paid as a salary. In fact, many small businesses just doubled their return on income with just using this service effectively. With this ERP, they were able to monitor the time of production, cost, employee activity, overall performance of the company and many more crucial information. Before setting up ERP systems, small business must first identify the business requirements. The impact which the ERP is going to have on the business should be well analyzed. Cost factor involved in implementation should be set aside initially. Once the requirements are well planned, then comparison can be made on different vendors available and the vendor which provides cost effective service and be opted.

Organizations are implementing Enterprise Resource Planning system to streamline their internal business process and for smooth flow of data between the different functional departments like inventory, purchase, production, accounts, etc. The different functional modules of the ERP software look after the respective functional department. Some of the functional modules in the ERP are as follows:

1. Production Planning Module: The Enterprise Resource Planning system has evolved from Material Resource Planning which was used for the manufacturing requirements of the companies. ERP is more robust software for production planning as it optimizes the utilization of the manufacturing capacity, material resources and the parts using production data and sales forecasting.

2. Purchasing Module: This module aids in streamlining the procurement of required raw materials. It is integrated with the inventory control and production planning modules and often with the supply chain management software. This module automates the process of identifying potential suppliers, supplier evaluation. It is used for automation and management of purchasing.

3. Inventory Control Module: This module aids in managing the company's resource inventory and the product inventory. It helps in handling the replenishment of the product and maintenance of the stock levels of the products. The inventory control module monitors the inventory stock present at the different locations like at the warehouse, office and stores. The module can manage the inventory of raw materials used for product planning. It enables the company to plan the future production and keep a stock of products which go below critical level.

4. Sales Modules: This module automates the sales tasks, customer orders, invoicing and shipping of products. It is integrated with the company's ecommerce websites and many vendors provide with online storefront as a part of this module. The sales department is an important area for the organization.

5. Accounting and Finance Modules: Accounting and finance are the core areas of an organization. This module interacts with the other functional modules to collect the financial data for the general ledger and other financial statements of the company.

6. Human Resource Module: This can be used as an independent module. It is used for integrating the recruitment process, payroll, training and the performance evaluation process. The module handles the history of the employee, tracks the employees laid off and aids in

rehiring of the employees.

7. Manufacturing Module: This module includes product designing, bills of material, cost management, workflow, etc.

8. Marketing Module: The ERP marketing module supports lead generation and the promotional activities.

Each of these above functional modules of ERP software plays an important role. The organizations can choose to implement some of the modules or all according to their requirements. The companies opt for the modules which are technically and economically feasible to them. These modules streamline the flow of the communication across the company by integrating the various functional departments. The enterprise resource system is bound with all these functional modules. These distinct yet seamlessly integrated modules cover most of the functional needs of an organization. The functional modules of ERP software help to achieve efficiency of operations, cost savings and help to maximize the profits.

Processes, organization, structure and information technologies are the key components of BPR, which automates business processes across the enterprise and provides an organization with a well-designed and well-managed information system. While implementing ERP, the organizations have two options to consider.

Either the organization must reengineer business processes before implementing ERP or directly implement ERP and avoid reengineering.

2.3 Business Process Reengineering:

In the first option of reengineering business processes, before implementing ERP, the organization needs to analyze current processes, identify non-value adding activities and redesign the process to create value for the customer, and then develop in-house applications or modify an ERP system package to suit the organizations requirements. In this case, employees will develop a good sense of process orientation and ownership.

This would also be a customized solution keeping with line of the organization's structure, culture, existing IT resources, employee needs and disruption to routine work during the change programmer likely to be the least. It could have a high probability of implementation. The drawback of this option is that the reengineered process may not be the best in the class, as the organization may not have access to world-class release and best practices. Moreover, this may be the only chance to radically improve in the near future and most attention should be paid

while choosing the right ERP. Also, developing an in-house application or implementing a modified ERP is not advisable.

The second option of implementing ERP package is to adopt ERP with minimum deviation from the standard settings. All the processes in a company should conform to the ERP model and the organization has to change its current work practices and switch over to what the ERP system offers. This approach of implementation offers a world-class efficient and effective process with built-in measures and controls, and is likely to be quickly installed.

But if the employees do not have good understanding of their internal customer needs or current processes, or if these processes are not well defined and documented, then it is quite possible that while selecting the standard process from the ERP package, employees may not be able to perceive the difficulties likely to be encountered during the implementation stage. Employees would lack process ownership and orientation. Other than technical issues, issues like organization structure, culture, lack of involvement of people etc. can lead to major implementation difficulties, and full benefits of standard ERP package may not be achieved. It may lead to a situation where the organization may have to again reengineer its processes. This could be a very costly mistake.

There is also a third option of reengineering business process during implementation of ERP. But it does not considered to be a practical option and is likely to cause maximum disruption to existing work. It should not be forgotten that during BPR and ERP initiatives, routine work is still to be carried out and customers need to be served.

Enterprise resource planning (ERP) is a software platform that helps business owners determine how to best use their available resources. Business process re-engineering (BPR) involves observing and analyzing how the business works to determine changes that may streamline operation at the business. ERP and BPR can go hand-in-hand. An organization's management might use BPR as a means of looking at the current operations of a business to determine how to best proceed when designing or choosing a new ERP.

The goal of business process re-engineering is to determine what changes can be made in the way the business operates to improve aspects of a business. Often, BPR will focus on a specific part of the business, like costs, customer service or marketing and advertising. Using BPR does not necessarily lead to ERP. Though ERP and BPR are related, a well-conducted BPR may find that there is no need for an ERP platform in the business. A business conducting BPR may determine to drop an ERP method for reasons including cost, effectiveness, or maintenance.

2.4 Business Process Management (BPM):

The term business process management covers how we study, identify, change, and monitor business processes to ensure they run smoothly and can be improved over time. Often framed in terms of the daily flow of work.

BPM is best thought of as a business practice, encompassing techniques and structured methods. It is not a technology, though there are technologies on the market that carry the descriptor because of what they enable: namely, identifying and modifying existing processes so they align with a desired, presumably improved, future state of affairs. It is about formalizing and institutionalizing better ways for work to get done.

Successfully employing BPM usually involves the following:

- Organizing around outcomes not tasks to ensure the proper focus is maintained

- Correcting and improving processes before (potentially) automating them; otherwise all you've done is make the mess run faster

- Establishing processes and assigning ownership lest the work and improvements simply drift away – and they will, as human nature takes over and the momentum peters out

- Standardizing processes across the enterprise so they can be more readily understood and managed, errors reduced, and risks mitigated

- Enabling continuous change so the improvements can be extended and propagated over time

- Improving existing processes, rather than building radically new or "perfect" ones, because that can take so long as to erode or negate any gains achieved

BPM should not be a one-time exercise. It should involve a continuous evaluation of the processes and include taking actions to improve the total flow of processes. This all leads to a continuous cycle of evaluating and improving the organization.

2.4.1 STEPS OF BPM :

- Analyze

- Re-design and model

- Implement

- Monitor

- Manage

- Automate

Getting information to where it needs to go, when it needs to go there, is only part of the solution – much of the rest involves first requesting the insights you need, and then having those insights

communicated to you in an immediately usable format. This is what reporting and querying software is all about.

Success depends in large measure on how well you label the data in your repositories so it can be identified and included when an appropriate query comes along. A major boost toward accomplishing this goal exists in the form of the Common Warehouse Metamodel (CWM), a complete specification of syntax and semantics that data warehousing and business intelligence tools can leverage to successfully interchange shared metadata.

Released and owned by the Object Management Group (OMG), the CWM specifies interfaces that can be used to enable the interchange of warehouse and business intelligence metadata between warehouse tools, warehouse platforms, and warehouse metadata repositories in distributed heterogeneous environments. It is based on three standards:

- UML - Unified Modeling Language, an Object Management Group (OMG) modeling standard
- MOF - Meta Object Facility, an OMG metamodeling and metadata repository standard
- XMI - XML Metadata Interchange, an OMG metadata interchange standard

CWM models further enable users to trace the lineage of data by providing objects that describe where the data came from and when and how it was created. Instances of the metamodel are exchanged via XML Metadata Interchange (XMI) documents.

The simplest of these is cleverly known as routing or simple workflow. It moves content – very often in the form of conventional documents – from one place or person to another, and when task A is complete, it allows for task B to begin. Routing tends to be ad-hoc, without any automated rules processing, and with little or no integration between the process management and the affected applications. Instead, it is pretty much person-to-person.

Workflow is more than just simply moving things from A to B to C to D because it allows tasks to be carried out in parallel, saving time and increasing productivity. Able to manage multiple processes taking place at the same time, it accommodates exceptions and conditions by applying user-defined rules.

BPM itself is perhaps the "ultra" process improvement technique because it explicitly addresses the complexity of inter-application and cross-repository processes, and incorporates data-driven, as well as, content-driven processes – all on an ongoing basis.

Usually driven by business rules, it involves a lot of operational analysis and flow charting, and the more sophisticated offerings in the space include not only process designers, but also simulation tools so processes can be run virtually to identify bottlenecks or other issues related to either people or underlying infrastructure.

We must bear in mind that business processes should include the mobile workforce and how mobile device factor into the accomplishment of the overall organizational goals.

BPM is a systematic approach to improving a company's business processes. For example, a BPM application could monitor receiving systems for missing items, or walk an employee through steps to troubleshoot why an order did not arrive. It is the first technology that fosters ongoing collaboration between IT and business users to jointly build applications that effectively integrate people, process and information.

BPM gives an organization the ability to define, execute, manage and refine processes that:

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BPM gives an organization the ability to define, execute, manage and refine processes that:

- involve human interaction, such as placing orders work with multiple applications
- Handle dynamic process rules and changes, not just simple, static flows, (think tasks with multiple choices and contingencies).

Important components include process modeling (a graphical depiction of a process that becomes part of the application and governs how the business process performs when you run the application), and Web and systems integration technologies, which include displaying and retrieving data via a Web browser and which enable you to orchestrate the necessary people and legacy applications into your processes. Another important component is what's been termed business activity monitoring, which gives reports on exactly how (and how well) the business processes and flow are working.

Optimizing processes that involve people and dynamic change has been difficult historically. One barrier to optimization has been the lack of visibility and ownership for processes that span functional departments or business units. In addition, the business often changes faster than IT can update applications that the business relies on to do its work, thus stifling innovation, growth, and performance and so on.

2.5 Functional Modules of ERP Software

ERP software is made up of many software modules. Each ERP software module mimics a major functional area of an organization. Common ERP modules include modules for product planning, parts and material purchasing, inventory control, product distribution, order tracking,

finance, accounting, marketing, and HR. Organizations often selectively implement the ERP modules that are both economically and technically feasible.

However, it is not necessary that every enterprise system application will have all modules mentioned above. Some organizations intending to use customized ERP software generally implement specific **ERP modules** that are technically feasible and also economical to implement. Such business organizations approach ERP Software Company with their enterprise resource planning software requirements and ask them to study and design enterprise system software as per their business requirements. Let's take a look at some main functional modules of **Enterprise resource planning** system in detail.

FIGURE:2.2 FUNCTIONAL MODULE

2.5.1 ERP Production Planning Module

In the process of evolution of manufacturing requirements planning (MRP) II into ERP, while vendors have developed more robust software for production planning, consulting firms have accumulated vast knowledge of implementing production planning module. Production planning optimizes the utilization of manufacturing capacity, parts, components and material resources using historical production data and sales forecasting.

2.5.2 ERP Purchasing Module

Purchase module streamline procurement of required raw materials. It automates the processes of identifying potential suppliers, negotiating price, awarding purchase order to the supplier, and billing processes. Purchase module is tightly integrated with the inventory control and production planning modules. Purchasing module is often integrated with supply chain management software.

2.5.3 ERP Inventory Control Module

Inventory module facilitates processes of maintaining the appropriate level of stock in a warehouse. The activities of inventory control involves in identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status. Integration of inventory control module with sales, purchase, finance modules allows ERP systems to generate vigilant executive level reports.

2.5.4 ERP Sales Module

Revenues from sales are live blood for commercial organizations. Sales module implements functions of order placement, order scheduling, shipping and invoicing. Sales module is closely integrated with organizations' ecommerce websites. Many ERP vendors offer online storefront as part of the sales module.

2.5.5 ERP Market in Module

ERP marketing module supports lead generation, direct mailing campaign and more.

2.5.6 ERP Financial Module

Both for-profit organizations and non-profit organizations benefit from the implementation of ERP financial module. The financial module is the core of many ERP software systems. It can gather financial data from various functional departments, and generates valuable financial reports such balance sheet, general ledger, trail balance, and quarterly financial statements.

2.5.7 ERP HR Module

HR (Human Resources) is another widely implemented ERP module. HR module streamlines the management of human resources and human capitals. HR modules routinely maintain a complete employee database including contact information, salary details, attendance, performance evaluation and promotion of all employees. Advanced HR module is integrated with knowledge

management systems to optimally utilize the expertise of all employees.

Each of these above functional modules of ERP software plays an important role. The organizations can choose to implement some of the modules or all according to their requirements. The companies opt for the modules which are technically and economically feasible to them. These modules streamline the flow of the communication across the company by integrating the various functional departments. The enterprise resource system is bound with all these functional modules. These distinct yet seamlessly integrated modules cover most of the functional needs of an organization. The functional modules of ERP software help to achieve efficiency of operations, cost savings and help to maximize the profits.

UNIT III ERP IMPLEMENTATION   10
Planning Evaluation and selection of ERP systems - Implementation life cycle - ERP implementation, Methodology and Frame work- Training – Data Migration. People Organization in implementation-Consultants, Vendors and Employees.

3.1 Planning Evaluation and Selection of ERP systems:

A successful ERP project requires selecting an ERP solution, implement the solution, manage changes and examine the practicality of the system, Wei and Wang, (2004). Wrong ERP solution choice would either fail the implementation or weaken the system to a greater impact on the enterprise, Hicks, (1995); Wilson, (1994).

Most enterprises often jump into looking at ERP functions and features rather than examining the strategy and business processes. It is important for management to know the current strategy, processes and supporting systems compared to what they could be with the new systems, Donovan, (2001).

For most enterprises, the decision to implement ERP functionalities will require buying a software package from one of the more popular vendors on ERP market like SAP and Oracle. But the selection process is not a straightforward task, hence thorough understanding of what ERP packages are to offer, differences in each of them and what might be at stake in selecting one package over the other should be well examined.

Evaluating and selecting an ERP system can be a very complex process on the other hand, but it should be a 'fact-based' process that will bring the enterprise to the point where comfortable & well-informed decisions can be made.

Therefore, a research carried out by Management Agility Inc, (2005), revealed that it is imperative to adopt a thorough evaluation and evaluation process before adopting any ERP solution in SMEs.

Planning

RFP

Solution Evaluation

Negotiation

Selection and Agreement

ERP Software & Hardware (Solution) Evaluation and Selection Steps

Define Requirements

Shop Round for Product

Clarify Requirements

Evaluation Vendor Inquiry

Interact with Vendors

Negotiate Agreement

Action Agreement

Define business case/need and spell-out required values. Be specific. Ensure the business sponsor is willing to push through business case for change.

Look round the market for what product is available. Identify vendors that operates and their general approaches to technologies the take. Discuss with others in the same industry as you are etc.

Clarify your requirements and be sure of what you are looking for in line with you business case. Refine requirements if possible and be specific too.

Find out what product is looking promising in line with the business need and from which vendor. Identify which vendor and their products and invite interesting ones for demo etc. Request for proposal (RFP).

Invite each shortlisted vendor over for a chat and find out more about the product. List out expectations based heavily on business requirements.

At this point evaluate this approach. Can you afford to change your current process? Can you afford the change the new product will bring and many more?

Initiate Negotiation for the selected product with the selected vendor. Agree on who does what, when are they to be done. Negotiate deliverables, timelines, cost & payments schedules and terms, support inclusive.

Review all legal terms, finalise the contract and select product for onward implementation.

Alignment of business requirement to what the software/hardware can provide. This is the core of the whole exercise else stop the evaluation.

Evaluate the product capabilities in line with the business requirement. Evaluate the impact of this product on the business requirement.

Stage 5

Fig. 2: Detailed flowchart for ERP Software, Hardware Evaluation and Selection Processes

Analyse Gaps

For effective ERP Solution evaluation and selection process, the above steps are categorised into 5 phases as explained below;

Stage 1 - Plan Requirement

Business need is defined, along with areas in business that required technical approach.

Develop a specific business case with business value for a solution.

Ensure that the project sponsor is willing to articulate the business case for change.

Indentify vendors that operate in the line of products you are looking for.

Get familiar with the software and hardware infrastructure presence for the solution seeking.

Get general view of investment needed, considering software, hardware, other related infrastructure and ongoing support.

Based on the survey, evaluate the organisation readiness for the investment and decide whether to continue or not.

Now define priorities under "must-have" and "nice-to-have" accordingly.

Stage 2 - Request for Proposals (RFP)

Shortlist interesting vendor based on the outcome of market survey for products.

Invite interesting vendors for interaction/demonstration of their products.

Collects facts/functionalities in line with the business need from various products demonstrations for the developments of unbiased RFP for vendors.

Set-up a neutral body to develop RFP using all facts gathered during products demonstration aligned to the business requirements.

Distribute out RFP that addresses the vendor as a company and the products they offer.

Generate basic expectations from an ideal proposal in line with the business need for onward selection of the ideal software vendor.

Stage 3 - Solution Evaluation

Identify and prioritise remaining gaps between software capabilities as demonstrated and business requirements. Sample form in fig. 3; below.

Identify how the gaps will be bridge in terms of configuration, configuration, process change or combination of all these.

If the gaps can be bridge consider reengineering of those affected business processes affected and continue with the evaluation.

Stage 4 - Contract Negotiation

Negotiate with each vendor.

Establish software, hardware and other infrastructure agreement requirements, which include version, components, maintenance and support. Also negotiate participation in user groups, license costs, maintenance fees and many others.

Establish service provider agreement which also include deliverables, timelines, resources, costs and payment schedules.

Establish other legal requirements.

Stage 5 - Selection and Agreement

Upon successful negotiation with the right vendor;

Review all legal terms on privacy protection, operation guidance and data manipulation etc.

Approve agreements with the selected vendors.

Agree on implementation plan.

3.2 ERP IMPLEMENTATION LIFE CYCLE:

1. During the pre-evaluation phase, ERP vendors available in the market are screened based on business requirements. ERP packages that don't suit the business requirements are eliminated.
2. During the package evaluation phase, selected package is evaluated against requirements across departments.
3. A detailed requirement analysis is done, involving different managers from across the departments. Requirement analysis helps list down all the functionalities required to ensure efficient processes across the organization.
4. Based on the analysis of requirements and functionalities, a detailed project plan is laid out. This involves senior management team and ERP experts. Designs are finalized; key resources to be involved in the project are identified in various departments; special arrangement is also made to tackle contingencies.
5. Once the planning is done, business process re-engineering takes place. Implementing ERP will impact the job responsibilities of lot of employees. So, new roles and responsibilities are to be assigned to employees. Processes are to be re-structured and integrated with ERP tools.
6. Post implementation and integration, staff and managers are to be trained properly so that they get good practice. Consultants will help employees to get hands on experience of the ERP tools.
7. At last, the tools that are implemented are tested rigorously. Issues arising during the testing phase are fixed and required changes are made.
   Thus ERP Implementation process can be explained.

ERP Implementation Lifecycle
- ERP Implementation

- ERP implementation lifecycle focus on the ERP project which is carried out to make ERP up and running.

- ERP project is likely to go through different phases like any other project.

- Most often these phases do not necessarily depend on one another in a sequence, i.e. one phase might start before previous phase has finished.

- Also all phases that will be discussed may not be applicable in all cases.

- The different phases of ERP implementation are:-

3.2.12 **Pre-evaluation Screening**
3.2.13 **Package Evaluation**

3.2.14 **Project Planning Phase**

3.2.15 **Gap-Analysis**

3.2.16 **Reengineering**

3.2.17 **Configuration**

ERP Implementation

3.2.18 **Implementation Team Training**

3.2.19 **Testing**

3.2.20 **Going Live**

3.2.21 **End-user training**

3.2.22 **Post – implementation**

3.2.1 Pre-Evaluation Screening

When the company has decided to implement the ERP the search for the convenient and suitable ERP package begins.
Refers to the discussed previous lecture *("ERP Selection")* to understand the criteria used in selecting particular ERP package.

3.2.2 Package Evaluation

The objective of this phase is to find the package that is flexible enough to meet the company's need or in other words, software that could be customized to obtain a 'good fit'.
Once the packages to be evaluated are identified, the company needs to develop selection criteria that will permit the evaluation of all the available packages on the same scale
To choose the best system, the identification of the system that meets the business needs, and that matches the business profile.
Some important points to be kept in mind while evaluating ERP software include:

a) Functional fit with the company's business process.

b) Degree of integration between the various components of the ERP system.

c) Flexibility and scalability

d) Complexity

e) User friendliness

f) Quick implementation

g) It is better to have a selection committee that will do the evaluation process.

3.2.3 Project Planning Phase

    a. This is the phase that designs the implementation process. Time schedules, deadlines, etc. for the project are arrived at.

    b. The project plan is developed in this phase.

    c. In this phase the details of how to go about the implementation are decided. The project plan is developed, roles are identified and responsibilities are assigned.

    d. The organizational resources that will be used for the implementation are decided and the people who are supposed to head the implementation are identified.

    e. The implementation team members are selected and task allocation is done.

    f. The phase will decide when to begin the project, how to do it and when the project is supposed to be completed.

    g. The phase will also plan the *'What to do'* in case of contingencies; how to monitor the progress of the implementation;

    h. The phase will plan what control measures should be installed and what corrective actions should be taken when things get out of control.

    i. The project planning is usually done by a committee constituted by the team leaders of each implementation group headed by CIO.

3.2.4 Gap Analysis

    This is the most crucial phase for the success of the ERP implementation.
Simply it is the process through which companies create a complete model of where they are now, and in which direction they want to head in the future. The trick is to design a model which both anticipates and covers any functional gaps.

    Some companies decide to live without a particular function. Other solutions include:

a. Upgrade

b. Identify the third party product that might fill the gap

c. Design a custom program

d. Altering the ERP source code, (the most expensive alternative; usually reserved for mission-critical installation)

3.2.5   Reengineering

    This phase involves human factors.

    a. In ERP implementation settings, reengineering has two connotations. The first connotation is the controversial one, involving the use of ERP to aid in downsizing efforts.

    b. In this case ERP is purchased with aim of reducing the number of employees.

    c. Every implementation will involve some change in job responsibilities as processes become more automated and efficient.

    d. However it is best to regard ERP as investment and cost-cutting measure rather than a downsizing tool.

e. ERP should endanger business change but not endanger the jobs of thousands of employee.
f. The second use of the word 'reengineering' in the ERP field focus on the Business Process Reengineering (BPR)
g. The BPR approach to an ERP implementation implies that there are two separate, but closely linked implementations on an ERP site.

3.2.6 Configuration

It is important for the success of ERP implementation that those configuring the system are able to explain what won't fit into the package where the gaps in functionality occur. ERP vendors are constantly make efforts to lower configuration costs. Strategies that are currently being done include automation and pre – configuration.

ERP Implementation

3.2.7 Implementation Team Training

Synchronously when the configuration is taking place, the implementation team is being trained.
This is the phase where the company trains its employees to implement and later, run the system.
For the company to be self-sufficient in running the ERP system, it should have a good in-house team that can handle the various solutions.
Thus the company must realise the importance of this phase and selects right employees with good attitude.

3.2.8 Testing

This is the point where you are testing real case scenarios.
The test cases must be designed to specifically to find the weak links in the system and these bugs should be fixed before going live.
Going Live
This is the phase where all technicalities are over, and the system is officially declared operational.
In this phase all data conversion must have been done, and databases are up and running; and the prototype is fully configured and tested.

3.2.9 Going Live

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The implementation team must have tested and run the system successfully for some time. Once the system is 'live' the old system is removed and the new system is used for doing business.

3.2.10 End-User Training

This is the phase where the actual users of the system will be trained on how to use the system.The employees who are going to use the new system are identified and their skills are noted.Based on their skill levels are divided into groups.
Then each group is given training on the new system.
This training is very useful as the success of the ERP system is in the hands of end-users.
The end-user training is much more important and much more difficult than implementation team training since people are always reluctant to change.

3.2.11 Post – Implementation

This is the very critical phase when the implementation phase is over.
There must be enough employees who are trained to handle the problem that might occurred when the system is running.
There must be technical people in the company who have the ability to enhance the system when required.
Living with ERP systems will be different from installing them.
Projects for implementing the ERP systems get a lot of resources and attention.
However an organisation can only get the maximum value of these inputs if it successfully adopts and effectively uses the system.

3.3 ERP implementation, Methodology and Frame work- Training

Implementation of ERP system is a complex exercise, involving many process alterations and several legacy issues. Organizations need a implementation strategy encompassing both pre implementation and implementation stages. The fallout of a poor strategy is unpreparedness of employees, implementation not in conformity with wider business strategy, poor business process redesign and time and cost overrun.

Following issues must be carefully thought out and formulated, as a part of implementation strategy, before embarking on actual implementation:

Business Process: Hypothetically, company insiders should know best about the processes of their organization. But employees often constrained to work in departmental silos and overlook wood for the tree. Under most circumstances, prevailing business practices are not properly defined and no"as is" flow charts, documenting existing processes, are available.

An ERP implementation could be a great occasion to assess and optimize existing business processes, control points, breaking points between departments, and interfaces with trading partners. But, often, due to resistance to changes and departmental clouts, ERP implementation is comprehended as an exercise to automate legacy processes. This may lead to little improvement in underlying business processes, resulting no appreciable return on investment.

Automating existing manual processes peculiar to a company necessitates, significant source code customization, as even a best fit ERP product match to a maximum of 85% to 90% of legacy processes. Source code customization will not only require changing of software objects but also need changing data models. The efforts needed to make such changes are significant in terms of development, testing and documentation. The future cost of maintenance and upgrades will be substantial, affecting entire life cycle of the system.

Unless a considered view favoring process changes is taken as a part of implementation strategy, pressure will mount subsequently for more and more customization, when the exercise of Business Process Mapping and Gap Analysis is taken up during implementation.

ERP systems are highly configurable and contain series of design trade off to meet various nuances of the same business cycles / processes. This should, normally, be sufficed to cover needed processes, probably with a little bit of swapping whenever needed. At occasions, it may be imperative to change source code to account for some unique core processes of the organizations. Procedure for authorization of such changes, normally requiring attention from sponsor, should also form part of the strategy document.

Implementation Methodology: Selection of implementation methodology constitutes an important component of implementation strategy. Most popular implementation methodology is "big bang" approach where on a scheduled cut-off date; entire system is installed throughout the organization. All users move to the new system and manual / legacy systems are discontinued. The implementation is swift and price tag is lesser than a phased implementation. On the flip side, risk element is much higher and resources for training, testing and hand holding are needed at a much higher level, albeit for a shorter period of time.

Another major implementation strategy is "phased implementation", where roll out is done over a period. This method is less focused, prolonged and necessitates maintenance of legacy system over a period of time. But, phased implementation is less risky, provides time for user's acquaintance and fall back scenarios are less complicated. There are various choice of phasing such as i) phased roll out by locations for a multi location company ii) phased roll out by business unit e.g. human resources iii) Phased roll out by module e.g. general ledger.

Methodology of implementation should form an important constituent of implementation strategy, which should be formulated after considering availability of resources, state of preparedness, risk perception, timeframe of implementation and budgetary provisions.

Other important strategy issues:

- Legacy data: Gathering, cleaning and removing of duplicate data.
- Hardware and software: Addition and updating of existing resources. Compatibility with existing Operating system and Database.
- Project structure: Project champions and competency centre.

3.4 Data Migration:

Data migration is the process of moving required volume of data from existing systems to new systems. Existing systems can be anything from custom-built IT infrastructures to spreadsheets and standalone databases. Data migration encompasses all the necessary steps to cleanse, correct and move data into a new system. Technological changes, change in providers, software updates or data warehousing/data mining projects make such delicate and critical operations necessary. A good data migration should allow one to:

Reduce risk: Data being an organization's most critical business asset, it is essential that any manipulation be carried out without any disruption.

Lower operational expenses: Data migration is a one-off activity triggered by certain circumstances. The data migration tool or solution reinforces the organization's resources which can remain focused on its ongoing continuous core activities.

Improve data quality: The cleansing and correction solutions ensure perfect data integrity after it has been migrated. From a user and development perspective, the migrated data results are completely optimized.

From a user perspective, the data migration solutions should make sure that a strategy is put in place to achieve maximum flexibility and quality.

3.5 People Organization in implementation:

3.5.1 ERP CONSULTANTS & VENDORS:

During 1990, ERP market was dominated by few vendors namely SAP, BaaN, Oracle, People Soft and JD Edwards, who were also known as big five of ERP market. The market was, then, was growing at compound rate of approximately 35%. Fortune 500 companies were the major customers. Key focus of ERP vendors, during that period, was to expand functional scope of their product and provide sharper vertical focus. Manufacturing made up for the largest segment of ERP spending.

ERP market went into an upheaval and following trend emerges:

Increased acquisition and merger activities: Financially stronger ERP vendors started to swallow their weaker brethren. Private Equity firms also started to play a big role. BaaN was taken over by Invensys and subsequently by SSA Global. SSA Global was later merged with Infor, which was supported by a large private equity company. J. D. Edwards was merged People Soft which in tern was taken over by Oracle through a hostile takeover.

Segmenting / diversifying of ERP Market: Due to saturation at top end, ERP vendors were trying to penetrate medium and small market segments. The market thus got segmented into tier 1(large organization), Tier 2(medium organizations) and tier 3 (small organization). Major ERP vendors started offering products for lower end of the market either through extension/rationalization of their products or through acquisition. ERP vendors were also diversifying their product to different verticals. Whereas, manufacturing provided the major chunk of their revenue, the focus area turned to retail, public sector, utility, financial sector, and telecom.

Web enablement: Rising opportunity of ERP vendors was to leverage their existing products with niece acquisition, to extend beyond their earlier solutions, limited to four walls of an organization. The explosive development of internet made possible seamless web based collaboration by organizations with their vendors and customers, such as "mySap.com" solution from SAP and e-business suite from Oracle.

Some Key Vendors

- **SAP:** They are the largest ERP solution provider with more than 75.000 customers and 12 million users and holding around 30% of market share. The flagship Solution, R/3 is unmatched for its sophistication and robustness. R/3 software gives an option of around 1000 pre-configured business processes. This solution is available in all major currencies and languages and can be hosted on several Operating Systems and Databases. As mid market option, SAP has brought out, Business All in One, a solution with industry tailored configurations. SAP offering for smaller organization is SAP Business One. SAP offers a hosted solution, namely SAP Business by Design, for organizations lacking IT resources.
- **Oracle:** Oracle is next to SAP in ERP market breadth, depth and share. It offers a comprehensive, multilingual and multi currency solution, mostly through its channel partners.. It is the first to implement internet computing model for developing and deploying its product. Oracle also took over various ERP solution providers during 2000 such as People Soft, JD Edwards, Retek (retail industry solution), and Siebel (customer relationship management software). It has taken up project Fusion (based on Service Oriented Architecture) to integrate various products, outcome of which is keenly awaited.

- **Infor:** Infor is of recent origin and expanded through a number of acquisitions. Its acquisition of SSA global during 2006 made it a forerunner as ERP solution provider. SSA global had two strong product lines, BPCS and BaaN. SSA also made a number of other acquisitions, such as MAPICS, Lily Software Associate and GEAC. SSA is focused on building, buying and integrating best of breed solutions.
- **Microsoft Dynamics:** Microsoft, which did not have an ERP portfolio, started by acquiring a host of ERP products like Navision, Solomon, Great Plain and Axapta. Excepting Axapta, which is strong in manufacturing and suitable for mid market, other products are meant for smaller organizations. Microsoft is much dependent on channel partners, not only for sales and consulting but also for add on development. Their solutions are closely integrated with their office suit.

3.5.2 EMPLOYEES.

- ERP EMPLOYEES TRAINING:

We've all read about the benefits of ERP software solutions in businesses. However, what many don't seem realize is the importance of ensuring the proper training for all employees (or ERP users). Simply implementing an ERP solution won't increase efficiency at your company; it's the combination of the ERP solution and knowing how to properly use the system. If employees don't fully understand how to use the ERP system, then efficiency will not be reached and some may view the investment as wasted.

UNIT IV POST IMPLEMENTATION   *8*
Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of ERP Implementation.

4.0 ERP Implementation:

ERP implementation is the firm's ability to adapt, configure, and integrate information flows and business processes. Even though a firm may implement ERP, it needs to adapt, reconfigure, and integrate its information flow and business processes on a continuing basis because markets change and new technology are created.

Successful ERP implementation involves redesigning business processes from an inflexible, mass-transaction orientation to an agile, lean, and knowledge-based process During business process transformation efforts, firms must incorporate corresponding training programs, operating procedures, and information technologies to support the emerging infrastructure. The result of appropriately implementing ERP is to improve firm performance primarily caused by redesigned business processes, integrated managerial functions, accelerated reporting cycles, and expanded information capabilities.

For the past few years, it has been possible to buy most so-called "back office" business applications--largely, transaction processing systems for such tasks as accounting, manufacturing, or human resources--off the shelf as packaged products. Packages to do this collection of work are generally referred to as Enterprise Resource Planning (ERP) systems, or sometimes, Enterprise systems. Most ERP systems are huge because of the diversity of tasks they must perform, the fact that they integrate those tasks, and the flexibility they must have to perform those tasks at enterprises with vastly varying needs.

4.1 Maintenance of ERP :

ERP maintenance presented a key definitions. First, we offered definitions for traditional business systems maintenance. We defined maintenance of a traditional business system as consisting of (at least) *enhancement* (changes to the functionality/requirements of the system) and *correction* (changes made to correct errors in the system).

Then we offered comparable definitions for the ERP setting. We defined maintenance of an ERP system as consisting of the following:

- **Customization** (changes made to ERP functionality via internal configuration switches)
- **Extension:** changes made via ERP system "exits" to...
  - **Custom-code "add-ons"**
  - **Third-party vendor "bolt-ons"**
  - **Legacy systems**

- **Modification** (changes made to the code of the ERP itself--either by the user or the vendor)

The underlying concern here was that, with the large level of maintenance/enhancement needed by traditional information systems, it might not be possible to perform comparable changes to an ERP. If that were the case, the longevity of use of an ERP could be severely compromised.

We asked whether the respondents had made changes to their ERP's functionality since implementation

Everyone had done "customization" (using configuration switches); all but one had done "extensions" (half of those had done "add-ons" and/or "bolt-ons" and/or linking to legacy code); a third of the total had used the vendor-supplied language to build extensions. Two-thirds of the respondents had had modification performed (changes to the ERP code itself), largely done by the users themselves or (to an extent half that for user changes) by the vendor of the ERP. (Note: User package software modification is generally considered to be a very bad practice.)

We then asked the respondents to compare the ease of ERP changes with comparable changes to a traditional, custom-built information system. A third of the respondents chose not to express an opinion on this matter (likely coming from the user community instead of a traditional IS background).

4.2 ERP SYSTEM CAN MAKE IMPACT ON ORGANIZATION:

With the fast developing of industries and the need for managing procedures and resources, it has become very important to have a tool which can help you coordinate several activities, and the best one is ERP. The advantages of having ERP are many. It gives you the opportunity of integrating every procedure of your business while improving the quality of several areas simultaneously. These areas include human resources, accounting and operations. In addition, ERP helps to increase your production levels and to control your costs more efficiently, and this means that you will be able to control the whole enterprise more efficiently.

A very important facility of the ERP systems is that they increase the availability of the information, helping companies to have information in real time to make decisions and accurate prognostics regarding the organization. It is important to mention that ERP systems are a very powerful tool when it comes to processing and organizing financial data. It improves the development of the commercial activity in the short and long term.

In the enterprise management module you can perform integral strategic planning, keeping an eye on the daily activities and having fluent communication with the investors. The human resources module allows you to make decisions and optimize the company's investments regarding employees. With all of this one can see that an ERP system brings visible advantages.

Another important consideration to make is that the implementation of ERP takes time and generates deep changes in the way you do business. But the important thing to remember is that every enterprise can see the benefits of the ERP systems, although for the first period it may only seem like an investment. The benefits indeed are really bigger than the costs, and it is very valuable l to invest in an ERP system.

4.3 SUCCESS FACTORS OF ERP IMPLEMENTATION:

Not quite. In order to keep your ERP solution working at peak efficiency – and providing the business advantages you're paying for – you need to have a plan for maintenance or you risk having your ERP system eventually become obsolete. Without a maintenance plan, the efficiency of your system will decline and its lifespan will be shortened. However, this kind of maintenance isn't so much nuts-and-bolts as it is figuring out how your company uses the ERP solution and figuring out ways to enhance its performance for your company.

Stay Up-to-date: Of course, one of the primary components of ERP maintenance is keeping abreast of upgrades from your vendor. Not only do these updates contain important bug fixes and increase your security, they also keep your solution from getting stale since many upgrades improve the functionality of your solution or add features. This is one way you can ensure that your ERP solution continues to meet your company's needs. You may feel that some upgrades aren't necessary for your company, but many need to be done sequentially. If you fall too far behind on the updates, it may be too difficult to catch up.

Changing Business Operations: Your business is constantly changing and so are your needs. If you don't have regular maintenance and support your ERP solution is likely to become static. The longer that goes on, the less it will fulfill your requirements. You may have added new customers, new services, or new technology – all of which can have an impact on how your run your organization. If your ERP solution can't keep up with these changes, employees will develop ways to get their desired results by working around it, thus diminishing the efficiency of the system. You should have an annual review of your business, its needs, and how it has changed so you can ensure that your ERP solution is keeping up with the times.

Training: Remember that people are an important component of ERP success. Yes, you had them trained when you installed the system, but do they remember everything they learned? Brush up training can help them use the system more efficiently, learn about the system's new functionalities, and get rid of bad habits that impede efficiency. Not to mention that you probably have new employees who have only learned the system through on-the-job training.

Improving the System: You will probably want to make adjustments to the system as the employees get used to it. They will use it differently after a year than they do when they're newly trained. Ask your employees for suggestions on how to enhance the system's

functionality. You'll get more out of your solution if it can adapt to more knowledgeable users. Equipment: Hardware can decrease in efficiency or wear out. Look at your equipment's metrics to see if there's been a drop off in performance. Sometimes the technology needs maintenance or such declines point to where you need maintenance on your ERP solution. Or there might be new technology on the market that can really improve your ERP solutions efficiency or effectiveness. You owe it to yourself to review your hardware needs and capabilities on a regular basis.

A true Enterprise Resource Planning (ERP) system integrates both internal and external information flows used by the organization within a single, comprehensive solution. An ERP solution incorporates the practical systems used by organizations to manage the basic commercial functions of their business, such as: planning, inventory/materials management, purchasing, manufacturing, finance, accounting, human resources, marketing and sales, services etc. The objective of the ERP solution is to drive the flow of information between all internal business functions while managing connections, or "touchpoints.

ERP solutions run on a variety of computer hardware and network configurations, including "on premises" (i.e. client/server) or hosted (i.e. "cloud-based" or Software as a Service). ERP solutions use a common database to hold information from the various business functions that's accessible in some form or another by various users. The use of an integrated database to manage the solution's multi-module application framework within a common information system is one of the primary ERP benefits of this kind of system over "point solutions.

Unlike point solutions (historically used by small to midsize businesses) that rely on multiple (sometimes duplicating) databases which strain IT resources, ERP solutions standardize the use of one application to run an entire business. This not only increases efficiencies, but also decreases the overall total cost of ownership (TCO), thereby reducing operational costs and improving the company's profitability.

Key benefits of ERP software:

1. Scalability: An ERP system is easily scalable. That means adding new functionality to the system as the business needs change is easy. This could mean easy management of new processes, departments, and more.
2. Improved reporting: Much of the inefficiency in operational work stems from improper reporting. With an ERP system, this possibility is eliminated as reporting follows an automated template system, allowing various departments to access information seamlessly.
3. Data quality: As compared with manual record-keeping or other traditional approaches, an ERP system improves data quality by improving the underlying processes. As a result, better business decisions can be reached.
4. Lower cost of operations: An ERP system introduces fundamental innovations in managing resources, which eliminates delays and thus reduces cost of operations. For instance, use of mobility allows real-time collection of data, which is indispensable to lowering costs.
5. Better CRM: A direct benefit of using a good ERP system is improved customer relations as a result of better business processes.
6. Business analytics: Having high-quality data allows businesses to use the power of intelligent analytics tools to arrive at better business decisions. In fact, many good ERP systems have built-in analytics functionality to allow easier data analysis.

7. Improved data access: Controlling data access properly is always a challenge in organizations. With an ERP system, this challenge is overcome with the use of advanced user management and access control.
8. Better supply chain: Having the right ERP system in place means improved procurement, inventory, demand forecasting, etc., essentially improving the entire supply chain and making it more responsive.
9. Regulatory compliance: Having the system in control means organizations can better comply with regulations. Further, the most important and recurring regulatory requirements can be built right into the system.
10. Reduced complexity: Perhaps the most elegant argument in the favor of ERP systems is that they reduce the complexity of a business and introduce a neatly designed system of workflows. This makes the entire human resource chain more efficient.

There are many more benefits of an ERP system, but these are the chief ones. Needless to say, a good ERP system is indispensable in the modern economic scenario.

4.3.1. KEY SUCCESS FACTORS :

One of the most common fallacies with ERP implementations is that organizations are prepared for the undertaking. Organizations need to not only recognize and understand the success drivers, but also to take action on related preparatory recommendations that support them.

Success is defined as getting what you want with the ERP implementation, on time, on budget and with a satisfactory Return on Investment (ROI).

The key success factors are:

1. Project Startup
2. Management Commitment
3. Project Scope
4. Project Team
5. Change Management, Communication and Training
6. Customizations/Modifications
7. Budget
8. Project Closure

1. Project Startup

Perform the due diligence of getting the project on the right track by preparing all the necessary information and communicating it to the appropriate personnel.

Recommendations:

• Prepare/review the business strategy.
• Prepare/review the IT strategy.
• Prepare/review the ERP strategy.
• Prepare/review the project scope (included in more detail below).
• Prepare the organization for process changes and the new system by applying the proper change management strategies and techniques.

2. Management Commitment

An ERP implementation is going to impact how a company operates by updating business processes and changing system transactions. IT should not be the only area responsible for the project. Senior managers and mid-level managers should be involved in the project from its inception to its completion. This gives the project the proper visibility across the organization and shows the staff in general the importance of the project.

Recommendations:

• Involve management in project sponsorship, a steering committee, issue escalation and issue resolution. This involvement will help to maintain management support and keep them informed about the project.

3. Project Scope

The core ERP system will most likely not satisfy all the needs of the organization. Develop the ERP strategy and understand the components of the ERP, and how it will fit with other systems and tools. Define your project scope from a position of knowledge, fully detailing what the project is going to include.

Recommendations:

• Understand the business requirements and plan how they are going to be satisfied.
• The ERP will satisfy some of your business requirements. Put together a plan as to how other business requirements such as data management, business intelligence, social media, etc. will be met.
• Document items that are not in scope.

4. Project Team

The core project team should be composed of full-time personnel, including a project manager and others representing the core areas of the business. If a consulting integrator is used, the core project team needs to have a good and cohesive working relationship with the consultants. Also, identify a set of resources from the various areas of the business to provide subject matter expertise.

Recommendations:

• Use proven implementation methodologies and tools for the project.
• Empower the implementation team to make decisions.
• The core project team should be in the same location to aid in communication.
Create a competency center for post go-live support needs.
• Identify subject matter experts (SMEs) from pertinent areas across the organization.
• Project team to have a good working relationship with the consultants.

5. Change Management, Communication and Training

The ERP project will not only result in changes in systems, but also process and organizational changes. A change management team will be necessary for the organization to deal with the impact. The size of the team will vary depending on the size of the project and amount of changes. Training falls under change management, and the most common method is to "train the trainers." Normally the software vendors or the consulting integrators will train the trainers, who are employees in the organization. This approach is most helpful, because the organization will end up with the trained professionals on its staff.

4.3.2 Failure of ERP Implementation:

1. Doing it in the first place.

Even before implementation the company is dilemma whether they really require it or not. Often large ERP implementation projects fail before they even start. Companies unhappy with their current system become convinced their reporting, integration, or efficiency problems lie in the software they are using. Convinced the grass is greener on the other side of the fence, they embark on a large, risky, and expensive ERP replacement project, when a simple tune-up of their current system, or a small add-on application, such as a better reporting system or employee portal, would address the problem at a fraction of the cost. Even a reimplementation of the same software is usually less costly than switching to another software vendor.

2. No clear destination.

To be clear with the expectations. Once an organization makes the decision to implement a new ERP system, the first step is to have a clear definition of success. Often, lack of consensus on the problems being solved, the outcome desired, or the specific financial justification of the project, leads to challenges later controlling the scope and maintaining executive sponsorship. Having a clear destination means defining the important business processes, financial benefits, and deadlines up front and making certain stakeholders agree how to address them. Without a strong definition of success, the end point becomes a moving target.

3. A good plan or just a plan?

A detailed plan is very necessary for successful implementation. All projects of this size start with some kind of plan. However, more times than not, the plan are not realistic, detailed, or specific enough. Companies build a high-level plan with broad assumptions or underestimate the amount of business change involved. Despite how obvious this sounds, it remains the most common mistake companies make. To be a good plan, it needs to identify all the requirements and the people who are going to work on them. It needs to be at a level of detail where a knowledgeable person can visualize the work, usually in work blocks of a few days. It needs to have a logical sequence of tasks, like leaving time in the schedule to fix bugs found in test cycles. Until you have a good plan, you really do not know when the project will end or how much it will cost.

4. Part-time project management.

A person experienced in project management makes lot of difference. There is some debate whether project management is a skill all good managers should have or whether the field will eventually develop into its own professional discipline, just like there are registered engineers, nurses, and lawyers. Putting that debate aside, it is clear software projects of this size need their own dedicated, experienced project managers. Asking the executive sponsor or the business owner to also manage the project as a part-time adjunct to their main role means neither job will be done well. Not just a scorekeeper, the project manager needs to be an active leader pushing for accountability, transparency, and decisiveness.

5. Under-estimating resources required.

Most common blunder to happen is with resources projected. Having a solid understanding of the internal and external resources needed to complete the project is critical. For internal resources, understanding the time commitment needed from business users, typically in the Finance, Accounting, or Human Resources departments, is one of the most commonly underestimated areas. During critical phases of the project, it is often necessary to backfill the majority of transactional employees by bringing in temporary resources. This frees up the users of the new system so they have time for implementation and training. For external resources,

having an agreement up-front with your consultants and contractors about the specific duration, skills, and quantity of resources needed is critical.

6. Over-reliance on the consultants.

Too much dependability on consultant can make the team more redundant. Most ERP implementation projects involve consultants, for the expertise, best-practices, and additional resources they bring. While their outside experience is definitely helpful for a project, there is a risk that the company can become over-reliant on the consultants. The company needs to maintain control over the key business decisions, hold the consultants accountable, and have an explicit plan to transfer the knowledge from the consultants to the internal employees when the project is winding down.

7. Customization.

This aspect makes it or breaks it for an ERP tool. Most companies these days understand that customizing their ERP system adds risk, time, and cost to the project. In fact, customizations, along with interfaces and data conversion, are the main areas of technical risk in ERP implementations. Perhaps more surprising is that in a recent survey, less than 20% of respondents implemented their ERP system with little or no customization. Despite the risk and expense of customizations, most companies find it enormously difficult to control the project scope by turning down customizations. Customizations always start out small, but incrementally grow to become the technical challenges that derail these projects. Few ERP implementations have zero customizations, but take a very firm line on justifying even the smallest ones and manage them tightly.

8. On the job training.

Experience makes a lot of difference. The typical lifespan an ERP system within an organization is 10 to 12 years. With that in mind, most employees in a company have been through one or two ERP implementations in their career. Just as you would not be comfortable with a surgeon as their first or second patient, the leaders of your ERP project, both internal and external, need to have experience implementing your specific chosen system several times. This is one of the major benefits to working closely with an outside consultant or directly with the software vendor.

9. Insufficient testing.

It should be treated as rectifying stage. When schedules get tight, reducing the number and depth of test cycles is one of the first areas that often get cut. The purpose of testing in an ERP project is not to see if the software works. The purpose is to see if the system meets your business needs

and produces the output you need. Reducing testing may not leave defects undiscovered, but it certainly increases the risk the ERP system will be missing important functions or not be well accepted by end users.

10. Not enough user training.

The management shouldn't hurry to start using the tool without adequate training to users. Today's modern ERP systems are being used by more and more personnel within a company. Beyond the Finance and Accounting departments, modern systems also cover procurement, supply chain functions, compliance, customer relationships, sales, and much more. If the system includes human resources or expense reporting, then essentially all employees use the system. Training hundreds or thousands of users, to the right depth, at just the right time, is no easy task. Leaving training to a small phase at the end of the project makes it very difficult for users to get the training they need to understand the system and have a positive first impression at the rollout.

If ERP systems are the nervous system of a company, then doing an ERP implementation is like brain surgery: only to be attempted if there is a really good reason and not to soon be repeated. Unfortunately, ERP implementation projects often fall victim to some of the same problems of any large, complex project.

UNIT V EMERGING TRENDS ON ERP   9
Extended ERP systems and ERP add-ons -CRM, SCM, Business analytics - Future trends in ERP,systems-web enabled, Wireless technologies, cloud computing.

5.1. EXTENDED ERP SYSTEMS AND ERP ADD-ONS :

Businesses often employ two systems to make sure business processes run efficiently - a Client Relationship Management (CRM) system and an Enterprise Resource Planning (ERP) system. SAP, Oracle, Salesforce.com and Microsoft offer on-premise as well as Software as a Service (SaaS) CRM and ERP solutions to businesses of all sizes. A CRM system deals with frontend information - managing valuable customer data and enriching it through interactions with marketing and customer support.

This helps businesses understand prospects and clients, manage relationships and sales pipeline, and upsell and cross-sell products. An ERP system handles critical backend information - generally managing customer information that is required once orders have been placed.

This can include purchase history, billing and shipping details, accounting information, financial data, and supply chain management details. Both client relationship management and enterprise resource planning systems independently offer substantial benefits to businesses.

5.2 CRM:

The Integration Challenge Generally, ERP and CRM systems tend to remain siloed as their contrasting architectures make it difficult to streamline integration. Those who try to create seamless connectivity between the two often turn to custom point-to-point integration. This method is fragile, expensive, and difficult to maintain. With point-to-point connections, a developer needs to manage connectivity and implement changes. Moreover, changes impact the entire system, leaving room for errors. These point-to-point integrations deliver a short-term solution, but become overly complicated as businesses grow. Another method businesses many times resort to is "swivel chair" data entry.

 This method requires an individual to manually retrieve data from one system and enter it into another. Such a procedure is error-prone and takes an extensive amount of time and human resources. Some businesses simplify the task by employing data loaders such as Dataloader.io for Salesforce.com. When working with CRM systems offered by a vendor other than Salesforce.com, however, a different solution is required. With two different systems unable to communicate with one another, it becomes nearly impossible to track all customer interactions and obtain information through one interface. Sales reps spend time jumping between applications to create a 360 degree view of their customers, slowing down sales processes. As a lack of integration creates an inefficient workspace, businesses need a robust CRM and ERP integration solution in order to streamline their business processes.

5.2.1. Benefits of CRM Module:

1. Consolidated Sales Processes

One specific challenge that manufacturing firms face is supporting two modes of selling: a direct sales team and a distribution channel. Not only are you focused on appealing to your distributors so they push your product, you're managing your direct sales team and their relationships with your clients. So what happens when your direct sales team goes head-to-head with your distributor on the same project? Are you even aware of the overlap before it's too late? A well-implemented CRM system is flexible enough to support the two different modes of selling and get your teams the information they need to ensure you aren't engaging yourself in a bidding war.

2. Increased Visibility and Improved Forecasting

In our experience, we've found that a majority of sellers don't have access to their ERP systems. This is a problem! If you don't have a CRM system and you're storing valuable client and product information that your sales force needs, you have a problem. Because of this lack of access and information, any hope for accurate forecasting goes out the window. When integrated, ERP and CRM systems can give your team real-time visibility into the business data so they can properly   sell   and   have   compelling   conversations   with   customers.

3. Cleaner Quote to Cash Process

This is a conversation we have with almost every one of our manufacturing clients. The concept of having to create accurate quotes off of complicated product configurations is an extremely difficult task. But with increased visibility comes an improved quote to cash process (hallelujah!) We know that the product configurations that you create can be very complex because you build to order. Every choice impacts the next and without a deep understanding of the product configuration at the beginning of the project you're setting yourself up to fail. Unfortunately, we've found that the beginning of the sales process hasn't paid enough attention to product configurations and how this impacts the entirety of the project's lifecycle. When CRM and ERP systems are integrated, your sales team can access the information they need at the beginning to accurately quote and deliver.

4. Mobility

Now that you've addressed the two modes of selling, determined who is responsible for the sale, and integrated your CRM and ERP systems properly, your team is ready to hit the ground running. Or are they? Your field team is on the road having dynamic conversations with customers and they must be able to update content at the point of interaction, not at the end of the day. You have to have a mobility strategy that allows you to update pipeline and quote information on the fly. Mobile CRM applications allow you to capture and document this information, ultimately helping you to engage and make better decisions for your customers

based off of order information, historical purchases, and current production schedules; all accessible with just a swipe and a tap.

5. The Distributor Portal

A trend that we are currently seeing in manufacturing is an increased focus on keeping existing customers, rather than winning new business. This means that once you've made the sale, you have to pivot your attention to keeping the conversation going. Manufacturers, repeat after me: cross-selling is your friend. And how can your team cross-sell more effectively? Through portals updated with information from both ERP and CRM systems. Portals allow you to see where in the manufacturing process an order is, check the status and delivery of past orders, and see the account in real-time. All of this information gives you valuable insight that can help you make the next sale while keeping your existing customers in the know.

CRM is no replacement for ERP and ERP is no replacement for CRM, but the integration between these two systems is essential to increasing collaboration between departments. If you're considering integrating a CRM tool with your existing ERP system, remember this: the key is to create two systems that are tightly integrated and designed in a way that creates a customer-centric environment

5.3. Supply Chain Management (SCM):

SCM can help you transform a traditional linear supply chain into an adaptive network with the following benefits.

- With the increased visibility into the supply chain and adaptive supply chain network, you can be more responsive. You can sense and respond quickly to changes and quickly capitalize on new opportunities.
- By offering a common information framework that supports communication and collaboration, SCM enables you to better adapt to and meet customer demands.
- You can track and monitor compliance in areas as environment, health and safety.
- Information transparency and real-time business intelligence can lead to shorter cash-to-cash cycle times. Reduced inventory levels and increased inventory turns across the network can lower overall costs.
- With SCM, you can lower operational expenses with timelier planning for procurement, manufacturing and transportation. Better order, product and execution tracking can lead to improvements in performance and quality - and lower costs. You can also improve margins through better coordination with business partners.
- Tight connection with trading partners keep your supply chain aligned with current business strategies and priorities, improving your organization's overall performance and achievement of goals.

5.4.BUSINESS INTELLIGENCE (BI)

- Business intelligence (BI), also referred to as business analytics, is a term used to describe a range of different applications and technologies used to extract and analyze large amounts of data to aid in decision making. BI includes data-mining tools and querying tools, which are often
- interactive and visual. The growth of data-generating technologies such as RFID,combined with improvements in BI tools, has led to significant growth in the BI market. Prior to 2008, almost all of SAP's ERP business came from traditional ERP suite applications.

- However, in the period from 2008 to 2011, the percentage of the business that came from BI rose to 50 percent.On the left side of the diagram are the potential BI data sources, which are growingboth in number and in the volume of data produced. For example, sources such as Facebook, Twitter, and other social media applications can provide information on consumer reaction to new products.
- The center section represents the analytical capabilities of BI; it includes items such as analytic applications and business intelligence, which are similar sets of data analysis tools. In SAP's framework, analytic applications are data analysis tools applied to specific industries, such as financial services, manufacturing, consumer products, retail, and utilities or to functional areas, such as supply chain management, finance, human resources, IT, and service, sales, and marketing.
- SAP BI includes a set of tools for exploration, analysis, and presentation that can be applied to a wide range of business questions. Enterprise performance management is the concept of developing strategic goals for the organization and then gathering data to evaluate how the organization is performing in relation to those goals. The governance, risk, and compliance category represents a group of activities focused on ensuring an organization is functioning ethically and legally.

- Governance refers to the processes that ensure that top management is receiving accurate and timely data necessary to run the organization and that control mechanisms are in place to make sure that management directions and instructions are being carried out. Risk, or risk management, consists of processes to identify risks to the organization (technological, financial, information security, supply chain disruptions, and so on) and to develop plans to minimize the potential damage to these risks. Compliance means conforming to stated requirements, which could be customer specifications for goods or services, Sarbanes-Oxley reporting requirements or state and federal regulations such as those relating to product safety.

- Data warehousing is the technology used to store the large volumes of data used in the analysis. Enterprise information management is a relatively new term that describes the business and
- Technology functions that manage information as a corporate asset. Previously, this was primarily through personal computers, but with the growth in mobile technology, an increasing variety of devices can now be used to access BI.

BI tools are typically leveraged by analysts for high level discussions which involve strategic decisions. A BI tool accesses all of the data in your data warehouse, both strategic (revenue, profit and growth), and operational (daily sales performance). BI tools enable you to conduct in-depth analyses to generate comprehensive information that can deliver high-level insights.

ERP, on the other hand, is an operational system chock full of operational and transactional data. It will give you an exact view of your business from an operational perspective, but it is not built to perform trend analyses or give you high-level overviews. It is a tool centred around delivering operational insights.

5.5. WIRELESS TECHNOLOGY USED IN ERP:

Advancement of wireless technology in ERP has given it a boost that has made ERP a big solution provider to the companies working in different sectors. Today the effect of ERP on the market is immense due to the use of wireless technology that gives it the reach beyond geographical locations and has made data communication and integration faster and reliable in real time.

With the advent of wi-fi internet connections and offices, web enabled mobile devices and laptops ERP application and its features can be used and accessed from any where. Manufacturing companies working from many locations with their head office, manufacturing units, warehouses and sales offices at different locations ERP application alone would have made a little difference in reducing the pile of problems they faced, but with the use of wireless technology in integrating ERP applications, the data transfer and its availability to all the concerned departments with in the organization and outside organization has solved chunk of their problems. Manufacturing company management is now aware of the stocks in the warehouse, production status of any product, shipping details, deal status and various other set of information, crucial for decision making, at their laptops with out any delays due to far locations.

Compliance of best practices and company policies are much easier today with

advancement of wireless technology in ERP. Sales force of any company of any sector gets access to relevant data and status of the customer from any where which helps them in closing the deals faster. Distribution companies whether small or big can have 24x7 working with e-commerce feature only possible with wireless technology in ERP. Maintenance of web store can be automated with out any human intervention to avoid delays and wastage of man power. Self service options provided to customers or possible customers not only improve customer satisfaction but save valuable man hours of the front office which can be utilized for more productive work than simply providing price and warranty details.

Today large organizations have global headquarters working with many headquarters in different countries connected by servers through wireless technology. These organizations rely for their decisions on their ERP which provides them with updated data to give real picture irrespective of the geographical location of the point of data entry. The advancement of wireless technology only has made ERP application capable of providing such facilities to its users.

Like any other technology wireless technology also has some problem areas which are to be taken care of. With the use of wireless technology privacy becomes of utmost significance, whenever the real data is brought under the public domain it becomes literally impossible to maintain privacy from the third party. More security features are desired, to maintain privacy of the companies using ERP with wireless technology. More and more alternates shall be used for data transfer and integration as they may be helpful in the case of emergency when any system crashes down. But there are no two opinions on the fact that advancement of wireless technology has taken ERP applications few steps ahead in providing solutions to their users.

5.6. FUTURE OF ERP TRENDS:

- To analyze the future trends of ERP it is first important to look at the current state of ERP Software industry. ERP software is used for CRM (customer relationship management and SCM (supply chain management). Presently ERP companies are trying to expand the capacity of their product that is why many of them are catering to SMEs (small and medium enterprises) instead of large organizations.
- Internet and e-commerce combined have both played an important role in evolution of Enterprise Resource Planning. Companies are trying to combine their supply chain management functions with the internet so that suppliers can also have easy access to information from anywhere in the world. ERP software is integrating the business processes within a company; vendors are working to merge the collaboration of suppliers, customers and employees that work with them.

- Many ERP companies have started to focus on SME, they are providing tailor made products and services vertically by reducing the cost and complexity of implementation. The technologies continue to change, and companies must be able to adapt to new technologies if they wish to remain competitive. Due to an inevitable constant advance in technologies it can be difficult to judge which direction certain vital business resources are going. Fortunately, enterprise resource planning is relatively easy to project and can be predicted with some measure of clarity.

- That's because the basic tenets of ERP systems are well-established and only need to be converted to other kinds of devices to keep up with advances in technology. In fact, while the underlying science behind ERP systems might be above the heads of most of the population, the concept is relatively simple – the more information that companies have at their disposal, the more educated their decisions in the future will be. Here are some of the ways that data recording and prediction will improve going forward.

- **Customization**
  The type of customization that's on the horizon leans more towards the scope of the systems, rather than the capabilities of enterprise resource planning applications. In other words, no matter what the size and shape of a company is, it will be able to affordably record whatever data is vital for its operations. Many small and medium sized businesses already have the possibility to get a better handle on the materials that make them function, but soon almost any company might be able to log important information.

- **Social media integration**

  In the case of ERP systems, social media deems very important. Companies at which employees aren't often face-to-face or familiar with one another might have trouble sharing information and being more collaborative, the way that the additional data ERP systems provide might require. However, when live chat, video conferencing and business intranets are combined, it becomes a simple matter for different departments to work together to use the data that ERP programs provide to improve company operations. Every company needs to maintain the ability to manage their ERP no matter what direction it may lead to.

- **Private clouds**

    At the moment, many companies are mulling a conversion to cloud enterprise resource planning. Not all of them will go forward with such plans anytime soon, but there will come a time when almost all information is remotely stored. There is a point of diminishing returns at which local storage becomes impractical and needlessly expensive, so it isn't just ERP technology that will exist in the cloud – it will be almost all of it.

    - Profile of the consultants' team with the resume of each member
    - Consulting fee and payment details
    - Implementation methodology
    - Time schedule and the implementation budget
    - Terms and conditions of knowledge transfer and employee training
    - List of deliverables (reports, manuals, knowledge bases etc)
    - Project monitoring and status reporting systems.

5.7 CLOUD COMPUTING

Cloud computing can be defined in simple terms as the delivery of a software product to a
user via the Internet. The user typically accesses the cloud product through a Web browser or a lightweight (meaning small and simple) application for a computer or mobile device. Cloud computing is not a completely new concept, rather it simply represents the latest stage of the development of computing and the Internet. To better understand how cloud computing will impact ERP system development; it is useful to review the development of SAP's ERP systems with the advent of the Internet.

5.7.1 SAP and the Internet:

In 1996, SAP introduced its joint Internet strategy with Microsoft. The core of SAP's first effort to integrate the Internet with its products was the Internet Transaction Server (ITS) a server-based software system that enabled efficient communication between an SAP ERP system and the Internet. To provide some context for the state of the Internet at this time—in 1996, Amazon.com was only one year old, and the online travel agencies Expedia and Travelocity were both just being founded. Many other Internet services we take for granted today did not exist at this time.

In May 1999, SAP announced mySAP.com, a new strategy designed to completely realign the company and its product portfolio. The goal of this initiative was to combine e-commerce solutions with SAP's existing ERP applications, using cutting-edge Web technology. In 2000,

SAP began building on the mySAP.com vision by adding the capability for electronic marketplaces and corporate portals.

TWO MARKS & 16 MARKS QUESTION ANSWERS

UNIT I – INTRODUCTION

1. **Define ERP**.

Enterprise Resource Planning (ERP) covers the techniques and concepts employed for the integrated management of businesses as a whole, from the viewpoint of the effective of management resources, to improve the efficiency of an enterprise.

2. **What is an Enterprise?**

An enterprise is a group of people with a common goal, which has certain resources at its disposal to achieve that goal.

3. **What are the main misconceptions about ERP?**

- First is that ERP is a computer system.
- Second is ERP is for manufacturing organizations alone.

4. **What are ERP packages?**

ERP packages are integrated (covering all business functions) software packages that support the ERP concepts. ERP software is designed to model and automate many of the basic processes of a company, from finance to the shop floor, with the goal of integrating information across the company and eliminating complex, expensive links between computer systems that were never meant to each other.

5. **Who are the main players in the ERP market?**

SAP AG, PeopleSoft, Oracle, Baan, JD Edwards, QAD, Ramco, IFS, DataWorks etc.

6. **When do the ERP system's set of generic processes produce dramatic improvements?**

ERP software is a mirror image of the major business processes of an organization, such as customer order fulfillment and manufacturing. Its success depends upon reach – a circumscribed ERP system isn't much better than the legacy system it replaces. ERP system's set

of generic processes produce the dramatic improvements they are capable of, only when used to connect parts of an organization and integrate its various processes seamlessly.

7. What are the reasons for the explosive growth of the ERP market?

- They enable improved business performance by achieving: cycle-time reduction, increased business agility, inventory reduction, order fulfillment improvement etc.
- They support business growth requirements.
- ERP systems provide flexible, integrated, real time decision support.
- ERP packages can now be afforded by even small and medium sized businesses and offers increased functionality at a reasonable cost.
- They help companies in supporting new products and new customers by meeting their global requirements, including multiple languages and currencies.

8. What are the direct benefits of ERP systems?

- Business Integration
- Flexibility
- Better analysis and planning capabilities
- Use of latest technology

9. Why is it said that ERP systems are flexible?

Different languages, accounting standards can be covered in one system, and functions that comprehensively manage multiple locations of a company can be packaged and can be implemented automatically.

10. What is cycle time?

Cycle time is the time between receipt of the order and delivery of the product.

11. What is Business Integration and how do the ERP systems achieve it?

The reason why ERP packages are referred as being integrated is the automatic data updation (automatic data exchange among applications) that takes place between related business components.

12. What are the factors that are critical for the success of the ERP implementation?

- Selection of the right package

- Commitment of top management

- Participation and dedication of the system's future users

- Backing, support and cooperation of the IS/IT personnel

- Development of interfaces with current operational systems and with those under development

- Effort of consultants, who have respect for the company's know-how and work culture

- Spirit and collaboration on the part of all

13. How do conventional application packages and ERP packages differ?

- First, ERP packages cannot have only individual business functions such as accounts and inventory, but also the entire range of main business functions necessary for the company's operations

- Second, ERP packages are targeted at everything from small businesses to the largest organizations, and that they can be composed of a highly flexible decentralized database and an information system cluster linked by a network

- Third, is global adaptation, represented by ERP packages' multilingual and multi-currency capacity.

14. What are the limitations of ERP?

- Managers cannot generate custom reports or queries without help from a programmer and this inhibits then from obtaining information quickly, so that they can act on it for competitive advantage

- ERP systems provide current status only, such as open orders. Managers often need to look past the current status, to find trends and patterns that aid better decision-making

- The data in the ERP application is not integrated with other enterprise or division systems and does not include external intelligence

16 Marks Questions and Answers
UNIT I – INTRODUCTION

1. **What is ERP? Give an overview.**

- ERP

  ERP concept describes the integration of key business information across the organization by way of computer software that is engineered to benefit the organization as a whole and improve its competitive posture.

- Reasons for growth of ERP market

  a. Intra department communication

  b. Paperless work

  c. Conflict free system

  d. Focuses on the growth of the business

  e. Go global

  f. Decision support system

  g. Overcome limitations of legacy system

  h. Latest technologies

- Advantages

  a. Business integeration

  b. Accuracy and cost control

  c. Flexibility

  d. Multilanguage

  e. Multi Currency

  f. Multiple accounting standards

  g. Analysis and planning capabilities

  h. Decision making

  i. Latest technology

- Problem areas

  a. Personnel turnover

  b. Customization

c. Too expensive

d. Technical deficiency

e. problem in sharing

f. Inability

- Future of ERP packages

2. **What is an Enterprise? Give an overview.**

- Enterprise

    Enterprise system can be defined as a computer based information system that is built around a common database. This means that data that are registered by a user can be used by others who have access to the enterprise system instantaneously.

- Integrated management information

    An integrated management system is one that produces information using input,process and output with a feedback architecture.

- Role of enterprise

    Enterprise system can be described as complex information system which supports organizations in their business activities and also integrate all business data transactions as a single entity. Enterprise systems are application software packages that help manage business activities, information flows, information analysis, generating reports in the organizations etc.

- Business modeling
- Integrated data model

    The organizations use integrated data for analysis and taking decisions.

3. **What are the benefits of ERP?**

- Reduction of lead time
- On-time shipment

- Reduction in cycle time

- Better customer satisfaction

- Improved supplier performance

- Increased flexibility

- Reduction in quality costs

- Improved resource utility

- Improved information accuracy and decision making capability

4. **Write about the related technologies of ERP?**

- Business process Reengineering (BPR)

- Management Information system (MIS)

- Decision Support system (DSS)

- Executives information system

- Data Warehousing

- Data mining

- On-Line Analytical processing (OLAP)

- Supply chain Management(SCM)

- Customer Relationship Management

- Business Intelligence (BI)

5. **What are the phases of BPR?**

- Begin organizational change

- Building the reengineering organization

- Identifying BPR opportunities

- Understanding the existing process

- Reengineering the process

- Blueprint of the New Business System

- Perform the transformation

UNIT II – ERP SOLUTIONS AND FUNCTIONAL MODULES

1. **Define business.**

Business can be defined as the activities of individuals or groups that are involved in developing, producing and distributing the goods and services needed to satisfy other peoples' needs.

2. **What are the three resources of business?**

Land, labour and capital

3. **State the various business modules in ERP system.**

- Human resources
- Finance
- Manufacturing
- Plant maintenance
- Sales & distribution
- Materials management
- Quality management
- Production planning

4. **State the finance modules in most ERP systems**.

- Financial accounting
- Investment management
- Controlling
- Treasury
- Enterprise controlling

5**. Write about financial accounting.**

It provides company wide control and integration of financial information that is essential to strategic decision making. It gives the ability to centrally track financial accounting data within an international framework of multiple companies, languages, currencies and charts of accounts.

6. What are the three different layers of SAP R/3?

- Database layer
- Application layer
- Presentation layer

7. What is asset accounting and legal consolidation?

Asset accounting manages the company's fixed assets, whereas legal consolidation permits direct data transfer, from individual statements into the consolidated report.

8. What is cost centre accounting?

Cost center accounting analyses where overheads occur within the organization. Costs are assigned to the sub-areas of the organization where they are originated.

9. State the versions of SAP's ERP package.

- Mainframe version (SAP R/2)
- Client/server version

10. State some major subsystems of manufacturing module.

- Material and capacity planning
- Shop floor control
- Quality management
- JIT / Repetitive manufacturing
- Cost management
- Tooling

11. What are the various subsystems in HR module?

- Personnel management

- Organizational management

- Payroll accounting

- Time management

- Personnel management

12. What are the various subsystems of a plant maintenance module?

- Preventive maintenance control

- Equipment tracking

- Component tracking

- Plant maintenance calibration tracking

- Plant maintenance warranty claims tracking

13. What are the main modules of Materials Management module?

- Pre-purchasing activities

- Purchasing

- Vendor evaluation

- Inventory management

- Invoice verification and material inspection

14. State the sub activities in pre-purchasing.

- Requirements calculation

- Requisition for quotations

- Vendor ratings

- Quotation evaluation

- Vendor selection

- Contracts

15. What is BPR?

BPR or Business Process Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed.

16. **Give some sales related business transactions.**
   - Sales queries, such as inquiries and quotations
   - Sales orders
   - Outline agreements, such as contracts and scheduling agreements
   - Delivery / shipment
   - Invoicing / billing
   - After sales support

17. **What are the basic functions in sales order processing?**
   - Inquiry handling
   - Quotation preparation and quotation
   - Contracts and contract management (order management)
   - Monitoring the sales transactions
   - Checking for availability
   - Transferring requirements to materials planning (MRP)
   - Scheduling the delivery
   - Calculating pricing and taxes
   - Checking credit limits
   - Invoicing / billing
   - Creating printed or electronically transmitted documents

18. **What are the subsystems in a sales and distribution module?**
   - Master data management
   - Order management
   - Warehouse management

- Shipping
- Billing
- Pricing
- Sales support
- Transportation
- Foreign trade

19**. Who are the main players in the ERP market?**

SAP AG, PeopleSoft, Oracle, Baan, JD Edwards, QAD, Ramco, IFS, DataWorks etc.

16 MARKS QUESTIONS AND ANSWERS

1. **State the process of ERP software solutions?**
   a. Analytical and reporting tool
   b. Latest technology and continuous upgrades
   c. Internet enabled ERP
   d. Customize for the needs
   e. User friendly
   f. Business specific models
   g. Multi organization, multi location, multi-currency and multi-lingual
   h. Automated information flows
   i. Integrated with third party applications
   j. Facilitate decision making
   k. Cost saving solutions
   l. Transparency in business process
   m. Improves speed
   n. Effective communication
   o. Competitive advantage
   p. Dealership and supplier management
   q. Supply chain management
   r. Customer relationship management

s. Enterprise asset management (EAM)

t. Project management

u. Process control

v. Advanced planning and optimization.

2. **How the vendor solutions are classified?**

The different solutions are offered by the ERP vendors.

1. Large vendor solutions

2. Small vendor solutions

3. Medium vendor solutions

4. Vertical vendor solutions

3. State the objectives of Business process reengineering.

1. Customer centric

2. Reduces costs

3. Flexibility

4. Increases speed

5. Encourages creativity

6. Focuses on quality control

7. Productivity

4. Classify the features of BPR?

1. Enhances effective communication among the employees.

2. Focuses more on training and education of the employees.

3. Effective rethinking and reengineering of business process.

4. Enhances the decision making process for the managers and executives.

5. Accurate information system integration.

6. Consolidation of various activities into one component of the organization.

7. Multiple processes are done simultaneously in the organization.

8. Focused contact point is provided to customers.

9. Commitment to strong leadership

10. Empowerment of the process in organization

11. Emphasis on involvement of people in the organization.

12. Review of motivation and reward system.

13. Proper setting up of goals and performance measures.

14. Suitable methodology to optimize the available resources.

05. Explain the best practices of BPR:

1. Task elimination

2. Task modules

3. Integrated technology

4. Empowerment

5. Order management

6. Rearranging

7. Specialization

8. Data integration

9. Concurrent

10. Optimization

11. Alignment

12. Traceable

13. Outsource

14. Project management

15. Assign responsibility

16. Customer centric

06. Write down the steps involved in BPR?

01. Objectives of Business process reengineering

02. Simulation of the system

03. Implementation of the system

04. Examination and corrective measures

05. Optimizing the results

06. Redesigning the system if required.

07. State the various business modules in ERP system.

- Human resources

- Finance

- Manufacturing

- Plant maintenance

- Sales & distribution

- Materials management

- Quality management

- Production planning

08. State the finance modules in most ERP systems.

- Financial accounting

- Investment management

- Controlling

- Treasury

- Enterprise controlling

09. State some major subsystems of manufacturing module.

- Material and capacity planning

- Shop floor control

- Quality management

- JIT / Repetitive manufacturing

- Cost management

- Tooling

10. What are the basic functions in sales order processing?

- Inquiry handling

- Quotation preparation and quotation

- Contracts and contract management (order management)

- Monitoring the sales transactions

- Checking for availability

- Transferring requirements to materials planning (MRP)

- Scheduling the delivery

- Calculating pricing and taxes

- Checking credit limits

- Invoicing / billing

- Creating printed or electronically transmitted documents

11. What are the main modules of Materials Management module?

- Pre-purchasing activities

- Purchasing

- Vendor evaluation

- Inventory management

- Invoice verification and material inspection

UNIT III– ERP IMPLEMENTATION

1. What are the different phases of ERP implementation?

- Pre-evaluation screening

- Package evaluation

- Project planning phase

- Gap analysis

- Reengineering

- Configuration

- Implementation team training

- Testing

- Going live

- End user training

- Post-implementation

2. What is gap analysis?

Gap analysis is the most crucial phase for the success of the ERP implementation. It is the process through which companies create a model of where they are now, an din which direction they want to head in the future.

3. What are the general four phases of an ERP implementation?

- Understanding the problem
- Defining solutions
- Getting down to work
- Going live

4. Give the hidden costs in ERP implementation?

- Training
- Integration and testing
- Data conversion
- Data analysis
- ERP consultants

5. State the main members of an implementation team.

- Executive committee
- Project management team
- Work team
- Technical support team
- Administrative support team

6. What are the skills the people who implement the ERP should possess?

- Knowledge of how to organize and run a project of this magnitude
- Enough experience in handling problems and issues that arise during the implementation
- Good people skills and excellent training skills
- Good leadership skills

7. Who are vendors and give their role?

Vendors are people who have invested huge amounts of time and effort in research and development to create packaged (ERP) solutions. The vendor should supply the product and its documentation as soon as the contract is signed and the vendor should impart training to its clients'.

8. Who are business consultants and specify their role?

- Business consultants are professionals who specialize in developing techniques and methodologies for dealing with the implementation and with the various problems that will crop up during the implementation.
- Consultants should guarantee the success of the project and should be able to satisfy the company management with its needs.
- They should add value to the project.

9. State some key points of the contract with the vendor, which should be addressed.

- Value of the software and conditions of payment
- List of deliverables (software, documents etc.)
- Cost of implementation training
- Cost of end-user training
- Annual maintenance fee
- Warranty or guarantee terms

10. State some key points of the contract with the consultant, which should be addressed.

- Profile of the consultants' team with the resume of each member
- Consulting fee and payment details
- Implementation methodology
- Time schedule and the implementation budget
- Terms and conditions of knowledge transfer and employee training
- List of deliverables (reports, manuals, knowledge bases etc)

- Project monitoring and status reporting systems

11. **What is a data warehouse?**

A data warehouse is a database designed to support decision-making in an organization. It is updated batch-wise and is structured for fast online queries and summaries for managers. Data warehouses can contain enormous amounts of data.

12. **What is data mining?**

Data mining is the process of identifying valid, novel, potentially useful and ultimately comprehensible knowledge from databases that is used to make crucial business decisions.

13. **Why is the pre-evaluation screening required?**

There are hundreds of vendors claiming a solution that is ideal for your company. Analyzing these packages, though a time-consuming process would give a viable solution needed.

14. **Define action plan.**

A document used to guide the implementation of business process improvements. It contains tack assignments, schedules, resource allocations, assignments and evaluation criteria.

15. **What is an activity?**

A named process, function or task that occurs over time and has recognizable results. Activities use up assigned resources to produce products and services. Activities combine to form business processes.

16 Mark Questions and Answers

1. Briefly explain the evolution of the ERP system?
   - Strategically Alligned
   - Cost
   - Change Management
   - Match with Technology

- Risk factor

- Business Process

- Practical Ability

- Vendor selection

- Flexibility

- Benefit

2. State the steps involved to select the ERP systems?

1. Formation of objectives

2. Formulate the list of process

3. Evaluate the vendors

4. Provide request for proposals

5. Queries to the vendors

6. Evaluate the proposals

7. Choose two or three Finalists

8. Demonstrate packages

9. Finalize the winner

10. Validate the investment

3. Briefly explain the different phases of ERP implementation process?

Many tools are available to help manage implementation projects. Process mapping,described previously, is perhaps the most critical. For an ERP implementation to go smoothly and provide value, it is critical that a company understand both its current processes and the desired state of the processes after implementation.
SAP provides Solution Manager, a set of tools and information that helps companies manage the implementation of SAP ERP. In Solution Manager, the ERP implementation project is presented in an Implementation Roadmap, consisting of the following five phases:

• Project Preparation (15 to 20 days)
• Business Blueprint (25 to 40 days)
• Realization (55 to 80 days)
• Final Preparation (35 to 55 days)
• Go Live and Support (20 to 24 days)

Different phases of ERP implementation

- Pre-evaluation screening

- Package evaluation

- Project planning phase

- Gap analysis

- Reengineering

- Configuration

- Implementation team training

- Testing

- Going live

- End user training

- Post-implementation

4. **Write down the framework of ERP?**

- Infrastructure

- IT Maturity

- Business size

- Management commitment

- BPR Experience

- Manufacturing Area

- Management Commitment

- Government policy and regional Environment

5. **Give the hidden costs in ERP implementation?**

- Training

- Integration and testing

- Data conversion

- Data analysis

- ERP consultants

6. **State some key points of the contract with the vendor, which should be addressed.**

- Value of the software and conditions of payment

- List of deliverables (software, documents etc.)

- Cost of implementation training

- Cost of end-user training

- Annual maintenance fee

- Warranty or guarantee terms

7. **What are the factors used for Successful ERP Implementation?**

- Involvement of Top Management

- Product selection

- Process management

- Integeration

- Reengineering

- Implementation time

- Implementation Costs

- Training and education

- Team composition

UNIT-IV POST IMPLEMENTATION

01. What do you mean by value analysis?
Value analysis- each activity in the process is analyzed for the value it adds to the product or service. The value added is an increase in a product's or service's value, from the perspective of the customer.

02. What is meant by software updates?
ERP vendors constantly resolves the issues that exist in the system and implements the new best practices and incorporates the changes to the system as suggested by the customers in their feedbacks.

03. What is competitive advantage?
Adding new features and functionalities would give the organization the power to

overcome its competitors.

04. What do you mean by global access?

Global Access includes the features and updates designed to increase the flow of information from and the customers and business partners that can increase the ability to operate globally.

05. How to reduce the ERP maintenance cost?

1. Negotiate with vendor
2. Less software customization
3. Identify external support
4. Negotiate service rates
5. Direct and indirect maintenance costs

06. State the process of ERP maintance?

i.   Preventive maintenance

ii.   Emergency maintenance

iii.   Software updates

07. State the forms of post implementation activity?

Early enhancements

Later enhancements

ERP system switching

Late switches and reverts

08. What do you mean by data migration?

Data migration is the process of transforming data from the old format to the new system format.

09. State the role of ERP consultants.

The consultants support the organization in identifying the best ERP package which suites the business and he is responsible for the success for the ERP package implementation.

10. Define Gap analysis.

Gap analysis is the process of analyzing the deviations and bridging the gap between the existing system of the organization and business requirements and the newly implemented ERP system.

UNIT IV – POST IMPLEMENTATION

01. How does a company ensure that its ERP investment pays off in increased profitability?

The key challenge is not in managing technology, but in managing people. An ERP system changes how people work, and for the system to be effective, the change may have to be dramatic, going beyond the way employees interact with the software to the way they perform their tasks. Furthermore, business processes that are more effective require fewer people. Some employees will no longer be needed. It is no small thing to ask people to participate in a process that may not only change their day-to-day activities, but could
also eliminate their current jobs.

Managing the human behavior aspects of organizational change is called organizational change management (OCM). Do not underestimate the importance of this aspect of the implementation process. One of the keys to managing OCM is to realize that most people do not mind change, they mind being changed.

 If the ERP implementation is a project that is being forced on the employees, they will resist it. If employees view it as a chance to make the company more efficient and effective by improving business processes—and if these process improvements will make the company more profitable and therefore provide more job security—there is a greater likelihood that employees will support the implementation efforts.

As mentioned earlier, the best way to improve a business process is to have the people most familiar with the process leverage their experience and creativity to develop process-improvement ideas. When employees have contributed to a process change, they have a sense of ownership and will be more likely to support the change.

Implementation Tools

 The left side of the Solution Manager screen shows a hierarchical menu structure that organizes each step in the implementation, and on the right side of the screen are the detailed items, the descriptions, documents, white papers, tools, and so on to support each step.

02.Explain the issues of ERP Implementation?

ERP implementation is expensive (with costs ranging between $10 million and $500 million, depending on company size). The costs of an ERP implementation include the following:

• Software licensing fees—ERP software is quite expensive, and most ERP vendors charge annual license fees based on the number of users.

• Consulting fees : ERP implementations require the use of consultants with the skills to configure the software to support the company's business processes. Good consultants have extensive experience in the way ERP systems function in practice, and they can help companies make decisions that avoid excessive data input, while capturing the information necessary to make managerial decisions.

• Project team member time: ERP projects require key people within the company to guide the implementation. These are team members who have detailed knowledge of the company's business. They work closely with the consultants to make sure the configuration of the ERP software supports the company's needs, which means these workers are frequently taken away from their daily responsibilities.

• Employee training: Project team members need training in the ERP software so they can work successfully with the consultants in the implementation. Those team members also frequently work with training consultants to develop and deliver company-specific training programs for all employees.
• Productivity losses: No matter how smoothly an ERP implementation goes, companies normally lose productivity during the first weeks and months after switching to a new ERP system.
To justify the costs associated with an ERP system, a company must identify a significant financial benefit that will be generated by the use of the software, but the only way a company can save money with an ERP system is by using it to support more efficient and effective business processes. This means that an implementation project should not just re-create the company's current processes and information systems, although that is a possibility since SAP provides the source code with its ERP package.

A company could choose to alter the package through SAP's internal programming language, called Advanced Business Application Programming (ABAP)—which access to the SAP ERP source code, it is possible for a company to spend a significant sum of money on software code development to avoid changing a business process to the best practice process designed into the ERP software.

Many companies have difficultly handling change and prefer to continue doing business as they always haverather than adopting the best practices built into the ERP system. As part of the implementation, a company must also manage the transfer of data from its old computer system to the new ERP system. In addition to managing master data such as materials data, customer data, vendor data, and so on, a company must also transfer transaction data, which includes sales orders and purchase orders, many of which are likely to be in various stages of processing—a challenging task.

03. State the process of ERP Maintenance in detail?
       01. Preventive Maintenance
       02. Emergency Maintenance

03. Software updates
04. Upgrading during maintenance
    a. Competitive Advantage
    b. Global Access
    c. Integeration option
    d. Best practices
    e. Cost Reduction

04. Write down the impact on implementing ERP systems in Organization.

- Enhanced operations
- Easy upgrade
- Improved productivity
- Reporting made easier
- Improved accuracy and consistency
- Better integration
- User friendly
- Improves Communication
- Reduces cycle time
- Decreased operating costs
- Supports daily activity
- Aligned process
- Strategic planning support.

05. What are the factors affecting the post implementation process of ERP?

- Customization
- Post implementation training
- Top management support or influence
- Post implementation benchmarking
- Change management
- Maintenance of ERP
- Introduction of additional features at the post implementation phase
- Success of activities at pre-implementation stage.

UNIT V – EMERGING TRENDS ON ERP

01.What is OLAP?

OLAP or On-Line Analytical Processing is a decision support software that allows the user to quickly analyze information that has been summarized into multidimensional views and hierarchies.

02. What is supply chain?

A supply chain is a network of facilities and distribution options, that performs the functions of procurement of materials, transformation of these materials into intermediate an finished products, and the distribution of these finished products to customers.

03. What is SCM?

SCM or Supply Chain Management is a generic term that encompasses the coordination of order generation, order taking and offer fulfillment/distribution of products, services or information.

04. How ERP used in CRM?

Customer relationship management (CRM) systems build on the organizational value ERP provides; specifically, they increase the flexibility of the company's common database regarding customer service. Various kinds of CRM software are available, some from ERP vendors (including SAP) and some from third-party software companies. CRM software can lead to operational savings, but most companies buy it because they believe that creating better customer relationships will result in higher revenue. Uses of CRM have evolved since the software was initially launched; what began as a customer contact repository has extended its capabilities to include sophisticated business intelligence. CRM can be installed in-house or on-demand.

05. Define business analytics.

Business analytics is a term used to describe a range of different applications and technologies used to extract and analyze large amounts of data to aid in decision making.

06. What do you mean by Cloud Computing?

Cloud computing can be defined in simple terms as the delivery of a software product to a user via the Internet. The user typically accesses the cloud product through a Web browser or a lightweight (meaning small and simple) application for a computer or mobile device.

07. How the ERP systems enabled with internet?

E-commerce needs are driving companies to connect their business applications, such as ERP systems, both internally and externally through the Internet. Software designed with an SOA can be quickly deployed and reconfigured as business conditions require changes to the applications, databases, and other infrastructure hosted in data centers owned by a company. The combination of software tools that enables an organization's
various systems and applications to communicate with other applications is called Web services.

08. What do you mean by open source ERP?
Open source ERP provides the users with free versions of software programs without license, other rules and regulations.opern source erp platforms the user is able to access the source code and know how the applications work and can change the code as per the business needs. This has been commented as one of the main reasons for small and medium sized orgainsations to select open source ERP platform rather than outsourcing the developing applications that suit the business requirements.

9. What are the advantages of business analytics?

Strategic workforce performance information
Evaluates supplierand customer performance
Accelerate activites of human resources
Achieves greater visibility
Receives daily activities.
Controls and monitors maintenance process

10.What are the components of extended ERP?

Business intelligence components
Customer relationship management
Supply chain management
E-business

11. What are the benefits of cloud computing?
        Reduces cost
        Economies of scale
        Virtualization
        Payment basis
        Maintenance costs
        Thin client
        Scalability

12. State the limitations of the cloud –based ERP applications.
        Limited functionality and availability
        Reduced customization
        Security risks

Organizational conflict

01. State some key points of the contract with the consultant, which should be addressed.

- Profile of the consultants' team with the resume of each member

- Consulting fee and payment details

- Implementation methodology

- Time schedule and the implementation budget

- Terms and conditions of knowledge transfer and employee training

- List of deliverables (reports, manuals, knowledge bases etc)

  Project monitoring and status reporting systems

02.How the internet used in Cloud computing process?

Cloud computing can be defined in simple terms as the delivery of a software product to a
user via the Internet. The user typically accesses the cloud product through a Web browser or a
lightweight (meaning small and simple) application for a computer or mobile device. Cloud
computing is not a completely new concept, rather it simply represents the latest stage of the
development of computing and the Internet. To better understand how cloud computing will
impact ERP system development, it is useful to review the development of SAP's ERP systems
with the advent of the Internet.

SAP and the Internet

In 1996, SAP introduced its joint Internet strategy with Microsoft. The core of SAP's first effort
to integrate the Internet with its products was the Internet Transaction Server (ITS) a server-
based software system that enabled efficient communication between an SAP ERP system and
the Internet. To provide some context for the state of the Internet at this time—in 1996,
Amazon.com was only one year old, and the online travel agencies Expedia and Travelocity
were both just being founded. Many other Internet services we take for granted today did not
exist at this time.
In May 1999, SAP announced mySAP.com, a new strategy designed to completely realign the
company and its product portfolio. The goal of this initiative was to combine e-commerce
solutions with SAP's existing ERP applications, using cutting-edge Web technology. In 2000,
SAP began building on the mySAP.com vision by adding the capability for electronic
marketplaces and corporate portals.

03.How the Business Analytics process used in ERP ?

Business intelligence (BI), also referred to as business analytics, is a term used to describe a range of different applications and technologies used to extract and analyze large amounts of data to aid in decision making. BI includes data-mining tools and querying tools, which are often interactive and visual. The growth of data-generating technologies such as RFID,combined with improvements in BI tools, has led to significant growth in the BI market. Prior to 2008, almost all of SAP's ERP business came from traditional ERP suite applications.

However, in the period from 2008 to 2011, the percentage of the business that came from BI rose to 50 percent.On the left side of the diagram are the potential BI data sources, which are growingboth in number and in the volume of data produced. For example, sources such as Facebook, Twitter, and other social media applications can provide information on consumer reaction to new products.
The center section represents the analytical capabilities of BI; it includes items such as analytic applications and business intelligence, which are similar sets of data analysis tools. In SAP's framework, analytic applications are data analysis tools applied to specific industries, such as financial services, manufacturing, consumer products, retail, and utilities or to functional areas, such as supply chain management, finance, human resources, IT, and service, sales, and marketing. Enterprise performance management is the concept of developing strategic goals for the organization and then gathering data to evaluate how the organization is performing in relation to those goals. The governance, risk, and compliance category represents a group of activities focused on ensuring an organization is functioning ethically and legally.

Governance refers to the processes that ensure that top management is receiving accurate and timely data necessary to run the organization and that control mechanisms are in place to make sure that management directions and instructions are being carried out. Risk, or risk management, consists of processes to identify risks to the organization and to develop plans to minimize the potential damage to these risks.

Data warehousing is the technology used to store the large volumes of data used in the analysis. Enterprise information management is a relatively new term that describes the business and technology functions that manage information as a corporate asset.   Previously, this was primarily through personal computers, but with the growth in mobile technology, an increasing variety of devices can now be used to access BI.

04. What are the emerging trends in ERP?

- ERP platforms

- Open source ERP

- Supply chain management

- Customer relationship management

- Business analytics

- Extended ERP

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Question Paper Code : 40342

M.B.A DEGREE EXAMINATION, APRIL/MAY 2015.

Third Semester

BA 7301 – ENTERPRISE RESOURCE PLANNING

(Regulation 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What are the main misconceptions about ERP?

2.   What are the limitations of ERP?

3.   State the various business modules in ERP system.

4.   What are the phases of BPR?

5.   Give the hidden costs in ERP implementation.

6.   State some key points of the contract with the vendor, which should be addressed.

7.   What are the main activities after going live?

8.   Name four success factors of an ERP implementation.

9.   What are the three fundamental components in CRM?

10.   What are the future trends in ERP systems?

PART B — (5 × 16 = 80 marks)

11.   (a)   What are the risks of ERP implementation? Discuss Risk management in ERP implementation.

12. (a) Explain in detail about different phases of BPR.

Or

(b) Describe briefly about The Functional Modules Of ERP Software.

13. (a) Explain ERP implementation life cycle in detail.

Or

(b) Give an overview of the data migration process. Explain the different data migration methods.

14. (a) Discuss the top 10 Success factors of ERP Implementation.

Or

(b) Discuss the top 10 failure factors of ERP Implementation.

15. (a) Describe the Main functions of Supply Chain Management.

Or

(b) Explain the growth and popularity of internet and its impact on ERP system.

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