Enterprise Resource Planning
Index

I. Content .................................................................................................................. II

II. List of Figures .......................................................................................................... IX

III. List of Tables .......................................................................................................... X

IV. Abbreviations ......................................................................................................... XI

V. Case Study ............................................................................................................... 147

VI. Bibliography .......................................................................................................... 155

VII. Answers to Self Assessment .............................................................................. 159

Book at a Glance
### Chapter VII

**ERP Implementation Cycle**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 Introduction</td>
<td>117</td>
</tr>
<tr>
<td>8.2 Pre-evaluation Screening</td>
<td>118</td>
</tr>
<tr>
<td>8.3 Package Evaluation</td>
<td>119</td>
</tr>
<tr>
<td>8.4 Project Planning Phase</td>
<td>120</td>
</tr>
<tr>
<td>8.5 Gap Analysis</td>
<td>121</td>
</tr>
<tr>
<td>8.6 Re-engineering</td>
<td>121</td>
</tr>
<tr>
<td>8.7 Configuration</td>
<td>122</td>
</tr>
<tr>
<td>8.8 Implementation Team Training</td>
<td>122</td>
</tr>
<tr>
<td>8.9 Testing</td>
<td>123</td>
</tr>
<tr>
<td>8.10 Going Live</td>
<td>123</td>
</tr>
<tr>
<td>8.11 End-user Training</td>
<td>123</td>
</tr>
<tr>
<td>8.12 Post-implementation (Maintenance Mode)</td>
<td>123</td>
</tr>
</tbody>
</table>

**Summary**

Page 117

**References**

Page 114

**Self Assessment**

Page 115

---

### Chapter VIII

**ERP Implementation Cycle**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1 Introduction</td>
<td>129</td>
</tr>
<tr>
<td>9.2 In-house Implementation – Pros and Cons</td>
<td>130</td>
</tr>
<tr>
<td>9.3 Vendors</td>
<td>131</td>
</tr>
</tbody>
</table>

**9.3.1 Role of the Vendor**

Page 132
## Chapter X

**Aim** .................................................................................................................. 138  
**Objectives** ........................................................................................................ 138  
**Learning outcome** ............................................................................................ 138  

### 10.1 Introduction

............................................................................................................................ 139  

### 10.2 New Markets

............................................................................................................................ 140  

### 10.3 New Channels

............................................................................................................................ 140  

### 10.4 Faster Implementation Methodologies

............................................................................................................................ 140  

#### 10.4.1 Business Model and Business Application Programming Interfaces (BAPI's)

............................................................................................................................ 141  

### 10.5 Convergence on Windows NT

............................................................................................................................ 141  

### 10.6 Application Platforms

............................................................................................................................ 142  

### 10.7 New Business Segments

............................................................................................................................ 142  

### 10.8 More Features

............................................................................................................................ 142  

### 10.9 Web Enabling

............................................................................................................................ 142  

### 10.10 Market Snapshot

............................................................................................................................ 143

**Summary** ............................................................................................................ 144

**References** ........................................................................................................ 144

**Recommended Reading** ..................................................................................... 144

**Self Assessment** ................................................................................................ 145
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Enterprise</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>Organisation where there is little communication between the departments</td>
<td>11</td>
</tr>
<tr>
<td>2.3</td>
<td>An enterprise where all departments know what others are doing</td>
<td>12</td>
</tr>
<tr>
<td>2.4</td>
<td>Diagram showing the additional entity to be added with new tab</td>
<td>14</td>
</tr>
<tr>
<td>3.1</td>
<td>Data warehouse architecture</td>
<td>21</td>
</tr>
<tr>
<td>3.2</td>
<td>Integrated data mining</td>
<td>22</td>
</tr>
<tr>
<td>4.1</td>
<td>Master production schedule</td>
<td>34</td>
</tr>
<tr>
<td>4.2</td>
<td>Supply chain Kanban</td>
<td>38</td>
</tr>
<tr>
<td>8.1</td>
<td>ERP implementation process</td>
<td>118</td>
</tr>
</tbody>
</table>
List of Tables

Table 1.1 Evolution of ERP from 1960s to 1990s ................................................................. 3
Table 3.1 Characteristics of OLAP .................................................................................. 23
Table 10.1 Major ERP vendors and their products ............................................................ 140
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABAP</td>
<td>Advanced Business Application Programming</td>
</tr>
<tr>
<td>ABC</td>
<td>Activity Based Costing</td>
</tr>
<tr>
<td>ALE</td>
<td>Application Link Enabling</td>
</tr>
<tr>
<td>ASAP</td>
<td>Accelerated SAP</td>
</tr>
<tr>
<td>ASQC</td>
<td>American Society for Quality Control</td>
</tr>
<tr>
<td>BAPI</td>
<td>Business Model and Business Application Programming Interface</td>
</tr>
<tr>
<td>BOM</td>
<td>Bills of Material</td>
</tr>
<tr>
<td>BPCS</td>
<td>Biuro Projektowania Systemów Cyfrowych</td>
</tr>
<tr>
<td>BPR</td>
<td>Business Process Reengineering</td>
</tr>
<tr>
<td>BPR</td>
<td>Business Process Reengineering</td>
</tr>
<tr>
<td>CAQ</td>
<td>Computer-Aided Quality</td>
</tr>
<tr>
<td>CIO</td>
<td>Chief Information officer</td>
</tr>
<tr>
<td>CIQ</td>
<td>Computer-Integrated Quality</td>
</tr>
<tr>
<td>COO</td>
<td>Chief Operations Officer</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer Relationship Management</td>
</tr>
<tr>
<td>CTO</td>
<td>Configure-to-order</td>
</tr>
<tr>
<td>DAX</td>
<td>Deutscher Aktien-Index (German stock index))</td>
</tr>
<tr>
<td>DB</td>
<td>Database</td>
</tr>
<tr>
<td>DOCA</td>
<td>Distributed Object Computing Architecture</td>
</tr>
<tr>
<td>DRP</td>
<td>Distribution Requirements Planning</td>
</tr>
<tr>
<td>DRP</td>
<td>Distribution Requirements Planning</td>
</tr>
<tr>
<td>DSS</td>
<td>Decision Support System</td>
</tr>
<tr>
<td>ECA</td>
<td>Electronic Commerce application</td>
</tr>
<tr>
<td>ECC</td>
<td>Engineering Change Control</td>
</tr>
<tr>
<td>ECO</td>
<td>Engineering Change Order</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
</tr>
<tr>
<td>EDP</td>
<td>Electronic Data Processing</td>
</tr>
<tr>
<td>EFT</td>
<td>Electronic Funds Transfer</td>
</tr>
<tr>
<td>EIS</td>
<td>Executive Information System</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>ETO</td>
<td>Engineer-to-order</td>
</tr>
<tr>
<td>FIFO</td>
<td>First in First Out</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographical Information System</td>
</tr>
<tr>
<td>GL</td>
<td>General Ledger</td>
</tr>
<tr>
<td>GMP</td>
<td>Good Manufacturing Practices</td>
</tr>
<tr>
<td>HRMS</td>
<td>Human Resource Management System</td>
</tr>
<tr>
<td>IBU</td>
<td>Industry Business Unit</td>
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<tr>
<td>LIFO</td>
<td>Last in First Out</td>
</tr>
<tr>
<td>MRP</td>
<td>Materials Requirement Planning</td>
</tr>
<tr>
<td>NYSE</td>
<td>New York Stock Exchange</td>
</tr>
<tr>
<td>OLAP</td>
<td>Online Analytical Processing</td>
</tr>
<tr>
<td>OLAP</td>
<td>Online Analytical Processing</td>
</tr>
<tr>
<td>OLE</td>
<td>Object Linking and Embedding</td>
</tr>
<tr>
<td>PDC</td>
<td>Plant Data Capture</td>
</tr>
<tr>
<td>PLCM</td>
<td>Product Life Cycle Management</td>
</tr>
<tr>
<td>QMS</td>
<td>Quality Management System</td>
</tr>
<tr>
<td>SAP</td>
<td>System Application and Products</td>
</tr>
<tr>
<td>SCM</td>
<td>Supply Chain Management</td>
</tr>
<tr>
<td>SFA</td>
<td>Sales Force Automation</td>
</tr>
<tr>
<td>SQL</td>
<td>Standard Query Language</td>
</tr>
</tbody>
</table>
Enterprise Resource Planning

SSA - System Software Associate
WAN - Wide Area Network
WH - Warehousing
Chapter I

Introduction to Enterprise Resource Planning (ERP)

**Aim**

The aim of this chapter is to:

- enable the students to understand the concept of ERP system
- introduce the ERP and its applications
- state reasons for the growth of the ERP Market

**Objectives**

The objectives of this chapter are to:

- explain the concept of ERP, its evolution and growth
- describe the advantages of ERP
- elucidate the difference between ERP system and ERP software
- emphasise on factors that helps to control the success of ERP

**Learning outcome**

At the end of this chapter, the students will able to:

- understand evolution of ERP
- recognise the factors responsible for the growth of ERP market
- understand the use of ERP
- identify the applicability of ERP
1.1 Introduction
Since last decade, information technology has made a drastic change in our life. As compared to earlier stage, when computer was used just as a typewriter, nowadays users have become more intelligent and IT literate. Now the user knows that a PC can do many more things rather than just typing a letter in a word processing software or making balance sheets in Excel. They expect more things out of their PC. During this phase of industry, every one of us must have heard the word ERP i.e., Enterprise Resource Planning. In one sentence, ERP is a combination of management practice and technology, where information technology integrates with your company’s core business processes to enable the achievement of specific business objectives.

1.2 History and Evolution

- Enterprise Resource Planning is the evolution of Manufacturing Requirements Planning (MRP) II in 1980s, which was mainly related to Manufacturing Industry and was designed to control manufacturing process and planning the required production with efficient output.
- Where as, MRP is the evolution of Inventory Management and Control conceived in 1960s, which was mainly designed for management of Stocks in any particular industry.
- ERP has expanded from co-ordination of manufacturing processes to the integration of enterprise-wide backend processes like production planning and scheduling of delivery.
- In terms of technology, ERP has evolved from legacy implementation to more flexible tiered client-server architecture.

From business perspective, ERP has expanded from coordination of manufacturing processes to the integration of enterprise-wide backend processes. From technological aspect, ERP has evolved from legacy implementation to more flexible tiered client-server architecture.

The following table summarises the evolution of ERP from 1960s to 1990s:

<table>
<thead>
<tr>
<th>System</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
</table>
| Inventory Management and Control| 1960's |  • Inventory Management and control is the combination of information technology and business processes of maintaining the appropriate level of stock in a warehouse  
• The activities of inventory management include identifying inventory requirements, setting targets, providing replenishment techniques and options, monitoring item usages, reconciling the inventory balances, and reporting inventory status |
| Materials Requirement Planning (MRP) | 1970's |  • Materials Requirement Planning (MRP) utilises software applications for scheduling production processes  
• MRP generates schedules for the operations and raw material purchases based on the production requirements of finished goods, the structure of the production system, the current inventories levels and the lot sizing procedure for each operation |
| Manufacturing Requirement Planning-II (MRP-II) | 1980's |  • Manufacturing Requirements Planning or MRP utilises software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution. |
Enterprise Resource Planning

1990’s

- Enterprise Resource Planning or ERP uses multi-module application software for improving the performance of the internal business processes.
- ERP systems often integrate business activities across functional departments, from product planning, parts purchasing, inventory control, product distribution and fulfillment, to order tracking.
- ERP software systems may include application modules for supporting marketing, finance, accounting and human resources.

Table 1.1 Evolution of ERP from 1960s to 1990s

1.3 Meaning

- ERP is one of the most widely implemented business software systems in a wide variety of industries and organisations.
- ERP is the acronym of Enterprise Resource Planning.
- It utilises ERP software applications to improve the performance of organisations’ resource planning, management control and operational control.
- ERP software is multi-module application software that integrates activities across functional departments, from product planning, parts purchasing, inventory control and product distribution, to order tracking.
- ERP software may include application modules for the finance, accounting and human resources aspects of a business.
- ERP is just not only a software but also a business integrating process.

1.4 Definition

‘ERP’ refers to both ERP software and business strategies that implement ERP systems.

ERP Software

- Software solution that addresses the enterprise needs taking the process view of an organisation to meet the organisational goals tightly integrating all functions of an enterprise.

ERP System

- An ERP system is more than sum of its parts or components which interacts together to achieve a common goal streamline and improve organisations business processes.
- ERP components includes; ERP Software, Business Processes, Users and Hardware.

1.5 Concept

- The term ERP originally referred to how a large organisation planned to use organisational wide resources.
- In the past, ERP systems were used in larger more industrial types of companies. However, the use of ERP has changed and is extremely comprehensive, today the term can refer to any type of company, no matter what industry it falls in. In fact, ERP systems are used in almost any type of organisation large or small.
- In order for a software system to be considered ERP, it must provide an organisation with functionality for two or more systems. While some ERP packages exist that only cover two functions for an organisation (Payroll and Accounting) most ERP systems cover several functions.
- An ERP system is based on a common database and a modular software design. The common database can allow every department of a business to store and retrieve information in real-time. The information should be reliable, accessible, and easily shared.
The modular software design should mean a business can select the modules they need, mix and match modules from different vendors, and add new modules of their own to improve business performance.

Today’s ERP systems can cover a wide range of functions and integrate them into one unified database. For instance, functions such as Human Resources, Supply Chain Management, Customer Relations Management, Financials, Manufacturing functions and Warehouse Management functions were all once stand alone software applications, usually housed with their own database and network, today, they can all fit under one umbrella of ERP system.

### 1.6 Implementation of an ERP System

- Implementing an ERP system is not an easy task to achieve, in fact it takes lots of planning, consulting and in most cases 3 months to 1 year.
- ERP systems are extraordinary wide in scope and for many larger organisations can be extremely complex. Implementing an ERP system will ultimately require significant changes on staff and work practices.
- While it may seem reasonable for an in house IT staff to head the project, it is widely advised that ERP implementation consultants be used, due to the fact that consultants are usually more cost effective and are specifically trained in implementing these types of systems.
- One of the most important traits that an organisation should have when implementing an ERP system is ownership of the project. Because so many changes take place and its broad effect on almost every individual in the organisation, it is important to make sure that everyone is on board and will help make the project and using the new ERP system a success.
- Usually organisations use ERP vendors or consulting companies to implement their customised ERP system.
- There are three types of professional services that are provided when implementing an ERP system, they are Consulting, Customisation and Support.
  - **Consulting services**: Usually consulting services are responsible for the initial stages of ERP implementation, they help an organisation go live with their new system, with product training, workflow, improve ERP’s use in the specific organisation, etc.
  - **Customisation services**: Customisation services work by extending the use of the new ERP system or changing its use by creating customised interfaces and/or underlying application code. While ERP systems are made for many core routines, there are still some needs that need to be built or customised for an organisation.
  - **Support services**: Support services include both support and maintenance of ERP systems. For instance, trouble shooting and assistance with ERP issues.

### 1.7 Advantages of ERP

Advantages can be both direct and indirect.

**The direct advantages are**:

- improvement in integrating business
- communications with the use of information within the organisation is made fast and effective
- creating adequate function and flexible efficiency
- a unifying system smoothens out the various bottlenecks of information and uses a single language for maintaining business advantage
- providing advantage for planning and analysis
- easy access to update information helps in proper planning, decision making utilizing relevant analysis
- updating information and technology in the organisation
- by continuous up gradation in both information and technology the organisation remains modern and avoid stagnancy
The indirect advantages are:

- Customer goodwill and relations: Rapidly responding to customer demands is one of the great advantages that ERP can offer for successful business. Fulfilling the demands automatically creates goodwill and strong relationships with the customer.
- Helps in creating customer satisfaction: Changes in customer demands can be rapidly incorporated with the use of the ERP. Customer satisfaction is thus maintained.
- Enhances the image of the organisation: The ability to deliver on time and with effectiveness creates a strong trust in the minds of the customers and society. This enhances the corporate image of the organisation.

1.8 Disadvantages of ERP

While advantages usually outweigh disadvantages for most organisations implementing an ERP system, here are some of the most common obstacles experienced: some of the most common obstacles experienced are listed below:

- Usually many obstacles can be prevented if adequate investment is made and adequate training is involved, however, success does depend on skills and the experience of the workforce to quickly adapt to the new system.

  - customisation in many situations is limited
  - the need to reengineer business processes
  - ERP systems can be cost prohibitive to install and run
  - technical support can be shoddy
  - ERPs may be too rigid for specific organisations that are either new or want to move in a new direction in the near future

1.9 Applicability of ERP

ERP and its predecessors, MRP-II have been successfully implemented in companies with the following characteristics:

- make-to-stock
- make-to-order
- design-to-order
- complex product
- simple product
- multiple plants
- single plant
- contract manufacturers
- manufacturing with distribution networks
- sell direct to end users
- sell through distributors
- business heavily regulated by the government
- conventional manufacturing
- process manufacturing
- repetitive manufacturing
- job shop
- flow shop
- fabrication only
- assembly only
- high-speed manufacturing
- low-speed manufacturing
In every sector of an industry network, ERP has virtually universal application. ERP is the body of knowledge that contains the standard best practices for managing an enterprise.

### 1.10 Reasons for the Growth of the ERP Market

There is no question that the market for enterprise resource planning (ERP) systems is much demanded. Industry analysis is forecasting growth rates of more than 30% for at least the next five years. Why are so many companies replacing their key business systems?

Here are some reasons:

- enables improved business performance
  - cycle time reduction
  - increased business agility
  - inventory reduction
  - order fulfilment improvement
- supports business growth requirements
  - new products/product lines, new customers
  - global requirements including multiple languages and currencies
- provides flexible, integrated, real-time decision support
  - improve responsive across the organisation
- eliminates limitation in legacy systems
  - century dating issues
  - fragmentation of data and processing
  - inflexibility to change
  - insupportable technologies
- takes advantage of the untapped mid-market (medium-size organisations)
  - increased functionality at a reasonable cost
  - client-server/open system technology
  - vertical market solutions

There are some of the reasons for the explosive growth rate of the ERP markets and ERP vendors. As more and more companies are joining the race and as the ERP vendors are shifting their focus from big fortune 1000 companies to different market segments the future will see fierce battle for market share and mergers and acquisitions for strategic and competitive advantage. The ultimate winner in this race will be the customer, who will get better products and better service at affordable prices.

### 1.11 Success of the ERP

It is important to understand that choosing the right the ERP package and ensuring its correct implementation is of utmost importance. A wrong package wrongly implemented can threaten the organisational efficiency.

**To ensure the effective use of ERP:**

- A proper understanding of the business in the organisation by its people is necessary.
- ERP package should best be suited to meet the requirements of the organisation. A good vendor can make a significant difference in this regard.
- Implementation of the ERP program should be accurately planned and executed well.
- End user training is necessary to ensure the correct implementation and maintenance of the ERP.
Summary

- Enterprise Resource Planning is one of the fastest growing segments in information technology. It enables organisations to respond quickly to the ever increasing customer needs and to capitalise on market opportunities.
- According ERP definition it is a combination of management practice and technology, where information technology integrates with your company’s core business processes to enable the achievement of specific business objectives.
- The term ERP originally referred to how a large organisation plans to use its wide resources.
- ERP systems were used in larger more industrial types of companies.
- In order for a software system to be considered ERP, it must provide an organisation with functionality for two or more systems.
- The modular software design should mean a business can select the modules they need, mix and match modules from different vendors, and add new modules of their own to improve business performance.

References


Recommended Reading

Self Assessment

1. ERP is combination of ________ and ________.
   a. technology, assessment
   b. assessment, management
   c. management, technology
   d. technology, business process

2. In ERP information technology integrates with company’s ________ to achieve its ultimate goal.
   a. business ethics
   b. business processes
   c. management
   d. resources

3. ERP is evolution of ____________.
   a. manufacturing requirement planning
   b. material resource planning
   c. production planning
   d. capacity resource planning

4. MRP is evolution of _________.
   a. capacity resource planning
   b. manufacturing requirement planning
   c. production capacity and control
   d. inventory management and control

5. _________ utilises software applications for scheduling production processes.
   a. Manufacturing requirement planning
   b. Materials requirement planning
   c. Inventory management and control
   d. Enterprise resource planning

6. Match the following:

<table>
<thead>
<tr>
<th>1. ERP software</th>
<th>A. ERP software, Processes, Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. MRP-II</td>
<td>B. Scheduling Production Processes</td>
</tr>
<tr>
<td>3. MRP</td>
<td>C. Coordinating manufacturing processes</td>
</tr>
<tr>
<td>4. ERP system</td>
<td>D. Multi-module application software</td>
</tr>
</tbody>
</table>

   a. 1-D,2-A,3-C,4-B
   b. 1-A,2-B,3-C,4-D
   c. 1-B,2-C,3-D,4-A
   d. 1-D,2-C,3-B,4-A
7. Which of the following services is responsible for the initial stages of ERP implementation?
   a. Generation
   b. Customisation
   c. Consulting
   d. Support

8. Which of the following is true?
   a. ERP systems are used only for large organisations.
   b. ERP systems are used only in small organisations.
   c. ERP systems are used in both large as well as small organisations.
   d. ERP systems are used in long term planning.

9. In ERP systems, common database can allow every department of a business to__________
   a. store information
   b. retrieve information
   c. store and retrieve information
   d. store and process information

10. On which of the following is the ERP system based?
    a. Database and Software design
    b. Database and Processes
    c. Processes and Software design
    d. Database
Chapter II
Enterprise—An Overview

Aim
The aim of the chapter is to:

• introduce the concept of enterprise
• introduce communication and interconnection between various departments of an organisation
• explain integrated data model

Objectives
The objectives of this chapter are to:

• explain the concept of enterprise
• elucidate the work culture of an industry (manufacturing and services)
• discuss integration of management information system in an organisation

Learning outcome
At the end of this chapter, the students will be able to:

• comprehend the concept of enterprise and its importance
• understand the integrated data model
• realise the interdepartmental processes of industries
2.1 Introduction

The term ‘Enterprise’ is often used in general business solutions to describe a corporate entity. An enterprise acts as a single entity, it is a group of people with a common goal, which has certain resources at its disposal to achieve this goal.

![Enterprise Diagram](image1)

**Fig. 2.1 Enterprise**

![Organisation Diagram](image2)

**Fig. 2.2 Organisation where there is little communication between the departments**

The view of a company or organisation is very different from the traditional approach where the organisation is divided into different units based on the functions they perform. Many organisations have these departments in common such as,

- manufacturing/production department
- production planning department
- purchasing department
- sales and distribution department
- finance department
- r and d department

These departments are compartmentalised and have their own goals and objectives, which from their point of view is in line with the organisation’s objectives. These departments function in isolation and have their own system of data collection and analysis. So the information that is created or generated by the various departments, in most cases are available only to the top management and not to the other departments. (Refer Fig. 2.2)

The result is that instead of taking the organisation towards the common goal the various departments tend to pull it in instead of taking the organisation towards the common goal the various departments tend to pull it in different directions since one department does not know what the other does. Also, departmental objectives can sometimes be conflicting.

**Example:**
The sales and marketing people may want more product variety to satisfy the varying needs of the customers while the production department will want to limit the product variety in order to cut down production costs.
So unless all the departments know what others are doing and for what purpose, such conflicts will arise and disrupt the normal functioning of the organisation.

In the enterprise way the entire organisation is considered as one system and all the departments are its sub-systems. Information regarding all aspects of the organisation is stored centrally and is available to all departments.

This transparency and information access ensures that the departments no longer work in isolation pursuing their own independent goals. Each sub-system knows what others are doing, why they are doing it and what should be done to move the company towards the common goal.

The ERP systems help to make this task easier by integrating the information system, enabling smooth and seamless flow of information across departmental barriers, automating business processes and functions and thus helping the organisation to work and move forward as a single entity.

**Fig. 2.3 An enterprise where all departments know what others are doing**

### 2.2 The Integration of Management Information System

- For effective utilisation of information within the organisation, the enterprise needs to integrate updated accurate information. This can be done with the use of management information systems.
- Any effective system consists of proper inputs, efficient processing and an accurate output. Management information systems help in this regard.
- The basic elements utilized in integrating business with management information systems are the people, the business procedures and the information.
- The effect of combination of the 3 elements is the key to integrate business with the management information system.
- Information generated by the people in collecting data, the methods of processing it and effective dissemination of decisions and information can make this happens.
- From compartmentalisation of the departments to the effective cohesion of the entire organisation, information plays an important role.
- The real test of an effective management information system is in its accuracy timing and relevance.
- ERP facilitates company-wide Integrated Information System covering all functional areas such as Manufacturing, Sales and Distribution, Payables, Receivables, Inventory, Accounts, Human Resources, Purchasing, etc.
• ERP is the core business activities and enhances customer service satisfaction
• ERP facilitates the flow of information across different parts of the organisation or department
• Bridge the gap between the ERP business partners that enables collaboration sustainable
• ERP is a good solution for better project management
• ERP is built as an open system architecture, which means automatically enables the introduction of latest technologies such as Electronic Funds Transfer (EFT), Electronic Data Interchange (EDI), Internet, Intranet, video conferencing, etc. E-Commerce
• ERP not only addresses the current requirements but also gives companies the opportunity to continue improving and refining business processes
• ERP provides business intelligence tools like Decision Support System (DSS), Executive Information system (EIS), Reporting, Data Mining and Early Warning Systems (Robots) for enabling people to make better decisions and improve their business processes
• ERP tracks various events in the organisation, and plans for future activities based on this incident

ERP driving forces:
• the need to improve supply chain efficiencies
• the need to improve customer access to products or services
• the need to reduce operating costs
• the need to respond quicker and more flexibly to changing market place

2.3 Modelling Business with Information Systems
• Creating a business model means understanding the various processes involved in the business activity of organisation.
• The model helps to create an ERP system that closely reflects the various business processes. The various linkages between these processes are important on the stand so as to create a successful model.
• But integrating various linkages with the information systems the business can be modelled as accurately as possible with the help of the ERP.

2.4 The Integrated Data Model (IDM)
• The Integrated Data Model (IDM) provides a more general and flexible foundation for the manipulation of information than models underlying traditional database management systems.
• The facilities provided by the model can be employed not only for database queries, updates, and report generation, but also for managing the arbitrary data structures used by systems programs and application programs.
• Moreover, because this occurs in a database setting, the ability to share this information concurrently with other users and to distribute information among different sites is provided in the same way as for more conventional kinds of data routinely stored in databases.
• IDM takes data abstraction as the fundamental underlying idea, and draws together some concepts previously employed for database systems, artificial intelligence applications, and programming languages. A data model is fundamental to each discipline.
• Database systems are explicit about this, but in fact every programming language and every artificial intelligence system also embodies a data model. We propose that a single data model can combine the best aspects of all three disciplines and remove many of the shortcomings of each.

2.5 Objectives and Types
• The central, pervasive concept in IDM is that of the object. Everything in an IDM database is an object; even the database is itself an object.
• The simple data abstraction idea is extended in two significant ways:
• An object may have more than one type
• An object may gain and lose types dynamically
• We must now clarify the meaning of “type”. Each type of group objects that behave similarly. One might define types such as Employee, Account, Document, or Image, for example.
• Every object is said to be an instance of one or more such types. As in a programming language with data abstraction, the type provides a set of operations that define the way instances of that type may be manipulated. Since an object may have more than one type, corresponding to the different roles it may be viewed as playing; it may be manipulated via the operations of several types.
• As an example, suppose that Jones is a person, an employee and a pilot. If Jones later becomes a manager, the type “manager” can be added as shown.

![Diagram showing the additional entity to be added with new tab](image)

- Each type provides a separate set of operations that can be invoked on Jones. For example, among the operations defined by the Person type might be Get Address and Set Address, the Employee type Get Manager and Set Manager, and the Pilot type Get License Number.
- Each type added to an object supplies specific additional capability, by providing additional operations. Types are full-fledged objects.
- Certain types are predefined by the model; other types can be defined by users. The latter is accomplished by creating a type object and binding operations to it; the operations are written (in one of several programming languages) as functions which take parameters and return a single result. Operations are treated as objects also.
- To summarise our concept of an object:
  • everything in an IDM database is an object
  • each object is an instance of one or more types
  • each type defines the operations that are available for its instances
  • the only action available in IDM is to invoke an operation on an object
Summary

- The chapter explains the meaning of an enterprise, the various elements that go to make up an enterprise.
- It helps and understanding of how information, which binds different departments, can be utilized to create a management information system that can integrate business.
- It gives the various methods by which business systems can be modelled and how information systems can be integrated into them.
- The integration of MIS talks about the ways of making information system more efficient.
- The basic elements utilized in integrating business with management information systems are the people, the business procedures and the information.
- Information generated by the people in collecting data, the methods of processing it and effective dissemination of decisions and information can make this happens.
- ERP facilitates company-wide Integrated Information System covering all functional areas such as manufacturing, sales and distribution, Payables, Receivables, Inventory, Accounts, Human Resources, Purchasing, etc.
- Also the Integrated Data Model (IDM) provides a more general and flexible foundation for the manipulation of information than models underlying traditional database management systems.

References


Recommended Reading

- Davis, H.C., Knight, S., Hall, W., 1994. Light Hypermedia Link Services: A Study of Third Party Application Integration. ECHT.
Self Assessment

1. ______ word is often used in general business solutions to describe a corporate entity.
   a. Venture
   b. Enterprise
   c. System
   d. Project

2. ERP systems helps in;
   a. resolving inter departmental conflicts
   b. satisfying varying needs of customers
   c. automating business process and functions, information processing etc.
   d. integrating information system

3. Which of the following is true?
   a. For effective utilisation of information within the organisation, the enterprise needs to integrate business process
   b. For effective utilisation of information within the organisation, the enterprise needs to integrate functions of departments
   c. For effective utilisation of information within the organisation, the enterprise needs to integrate recent issues and conflicts
   d. For effective utilisation of information within the organisation, the enterprise needs to integrate updates accurate information

4. Which of the following departments does the effective utilisation, up-dation and integration of updated information?
   a. Information technology department
   b. Management information system department
   c. Quality assurance department
   d. Information processing

5. ERP is the core business activity and enhances __________.
   a. after sales service
   b. customer satisfaction
   c. processing
   d. controlling and management

6. ___________ automatically enables the introduction of latest technologies such as EDI, EFT, E-commerce etc.
   a. Management Information System
   b. Open System Architecture
   c. Information System
   d. Business Intelligence
7. Business intelligence tools provide;
   a. Plans for future activities for processing
   b. Enabling people to make better decisions and improve their business processes
   c. Refined business processes
   d. Enables the introduction of latest technologies

8. Which of the following is good solution for better project management?
   a. EDI
   b. EFT
   c. EIS
   d. ERP

9. _______ provides a more general and flexible foundation for the manipulation of information than models underlying traditional database management systems.
   a. Business Intelligence Model
   b. Integrated Data Model
   c. EFT
   d. ERP system

10. _________ takes data abstraction as the fundamental underlying idea, and draws together some concepts previously employed for database systems, artificial intelligence applications, and programming language is known as,
    a. IDM
    b. ERP
    c. ESS
    d. DSS
Chapter III
ERP and Related Technologies

Aim

The aim of the chapter is to:

• introduce the concept of ERP technologies
• enumerate various technologies under ERP
• explain the importance of new technologies over traditional methods of resource planning technologies

Objectives

The objectives of the chapter are to:

• elucidate the importance of ERP technologies
• explain reengineering process
• clarify the use of data warehousing and data mining and its importance
• explain the Online Analytical Processing (OLAP), supply chain management
• introduce the concept of Geographical Information System (GIS), product life cycle management

Learning outcome

At the end of this chapter, the students will be able to:

• understand the enterprise planning technologies and its use
• differentiate between traditional methods of resource planning and new technologies
• use the improvement techniques that will help the organisations to perform operations efficiently and attain their common goal
3.1 Introduction
The concept of ERP is the integration of various business processes with the help of computer technology. Thus, with this production planning, sales and distribution, materials management, and accounting, which are separate activities, can be integrated. To ensure a successful integration of an ERP into the business, in our view, the following factors are necessary to be considered:

- Information must be stored in the correct format and this demands programming and a programmer.
- Past records should be available to understand the business trends in relation to current scenario.
- The influence of the other prevailing systems should be well understood to ensure the efficacy of the integration of ERP into the organisation.
- To help in the integration of ERP into business, additional technology is necessary.

These include:
- Business process reengineering
- Data warehousing
- Data mining
- Online analytical processing (OLAP)
- Supply chain management (SCM)
- GIS
- Customer Relationship Management (CRM)
- Product Life Cycle Management (PLCM)

With the successful implementation of the ERP system, previous management information systems, decision-support systems will not be further needed because they would be provided by the new ERP system.

3.2 Business Process Reengineering
Business Process Reengineering (BPR) is a management approach aiming at improvements by increasing efficiency and effectiveness of processes:

- within public organisations
- across public organisations
- from public organisations to businesses
- from public organisations to citizens
- A business process is a sequence of related tasks which make up a business activity.
- Public agencies should be organised to optimally carry out its functions (structure follows function).
- Functions are managerial control units with responsibility for and authority over a series of related activities, and it is executed through business processes.
- Activities involve one or more entities and are performed to directly or indirectly fulfill one of the objectives of the organisation.
- Business Process Reengineering (BPR) involves 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. [Hammer and Champy]
The reengineering concepts involve four dimensions that are stated below:

**Innovative rethinking**
This is a process that is itself utterly dependent on creativity, inspiration and old fashioned luck. Drucker (1993) argues that this paradox is apparent only not real most of what happens in successful innovations are not the happy occurrences of a blinding flash of insight but rather, the careful implementation of unspectacular but systematic management discipline.

**Process function**
Taking a systematic perspective, Hammer and Champy (1993) describes process functions as a collection of activities that take one or more kinds of input and creates an output that is of value to the customer. Typical process of this includes ordering of organisational structure, manufacturing, production, development, delivery and invoicing.

**Radical change**
In radical change, a key business process is the transformation of organisational element; it is essential to an organisation survival. Change leads to new ideas, technology, innovation and improvement. Therefore, it is important that organisations recognise the need for change and learns to manage the process effectively (Pamela et al, 1995).

**Organisational development and performance**
It takes a look at the firm’s level of efficiency and way to improve its current activity level in order to meet up to standards and survive the competitive pressure. One way to judge the performance of an organisation is to compare it with other unit within the company. Comparison with outsiders however can highlight the best industrial practices and promote their adoption. This technique is commonly term “benchmarking” -Roberts, 1994

3.2.1 Steps Involved in Business Process Reengineering
Davenport and Short (1990) prescribe a five-step approach to Business Process Reengineering. These are:

1. **Develop the business vision and process objectives:** Business Process Reengineering is driving by a business vision which implies specific business objectives such as cost reduction, time reduction, output quality improvement, quality of work life.

2. **Identify the processes to be redesigned:** Most firms use high-impacts approach which focuses and most important processes or those that conflict most with the business vision. A few firms use the exhaustive approach that attempts to identify all the processes within an organisation and prioritise them in order to redesigned urgency.

3. **Understand and measure the existing process:** By this step business enterprises avoid repetition of old mistake and provide a baseline for future improvements.

4. **Identity information technology (IT) levels:** Awareness of IT capabilities can and should influence process. This is because IT is a sine qua non to the business process reengineering.

5. **Design and build a prototype of new process:** The actual design should not be viewed as the end of the BPR process. Rather, it should be viewed as a prototype, aligns the BPR approach with quick delivery of results and the involvement and satisfaction of customers.

3.3 Data Warehousing
- A single, complete and consistent store of data obtained from a variety of different sources made available to end users in what they can understand and use in a business context. [Barry Devlin]
- Data warehousing is subject-oriented, integrated, time-variant, and non-volatile collection of data in support of management’s decision-making process.
A data warehouse is data management and data analysis. Data warehouse is implemented over the web with no central data repository.

The goal of data warehouse is to integrate enterprise wide corporate data into a single repository from which users can easily run queries.

### 3.3.1 Features

**Subject oriented**
- Ware Housing (WH) is organised around the major subjects of the enterprise rather than the major application areas. This is reflected in the need to store decision-support data rather than application-oriented data.

**Integrated**
- It is because the source data come together from different enterprise-wide applications systems. The source data is often inconsistent using. The integrated data source must be made consistent to present a unified view of the data to the users.

**Time variant**
- The source data in the WH is only accurate and valid at some point in time or over some time interval. The time-variance of the data warehouse is also shown in the extended time that the data is held, the implicit or explicit association of time with all data, and the fact that the data represents a series of snapshots.

**Non-volatile**
- Data is not updated in real time but is refreshed from Operating System (OS) on a regular basis. New data is always added as a supplement to DB (Database), rather than replacement. The DB continually absorbs this new data, incrementally integrating it with previous data.

### 3.4 Data Mining

- Data mining is the extraction of hidden predictive information from large databases, is a powerful new technology with great potential to help companies focus on the most important information in their data warehouses.

- Data mining tools predict future trends and behaviours, allowing businesses to make proactive, knowledge-driven decisions.

- The automated, prospective analyses offered by data mining move beyond the analyses of past events provided by retrospective tools typical of decision support systems.

- Data mining tools can answer business questions that traditionally were too time-consuming to resolve. They scour databases for hidden patterns, finding predictive information that experts may miss because it lies outside their expectations.

- Most companies already collect and refine massive quantities of data. Data mining techniques can be implemented rapidly on existing software and hardware platforms to enhance the value of existing information resources,
and can be integrated with new products and systems as they are brought on-line.

- When implemented on high performance client/server or parallel processing computers, data mining tools can analyze massive databases to deliver answers to questions such as, “Which clients are most likely to respond to my next promotional mailing, and why?
- Data mining techniques are the result of a long process of research and product development. This evolution began when business data was first stored on computers, continued with improvements in data access, and more recently, generated technologies that allow users to navigate through their data in real time.
- Data mining takes this evolutionary process beyond retrospective data access and navigation to prospective and proactive information delivery.
- Data mining is ready for application in the business community because it is supported by three technologies that are now sufficiently mature:
  - Massive data collection
  - Powerful multiprocessor computers
  - Data mining algorithms

![Fig. 3.2 Integrated data mining](image)

3.5 Online Analytical Processing (OLAP)

- Online Analytical Processing (OLAP) is a system that further transforms the data into a more structured form than tables.
- It is a form of Executive Information System (EIS) and Decision Support System (DSS).
- It looks at data in multi-dimensional form called data cube.
- It can be used by multiple users to access data in a data warehouse, e.g., via Internet.
- It provides managers with a quick and flexible access to large volume of data.

Definition

- “OLAP is the dynamic synthesis, analysis, and consolidation of large volumes of multi-dimensional data.” Codd (1993)
- OLAP is the technology that uses a multi-dimensional view of aggregate data to provide quick access to strategic information.
- Examples: Excel Pivot Table and Pivot Chart are examples of simple OLAP tools
- Online Analytical Processing is the capability to store and manage the data in a way, so that it can be effectively used to generate actionable information.
OLAP makes Business Intelligence happen, broadly by enabling the following:

• transforming the data into multi-dimensional cubes
• summarised pre-aggregated and derived data
• strong query management
• multitude of calculation and modelling functions

A data-warehouse could be having data in various formats like dimensional (with a high degree of de-normalization) or highly relational.

OLAP provides the building blocks to enable analysis (like rich functions, multi-dimensional models, analysis types).

Mostly the end-user tools (like business modelling tools, data mining tools, performance reporting tools), which sit on top of the OLAP to provide rich user Business Intelligence interface.

OLAP and Data warehouse work in conjunction to provide overall data-access for the end-user tools.

There is different way to store the data in OLAP Data-warehouse combination.

**MOLAP**
OLAP storing the data in the multi-dimensional mode is known as MOLAP. To put it in a simplistic manner, there is one array for one combination of dimensions and associated measures. In this storage method there is no connect between the MOLAP database and data-warehouse database for query purpose. It means that a user cannot drill down from MOLAP summary data to the transaction level data of data-warehouse.

**ROLAP**
OLAP storing the data in relational form in dimensional model is known as ROLAP. This is a de-normalized form in relational table structure. ROLAP database of OLAP server can be linked to the Data-warehouse database.

**HOLAP**
The aggregate data is stored in the multi-dimensional model in the OLAP database and the transactional level data is stored in the relational form in the data-warehouse database. There is a linkage between the summary MOLAP database of OLAP and relational transactional database of Data-warehouse. This gives you the best of both the worlds.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>OLAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>• Supports data analysis and decision making</td>
</tr>
<tr>
<td>Type of analysis supported</td>
<td>• Top down, query-driven, data analysis</td>
</tr>
<tr>
<td>Skills required of user</td>
<td>• Must be very knowledgeable of the data and its business context</td>
</tr>
</tbody>
</table>

**Table 3.1 Characteristics of OLAP**

### 3.6 Supply Chain Management

- Supply chain refers to managing the movement of goods and flow of information between an organisation and its suppliers and customers to achieve strategic advantage.
- Supply chain covers the processes of materials management, logistics, physical distribution management, purchase and information management.
- The term logistics management sometimes synonymously used with supply chain management.
- Supply chain follows steps mentioned below to carry out activity of SCM.
Understanding of the marketplace
In this step company should identify the market characteristics of each product and services such as, customer needs, pressure from suppliers and the level of competitor activity.

Analyse business
- Summarise and review the existing core competences of the organisation.
- What business are you in?
- Which operations are core to the operation? and
- Which could be outsourced?
- Combine the information on customer needs and strategic priorities to identify key business areas where an integrated supply chain management can have a benefit?

Analysing the existing supplier base
Produce a list for the suppliers for each product area, evaluate them against a set of performance criteria. These might include price, reliability, responsiveness, delivery arrangements, use of quality systems and product specification.

Categorise suppliers with the aim of reducing the overall total
Use some criteria, such as underperforming, preferred and strategic. Look to working with each category to bring cost reductions to business and to the supply chain.

Investigate supply chain partnerships
Partnerships are the natural next level in the evolution of the supply chain. Partnerships allow organisations to work together to take advantage of market opportunities and to respond to customer needs more effectively than they could in isolation.

Set up a supply chain network
This stage involves broadening these partnerships to include suppliers and customers. A process map of the entire supply chain can help.

Monitor the chain
Setting up a supply chain is only the first step. Ensuring that it operates as planned and delivers the benefits to all parties is a critical ongoing activity.

Ensure that appropriate measures and indicators are analyzed on a regular basis to ensure that everything is working to plan, so that any shortcomings can be quickly identified and action taken if necessary.

3.7 Product Life Cycle Management (LCM)
- LCM is a framework to analyse and manage the sustainability performance of goods and services.
- LCM is a business management approach that can be used by all types of business (and other organisations) in order to improve their sustainability performance.
- A method that can be used equally by both large and small firms, its purpose is to ensure more sustainable value chain management.
- LCM can be used to target, organise, analyse and manage product-related information and activities towards continuous improvement along the product life cycle.
- LCM is about making life cycle thinking and product sustainability operational for businesses that are aiming for continuous improvement. These are businesses that are striving towards reducing their footprints and minimising their environmental and socio-economic burdens while maximising economic and social values.
### 3.8 Geographic Information System (GIS)

- A GIS is Geographic Information System, (GIS) software represents features on the earth, such as buildings, cities, roads, rivers, and states, on a computer.
- People use GIS to visualize, question, analyze, and understand this data about the world and human activity.
- Often, this data is viewed on a map, which provides an advantage over using spreadsheets or databases. Why? Because maps and spatial analysis can reveal patterns, point out problems, and show connections that may not be apparent in tables or text. GIS makes map data interactive and, thus, more useful.
- For example, a GIS shows a street as more than a screen graphic one can click on a GIS street map to find out the speed limit, the number of lanes, the last time it was paved, any planned construction, and a multitude of additional related facts.
- All this information provides an accurate understanding of the street. If a city needed to widen this street, it could use GIS to create a 50-foot buffer on the street to find the properties that fall within the buffer.
- GIS can then easily identify property owners affected by the project so that they may be contacted. What if the street widening project diverts traffic to another area? Which delivery truck routes or school bus stops are affected? How should the deliveries be routed? Where can school bus stops are safely relocated? GIS combines layers of data to find the best alternatives, saving invaluable time for a government or a company.

### 3.9 Customer Relationship Management

- Customer Relationship Management (CRM) refers to a collaborative philosophy or system of business practices implemented across an enterprise to organise the acquisition, aggregation, and analysis of customer profiles.
- Customer information is already captured from numerous points, such as sales information systems, call centers, and surveys. CRM Services allow this information to be shared across the company in order to create a customer-centric organisation.
- The methods and software used for dissecting the collected customer data are called business intelligence systems. Once the data is analyzed, the most profitable customer demographics for the company can be targeted and catered to, and the long-term retention of this group will result in increased customer satisfaction and therefore increased revenue.
- Customer-focused organisational intelligence is also a way to differentiate a company. It can unify disparate departmental goals, and improve the customer buying experience, effective lead generation, marketing campaign management, sales, order fulfillment, and customer service.
- Customers with successful CRM systems report higher profits; lower costs to attract and retain customers; greater customer loyalty; and smoother, more streamlined workflows.

**Specific benefits include:**
- more timely and targeted customer services
- increased per-customer revenues
- greater cross-sell and up-sell success
- trimmed sales cycles
- more-efficient call center operations
- improved sales forecasting
- fewer customer problems
- better-informed marketing decisions
Summary

- This chapter deals with various technologies of ERP and their importance in various organisations.
- Management information system in every organisation is very efficient tool of making organisation connected with lower management to top management. The ERP system of MIS will have different inputs such decision support system, executive information system.
- Data warehousing is collection of processed and unprocessed data in random or discrete order which is stored in raw form in information warehouse which is related to every single department in an organisation which will further processed and used by the respective department.
- Data mining is activity carried out only after data warehousing, under which data is mined out of data bundles and separate through out according to specific requirements from department in an organisation.
- (OLAP) Online analytical processing is a system that further transforms the data into a more structured form than tables. OLAP can be used by multiple users to access data in a data warehouse, e.g., via Internet. It provides managers with a quick and flexible access to large volume of data.
- Customer relationship management (CRM) services allow this information to be shared across the company in order to create a customer-centric organisation.
- Geographical information system (GIS) software represents features on the earth, such as buildings, cities, roads, rivers, and states, on a computer. People use GIS to visualize, question, analyze, and understand this data about the world and human activity.
- Product Life cycle management (PLCM) is a framework to analyse and manage the sustainability performance of goods and services. LCM is a business management approach that can be used by all types of business (and other organisations) in order to improve their sustainability performance. A method that can be used equally by both large and small firms, its purpose is to ensure more sustainable value chain management.
- Supply chain management (SCM) covers the processes of materials management, logistics, physical distribution management, purchasing and information management. The term logistics management sometimes synonymously used with supply chain management.

References


Recommended Reading

1. __________ is a management approach aiming at improvements by increasing efficiency and effectiveness of processes.
   a. BPR
   b. CRM
   c. OLAP
   d. ERP

2. ____________ is a single, complete and consistent store of data obtained from a variety of different sources made available to end users in what they can understand and use in a business context.
   a. Data processing
   b. Data warehousing
   c. Data mining
   d. Data Integration

3. Subject-oriented, integrated, time-variant, and non-volatile are characteristics of _________________.
   a. data integration system
   b. ERP system
   c. data mining
   d. data warehousing

4. __________ tools predicts future trends and behaviours, allowing businesses to make proactive, knowledge-driven decisions.
   a. Data mining
   b. Data warehousing
   c. OLAP
   d. Data integration

5. Which of the following is a form of Executive Information System (EIS) and Decision Support System (DSS)?
   a. CRM
   b. Business Intelligence
   c. Data Warehousing
   d. OLAP

6. OLAP looks at data in multi-dimensional form called _________________.
   a. IDM
   b. OLAP tool
   c. Data Cube
   d. Warehousing

7. Business modelling tools, data mining tools, performance reporting tools are known as _____________.
   a. end user tools
   b. business tools
   c. management tools
   d. OLAP tools
8. Match the following

<table>
<thead>
<tr>
<th></th>
<th>MOLAP</th>
<th>A. Supports data analysis and decision making</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ROLAP</td>
<td>B. Linkage between relational database</td>
</tr>
<tr>
<td>2</td>
<td>HOLAP</td>
<td>C. De-normalized form of database</td>
</tr>
<tr>
<td>3</td>
<td>OLAP</td>
<td>D. Storing data in multi-dimensional mode</td>
</tr>
</tbody>
</table>

   a. 1-A,2-B,3-C,4-D
   b. 1-B,2-C,3-D,4-A
   c. 1-D,2-C,3-B,4-A
   d. 1-C,2-D,3-A,4-B

9. Managing the movement of goods and flow of information between an organisation and its suppliers and customers to achieve strategic advantage is known as ____________ management.

   a. materials
   b. logistics
   c. purchase
   d. supply chain

10. Which is a business management approach that can be used by all types of businesses (and other organisations) to improve their products and thus the sustainability performance of the companies and associated value chains?

   a. SCM
   b. LCM
   c. EPR
   d. BI
Chapter IV
ERP — A Manufacturing Perspective

Aim
The aim of this chapter is to:

- enable the students to understand the manufacturing perspective of ERP
- focus on various applications of ERP
- highlight issues in workflow, data processing, requirement planning

Objectives
The objectives of this chapter are to:

- explain computer-aided manufacturing and computer-aided design
- emphasise on MRP, MRP-II, closed loop of MRP
- describe the effects of applicability’s of DRP, PDM, TQM and process management

Learning outcome
At the end of this chapter, students will be able to:

- understand the use of CAD and CAM in manufacturing process
- know the effectiveness of TQM, product data management and work management
- understand the issues in workflow, data processing, requirement planning
- explain most common problem faced by the company in manufacturing process and workflow management
4.1 Introduction

In the manufacturing segment of the country, more than a quarter office expenses are utilized towards information technology. It is because production units utilise the information technology most effectively, especially for controlling inventory costs and customer services. Depending upon the nature of manufacturing, the emphasis on the use of information technology may vary, but most manufacturing units are attempting to incorporate the information technology advantage into its production system.

The major sources of investment of production units towards the utility of information technology are:

- creating infrastructure like building-up systems, establishing network components, and effective communication patterns
- designing soft wares and helping in its application
- utilising ERP packages
- expenses towards consulting services
- expenses towards the supply chain management
- data ware housing
- establishing e-commerce

ERP is becoming the point of focus of more and more companies so that they become players in the global market. ERP is not an add-on technology, but helps in creating the much-needed change to make business competitive globally.

It is important to understand that the rapid demand of ERP does not allow ERP to be fully utilised. This is because the complete advantage is only possible by a purposeful and the best implementation of ERP systems.

Nevertheless, ERP popularity is on the rise; moreover, ERP vendors are providing the necessary ERP packages to the manufacturing units.

A stepwise integration is under way in the implementation of ERP in manufacturing units. In the beginning of ERP, the integration of finance and logistics is done. This is followed by sales and distribution or the production technology.

In the present scenario, most companies prefer to implement ERP simultaneously to decrease the gestation period and also enhance faster integration of ERP.

4.2 Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)

- Computer aided design and manufacturing can be effectively exploited in design analysis and development. It also contributes to reverse engineering.
- Products data management is another area of application. This helps in improving efficiency and promoting competition. The export potential of an industry can significantly improve by using products data management.
- A computer-aided technology (CAx) is a broad term describing the use of computer technology to aid in the design, analysis, and manufacture of products.
- Advanced CAx tools merge many different aspects of the Product Lifecycle Management (PLM), including design, analysis using finite element analysis (FEA), manufacturing, production planning, product testing using virtual lab models and visualisation, product documentation, product support, etc.
- CAx encompasses a broad range of tools, both those commercially available and those which are proprietary to the engineering firm.
- The term CAD/CAM (computer-aided design and computer-aided manufacturing) is also often used in the context of a software tool covering a number of engineering functions.
Definitions

Computer Aided Design (CAD)

Computer Aided Design (CAD), also known as computer-aided design and drafting (CADD), is the use of computer technology for the process of design and design-documentation.

- CAD may be used to design curves and figures in two-dimensional (2D) space; or curves, surfaces, and solids in three-dimensional (3D) objects.
- CAD is an important industrial art extensively used in many applications, including automotive, shipbuilding, and aerospace industries, industrial and architectural design, prosthetics, and many more.
- CAD is also widely used to produce computer animation for special effects in movies, advertising and technical manuals.

An increasingly popular tool for product design is Computer-Aided-Design (CAD). CAD systems are computer programs or integrated packages for workstation hardware and software, which allow the user to draw and easily modify product designs on a computer screen.

Computer Aided Manufacturing (CAM)

Computer Aided Manufacturing (CAM) is the use of computer software to control machine tools and related machinery in the manufacturing of work-pieces.

- CAM may also refer to the use of a computer to assist in all operations of a manufacturing plant, including planning, management, transportation and storage.
- Its primary purpose is to create a faster production process and components and tooling with more precise dimensions and material consistency, which in some cases, uses only the required amount of raw material (thus minimising waste), while simultaneously reducing energy consumption.

Advanced CAD systems provide designers with at least three major benefits.

Graphics capabilities

CAD systems allow the designer to view a product from different perspectives, including three dimensional rotations and various cross-sections. The designer can also make proportional changes in scale, or change the angle of an arc with the click of a computer mouse rather than having to redraw the entire product.

Design, storage and retrieval

Some CAD systems can state the design characteristics of existing products and components. Then, for example, if a company needs a gear for a new product, the designer can enter the relevant information about the gear, such as its diameter, tooth pattern, and required hardness into the CAD system. The CAD system determines whether the company is already using an identical or sufficiently similar gear in which case a new one is unnecessary. If not a gear that has similar properties may exist. The designer can then use the design of this similar gear as a starting point for the new gear. This capability not only promotes the use of common components but also reduces design time.

Automatic evaluation of specifications

One of the most time-consuming aspects of design for highly technical products is calculating whether or not product specifications such as strength, heat resistance, or aerodynamic drag are satisfied. These calculations can be programmed into some CAD systems so that whenever the designer changes the design (by altering the shape or material to be used), these performance characteristics are recalculated automatically and compared to the product requirements. This is sometimes called Computer Aided Engineering (CAE).

For example,

- Motorola used three-dimensional CAD to produce its award winning MicroTac pocket sized cellular phone two years ahead of the competition. It is common for CAD systems to reduce product cycle times by 10—50%.
Even greater time and cost reductions have resulted from recent advances whereby CAD-engineered designs are converted automatically into software programs for computerised production machines. These are called Computer Aided-Design/Computer-Assisted-Manufacturing (CAD/CAM) systems. This automatic conversion eliminates the costly and time-consuming steps at a person convert design drawings into a computer programme for computer controlled production equipment, such as robots or machine tools. CAD and CAD/CAM systems are not used by large automotive or electronics companies alone. Future enterprises, the largest maker of wedding jewellery in the United States, reported that its CAD/CAM system reduced the time required to design and make jewellery from five months to one week.

4.2.1 Uses of CAD and CAM
- Computer-aided design is one of the many tools used by engineers and designers and is used in many ways depending on the profession of the user and the type of software in question.
- CAD is one part of the whole Digital Product Development (DPD) activity within the Product Lifecycle Management (PLM) process, and as such is used together with other tools, which are either integrated modules or stand-alone products, such as:
  - Computer-aided Engineering (CAE) and Finite Element Analysis (FEA)
  - Computer-aided manufacturing (CAM) including instructions to Computer Numerical Control (CNC) machines
- Photo realistic rendering
- Document management and revision control using Product Data Management (PDM)

4.3 Material Requirement Planning (MRP)
- Material Requirement Planning (MRP) is a computerised information system which captures the product structure associated with a product.
- The key elements of an MRP system are Master Production Schedule (MPS) and Bill of Material (BOM). MRP is considered to be an improvement over traditional inventory control systems.
- The concept of MRP was pioneered by Joseph Orlicky during early 70s. The key benefit of MRP system is to reduce inventory levels and improve customer service.
- MRP is considered an improvement over ordering components system by inventory. This was because it provided the advantage of maintaining records of dates even after an order was released.
- It helped in maintaining updated information related to time of delivery and the expected results. Later on, MRP was utilised in planning production and then integrating the shop floor with business plans. It also helped units of production to be converted into financial terms to understand the effectiveness of production.
- This transition allowed a new system: manufacturing resource planning to be established in organisations. This computer-aided design and computer-aided manufacturing along with the effective use of robotics guided the vehicles.
- In the production process for manufacturing resource planning to be effective, three types of information are necessary. These are master production schedules, bills of material, and inventory records.
- The master production schedules provide the details related to the manufacturing process and the various inputs required achieving the results.
- The bills of material show to the relationships between the various components. The inventory records maintain information related to the stocks order levels and the lead times.

4.3.1 Master Production Schedule
- Master production schedule is anticipated to build schedule for manufacturing end products.
- A statement of production, not a statement of market demand.
- MPS takes into account capacity limitations, as well as desires to utilize capacity fully.
- Stated in product specifications – in part numbers for which bill of material exist.
- Since it is a build schedule, it must be stated in terms used to determine component part needs and other requirements; not in monetary or other global unit of measure.
- Specific products may be groups of items such as models instead of end items.
- The exact product mix may be determined with Final Assembly Schedule (FAS), which is not ascertained until the latest possible moment.
- If the MPS is to be stated in terms of product groups, we must create a special bill of material (planning bill) for these groups.

**Task performed by a master production scheduler:**
- Construct and update the MPS Involves processing MPS transactions, maintaining MPS records and reports, having a periodic review and update cycle (rolling through time), processing and responding to exception conditions, and measuring MPS effectiveness on a routine basis.
- On a day-to-day basis, marketing and production are co-ordinated through the MPS in terms of order promising.
- Order promising is the activity by which customer order requests receive shipment dates.

**An effective MPS provides:**
- basis for making customer delivery promises
- utilising plant capacity effectively
- attaining the firm’s strategic objectives as reflected in the production plan
- resolving trade-off between manufacturing and marketing

Since MPS is the basis for manufacturing budgets, the financial budgets should be integrated with production planning/MPS activities
When MPS is extended over a time horizon, is a better basis for capital budgeting
Based on the production output specified in the MPS the day-to-day cash flow can be forecasted
The MPS should be realizable and not overstated. When scheduled production exceeds capacity, usually some or all of the following occur:
- invalid priority
- poor customer service (missed deliveries)
- excess in-process inventories
- high expediting costs
- lack of accountability
4.3.2 Bill of Materials

- Bill of materials helps in understanding the interrelationships between the components and the end items.
- BOM defines the relationship of components to end items. The BOM identifies all components used in the production of an end item, the quantity required, and the order in which the components are assembled.
- The key to MRP is time phasing of requirements for components based upon the structure of the BOM. If we have the idea of the estimated time required for either manufacture or purchase components (lead-time), we can determine when the orders should be released to the shop floor or outside suppliers to ensure that the required components will be available when needed.

4.3.3 Closed Loop MRP

- For MRP system to be useful, the production system should complete component orders on time. Closed loop MRP uses capacity planning and feedback to improve the ability of the production system to complete work as planned.
- Capacity planning tools allow the operations manager to adjust the master production schedule and/or planned order release dates, or obtain additional capacity, so that shop orders can be completed by their due dates.
- MRP planners use a number of planning factors (capacity planning factors, lead-time estimates, safety stocks, safety lead-time, etc.) and tools (capacity planning, frozen time horizons, firm planned orders, etc.) to improve the quality of the materials schedules generated by the MRP system.
- To determine how well the planning factors and tools are working; MRP planners need feedback from the shop floor and the purchasing department.
- With effective feedback, the MRP planner can revise the planning factors and techniques, so that better materials schedules can be developed in the future.
- Feedback is also important when suppliers or the shop floor cannot meet order due dates. Timely feedback to MRP planners allows them to develop alternatives, or at least minimize the effect of the problem.
- For example, production of a batch of a component may not be completed on time, but enough components may be available in on-hand inventory and safety stock to allow the production of a smaller quantity of the parent item to satisfy the MRP, until production of the component is completed.
4.4 Manufacturing Resource Planning-II (MRP-II)

- MRP was originally developed as a computer system that was limited to materials planning. As the computer technology and MRP systems developed, it became clear that MRP systems maintain extensive information that can be used for other company functions.
- For example, MRP systems maintain accurate inventory information. Combining this information with cost data allows accounting personnel to have accurate inventory information in meaningful financial terms. Rather than having separate production and accounting systems, a company can expand MRP to meet the requirements of both the systems.
- MRP-II is an expansion of closed loop MRP for managing an entire manufacturing company. MRP-II systems provide information that is useful to all functional areas and encourage cross-functional interaction. MRP-II supports sales and marketing by providing an order promising capability.
- Order promising is a method of tying customer’s orders for finished goods in the MPS. This allows sales personnel to have accurate information on product availability and gives them the ability to give customers accurate delivery dates.
- MRP-II supports financial planning by converting materials schedules into capital requirements. A company can use MRP-II to simulate the effects of different master production schedules on material usage, labour, and capital requirements.
- MRP-II provides the purchasing department with more than just purchase requisitions. The long-range planned order release schedules can be used to provide the purchasing department with information for developing long range buying plans.
- It is now common for suppliers to directly access a customer’s MRP-II system to receive up-to date information on the customers’ planned material needs.
- Information in the MRP-II system is used to provide accounting with information on material receipts to determine accounts payable. Shop floor control information is used to track workers’ hours for payroll purposes.
- Manufacturing is the central function in a manufacturing company. The information required to successfully plan and schedule production is valuable to the other (supporting) functions in the company.
- MRP-II systems increase company’s efficiency by providing the central source of management information.

4.5 Distribution Requirement Planning (DRP)

- Distribution Requirements Planning (DRP) extends the logic of MRP into the physical distribution system. It provides a mechanism for integrating the physical distribution system with the production planning and scheduling system.
- DRP assists companies that maintain distribution inventories in field warehouses, distribution centre, and so forth by improving the linkage between marketplace requirements and manufacturing activities.
- A DRP system helps management to anticipate future requirements in the field closely match the supply of products to the demand for them, effectively deploy inventories to satisfy customer requirements, and rapidly adjust to changes in the marketplace.
- A DRP system also engenders significant logistics saving through improved planning of transportation capacity needs, vehicle loading, vehicle dispatching and warehouse receipt planning.
- DRP has a central coordinating role in the physical distribution system, similar to MRP’s role in coordinating materials in the manufacturing system.
- DRP provides the necessary data for matching customer demand with the supply of products at various stages in the physical distribution system and with products being produced by manufacturing.
- The DRP record is similar to MRP record, for example, for a distribution centre forecast requirements, for a product replace gross requirements; and is used in conjunction with information concerning inventory on-hand at the distribution centre, inventory in transit to the distribution centre (analogous to scheduled receipts in MRP), transportation lead-time, safety stock requirements, and standard shipping quantities to determine time phased planned shipments to the distribution centre (analogous to time phased planned orders in MRP).
In addition to determining time-phased planned shipment quantities, DRP provides a company with access to all the detailed local information for managing physical distribution and for coordinating with manufacturing. Because customer demand is independent, each distribution centre needs detailed forecasts of the item in demand.

Careful attention to actual customer demand patterns may allow forecasts generated by a standard forecasting method to be tailored to local conditions, resulting in improved accuracy and inventory savings. As the actual field demands vary according to the forecasts, adjustment plans are made by DRP.

DRP makes continual adjustments, sending inventories from the central warehouse or manufacturing facility to those distribution centres where they are most needed.

In a case, when the total inventory is insufficient to satisfy requirements, DRP provides the basis for accurately stating when delivery can be expected and for deciding allocations, such as favouring the best customers or providing inventory to last the same amount of time at each distribution centre.

In short, DRP is a critical link between the marketplace, demand forecasting and master production scheduling.

4.6 JIT and Kanban System

JIT means to produce goods and services when needed, not too early and not too late.

It is time-based and often has quality and efficiency targets. JIT is a production philosophy and not a technology.

This is due to the fact that it looks at the whole of the production system, and goes far past inventory control. The JIT system has been called numerous names, from zero defects and synchronous production to stockless production at Hewlett Packard.

The JIT system also uses the pull method of scheduling material flow (Kanban).

A JIT system aims to make goods available whenever required, and these can be anything including parts, products or subassemblies, etc.

**JIT has the following benefits:**

- increased flexibility
- parts reduction
- increased quality
- simplicity of system

Increased flexibility provides the company with the ability to react to changing events, i.e. change in customer orders, or design modifications.

Increased productivity means that the least time and minimum resources are used in the process of production. The objective of JIT is to produce many parts of the same size, but this is not economically feasible as the set up cost is higher compared to the carrying cost.

JIT uses set of tools and techniques to achieve its aims,

A disciplined approach is required, which incorporates three principles pertaining to the organisation:

- Elimination of Waste
- Total Quality Management (TQM)
- Total Employee Involvement

4.6.1 Elimination of Waste

Waste elimination is basically disposal of any activity that is not value added, but we have to identify it. This activity does not increase product value and are costly to the company.

Examples of non-value adding activities include traditional production methods i.e. inspection of parts, holding stock, inventories, time, etc.

The waste can be eliminated off these activities by removing of defects, hence make-to-order.
4.6.2 Total Quality Management

- TQM disposes waste by eliminating defects. In a JIT environment, the aim is to prevent defects, and this is achieved by detecting problems at their roots.
- The whole organisation is involved in the process. Right from the stages of manufacturing, product development, and purchasing manufacturing uses Statistical Process Control (SPC) and in-process testing (to allow detection at source), while product development ensures that new products can be manufactured to specification.

4.6.3 Total Employee Involvement

- In total employee involvement, the management provides leadership opportunities, which results in employees’ involvement in the process of business.
- The opportunity is given in form of education and training, and teamwork.

4.6.4 Kanban

- For many companies, the core part of the production is Kanban, Japanese term for ‘visual record’, which directly or indirectly drives much of the manufacturing organisation.
- It was originally developed at Toyota in the 1950s as a way of managing material flow on the assembly line. Over the past three decades, the Kanban process, which is a highly efficient and effective in factory production system has developed into an optimum-manufacturing environment leading to global competitiveness.
- The Kanban process of production is sometimes incorrectly described as a simple just-in-time management technique, a concept that attempts to maintain minimum inventory.
- The Kanban process involves more than fine tuning production and supplier scheduling systems, where inventories are minimised by supplying the components only when needed in production, and work in progress in closely monitored.
- It also encourages industrial reengineering like a module and cellular production system, and group production techniques, where team members are responsible for specific work elements and employees are encouraged to effectively participate in continuously improving the Kanban processes within the Kaizen (continuous improvement) concept.
- The Japanese refer to Kanban as a simple parts’ movement system that depends on cards and boxes/ containers to take parts from one workstation to another on a production line.
- The essence of the Kanban concept is that a supplier or the warehouse should only deliver components to the production line as and when they are needed, for there should not be extra storage.
- Within this system, workstations located along production lines only produce/deliver desired components when they receive a card and an empty container, indicating that more parts are required for production.
- In case of line interruptions, each workstation will only produce enough components to fill the container and then stop.
- In addition, Kanban limits the amount of inventory by acting as a controlling authorisation to more inventories.
- Since Kanban is a chain process in which orders flow from one process to another, the production or delivery of components is pulled to the production line in contrast to the traditional forecast-oriented method where parts are pushed to the line.

The advantages of Kanban over the traditional push system are:

- a simple and understandable process
- provides quick and precise information
- low costs associated with the transfer of information
- provides quick response to changes
- limit of over-capacity in processes
• avoids overproduction
• minimises waste
• maintains control
• delegates responsibility to line workers

Following figure is about Kanban process in supply chain:

![Kanban Process Diagram](image)

**Fig. 4.2 Supply chain Kanban**

### 4.6.5 Benefits of JIT

- JIT continuously tries to reduce inventory levels of work in process (WIP), raw materials, and finished goods.
- Therefore, the lesser space is required for lower inventories and hence there is less chance of the product becoming damaged, spoiled, or obsolete.
- Material handling of lots can be automated, and operations can be placed closer together, enhancing communication and teamwork.

The following are some of the benefits of a properly implemented JIT system:

- **Increased flexibility**
  - Flexibility is a prerequisite, if small batch sizes are to be kept. A flexible workforce means the operators must be multi-skilled, which is done through training
  - The worker should also be free to move from low demand to high demand areas

- **Parts reduction**
  - JIT continuously seeks to reduce inventory levels of raw materials, work in process, and finished goods. Lower inventory means less space and less chance of the product being obsolete, damaged, or spoiled
  - Work-in-process inventories are reduced, as the firm implements the pull system
  - Raw material reduction is a key part of the JIT system and requires a sound relationship with the suppliers. Inventories can be reduced if products are produced, purchased, and delivered in small lots
  - To avoid unnecessary production delays, raw materials must arrive just before they are required. It should be the correct material and must satisfy the quality specifications.
  - Benchmarking quality function deployment and service design can be used for service operations. Service employees need to learn the value of providing defect free services
4.6.6 Pitfalls of JIT

The following two are the main reasons of failure of JIT in an organisation:

- fail to understand it and
- fail to implement it properly

Apart from that following are common hindrances:

- unaware of the tasks, resources, time scale, and costs
- need the full backing of the top management
- adequate training programme is not provided
- careful planning of process and control improvements is not followed strictly
- the planning stage will require dedication and time and may also require the assistance of an external consultant(s)
- all of the above must be integrated with moves towards JIT purchasing, or else the real JIT will not be achieved
- the JIT system should not be viewed as a one-off scheme but as an ongoing continuous process

4.7 Product Data Management (PDM)

- One of the major manufacturing challenges is to maximise the time-to-market benefits of concurrent engineering while maintaining control of the data, and distributing it automatically to the people who need it, when they need it.
- The way, PDM systems cope with this challenge, is that the master data is held only once in a secure ‘vault’, where its integrity can be assured and all changes to it are monitored, controlled, and recorded. Duplicate reference copies of the master data, on the other hand, can be distributed freely to users in various departments for design, analysis, and approval. The new data is then released back into the vault. When a ‘change’ is made to the data, what actually happens is that a modified copy of the data, signed and dated, is stored in the vault alongside the old data, which remains in its original form as a permanent record.
- This is the simple principle behind more advanced PDM systems. To understand it fully, let us look separately at how these systems control raw product data (Data Management and Process Management).
- Manufacturing companies are usually good at systematic recording component and assembly drawings, but often do not keep comprehensive records of attributes such as ‘size’, ‘weight’, ‘where used’, etc.
- As a result, engineers often have problems accessing the information they need. This leaves an unfortunate gap in their ability to manage their product data effectively.
- Data management systems should be able to manage both attributing and documentary product data, as well as relationships between them through a relational database system. With so much data being generated, a technique to classify this information easily and quickly needs to be established. Classification should be a fundamental capability of a PDM system.
- Information regarding similar types of components should be capable of being grouped together in named classes. More detailed classification would be possible by using attributes to describe the essential characteristics of each component in a given class.

4.7.1 Classification of Components

- Components will be entered in the database under a variety of classes, which suit individual business needs. Classes themselves can be grouped together under convenient broad headings. This allows the company’s working stock of components to be organised in an easily traceable, hierarchical network structure. Each part can be given its own set of attributes.
- Additionally, some systems have the capability of registering certain components available with specific optional attributes. This can be invaluable in controlling Bills of Materials (BOMs) for made-to-order variations of the standard items or customised items.
4.7.2 Classification of Documents

- Documents related to components and assemblies can be classified, for example, classes might be drawings, 3D models, Technical publications’, Spreadsheet files, etc.
- Each document can have its set of attributes, number, author, date entered; and at the same time relationships between documents and the components themselves can be maintained so.
- For example, a dossier for a specific ‘bearing assembly containing 2D drawings, solid models, and FEA files.
- PDM systems vary greatly in their classification capability. Some have none, however, others support the ability to define a classification only at the time when the database is implemented.
- More recent PDM systems have been provided with a capability that can be defined and modified at will, as the demands of the organisation change.

4.7.3 Product Structure

- For any selected product, the relationship between its component assemblies and between the parts that make up these assemblies should be maintained.
- This would mean that one could open a complete Bill of Materials, including documents and parts either for the entire product or for the selected assemblies.
- One distinct advantage is the ability to compare not just the physical relationships between parts in an assembly, but also other kinds of structures: for instance, manufacturing, financial, maintenance or document relationships.
- Hence, it is possible for specialist team members to see the product structured from their point of view.

4.7.4 Querying the Data

- As we can imagine, one needs to be able to ‘get at’ the components and assembly data by a variety of routes. One could move up and down a classification tree; pick one’s way through a product structure; simply call up the data one wants by searching for it by name or part number, or search for groups of data by specifying an attribute or combination of attributes.
- For example, we could ask to see all stainless steel rivets with anodised shanks less than 10 mm long.

4.7.5 Benefits of PDM

Some of the benefits of the PDM system:

Reduced Time-to-Market

This is the major benefit of a PDM system. Three factors serve to place limits on the speed with which we can bring a product to market.

- It can speed up tasks by making data instantly available, as it is needed.
- It supports concurrent task management.
- It allows authorised team members access to all relevant data with the assurance that it is always the latest version.

Improved Design Productivity

Product Data Management systems, when driving the appropriate tools, can significantly increase the productivity of our engineers. With a PDM system providing them with the correct tools to access this data efficiently, the design process itself can be dramatically shortened.

Another factor is that designers should spend more time on designing. Historically, a design engineer would spend as much as 25-30% of his time simply handling information, looking for it, retrieving it, waiting for copies of drawings, archiving new data. PDM removes this dead time almost entirely. The designer no longer needs to know where to look for released designs or other data. It is all there on demand.
A third major time saver is the elimination of the ‘reinvented wheel’ syndrome. The amount of time designers spend solving problems that has probably been solved before, is notorious. It is often considered quicker to do it again than to track down design elements that could be re-used. With a PDM system, however, the identification, re-use and modification of existing, similar designs should become routine.

**Improved design and manufacturing accuracy**

An important benefit of PDM systems is that everyone involved in a project is operating on the same set of data, which is always up-to-date. If we are working on a master file, we know that it is the only one. If we are viewing a reference copy, we know it is a replica of the latest master. The overlapping or inconsistent designs are eliminated though people are operating them concurrently. Naturally, this leads to far fewer instances of design problems that only emerge at manufacturing or QA. Fewer Engineering Change Orders (ECOs), more right-the-first-time designs results a faster path to the marketplace.

**Better use of creative team skills**

Designers are often conservative in their approach to problem solving for no reason, other than the high time penalties for exploring alternative solutions. The risks of spending excessive time on a radically new design approach, which may not work, would be unacceptable. PDM opens up the creative process in three important ways.

First, it keeps track of all the documents and test results relating to a given product change, minimizing design rework, and potential design mistakes. Second, it reduces the risk of failure by sharing the risk with others and by making the data available to the right people quickly. Third, it encourages team problem solving by allowing individuals to bounce ideas off each other using the packet-transfer facility, knowing that all of them are looking at the same problem.

**Comfortable to use**

Although PDM systems vary widely in their levels of user-friendliness, most set out to operate within the existing organisational structure of a product engineering operation without major disruption. The system should, in fact, make familiar tasks much more user-oriented than before. When users wish to view information on a PDM system, the application is loaded automatically; and then the document is loaded. In a conventional working environment, users would either have to be much more skilled at accessing the information, or be prepared to accept it in a much less flexible form.

**Data integrity safeguarded**

The single central vault concept ensures that, while data is immediately accessible to those who need it, all master documents and records of historical change remain absolutely accurate and secure.

**Better control of projects**

The reason that product development projects are almost invariably late is not because they are badly planned in the first place, but because they routinely go out of control. If someone asks ‘why?’ the answer would be: the immense volume of data generated by the project rapidly snowballs beyond the scope of traditional project management techniques. The greater, the competitive time pressures, the greater the scope for inconsistency, and likelihood of rework. PDM systems enable us to retain control of the project by ensuring that the data, on which it is based, is firmly controlled. Product structure, change management, configuration control, and traceability are key benefits. Control can also be enhanced by automatic data release and electronic sign-off procedures. As a result, it is impossible for a scheduled task to be ignored, buried, or forgotten.

**Better management of engineering change**

A PDM system allows us to create and maintain multiple revisions and versions of any design in the database. This means that iterations on a design can be created without the worry that previous versions will be lost or accidentally erased. every version and revision has to be ‘signed’ and dated’, removing any ambiguity about current designs and providing a complete audit trail of changes.
A major step toward total quality management
By introducing a coherent set of audited processes to the product development cycle, a PDM system goes a long way towards establishing the environment for ISO 9000 compliance and Total Quality Management (TQM). Many of the fundamental principals of TQM, such as 'empowerment of the individual' to identify and solve problems, are inherent in the PDM structure. The formal controls, checks, change management processes and defined responsibilities also ensure that the PDM system we select, contributes to the organisation’s conformance with international quality standards.

4.8 Process Management

- Process management, is about controlling the way people create and modify data-active procedures. This may sound like a new name for project management.
- Project management concerns itself only with the delegation of tasks; process management addresses, the impact of tasks on data.

Process management systems normally have three broad functions:
- They manage what happens to the data when someone works on it (Work Management).
- They manage the flow of data between people (Workflow Management).
- They keep track of all the events and movements that happen in functions 1 and 2 during the history of a project (Work History Management).

PDM systems vary widely in how they perform these functions. The following is a broad overview:

4.9 Work Management

- A PDM system offers a solution by acting as the engineer’s working environment, meticulously capturing all new and changed data as it is generated, maintaining a record of which version it is, recalling it on demand and effectively keeping track of the engineer’s every move.
- When an engineer is asked to carry out a design modification, he or she will normally require more than just the original design and the Engineering Change Order (ECO).
- Many documents, files, and forms may need to be referred to and other members of the design team may be involved. In a traditional design environment, a project folder or dossier would be compiled which the team could refer to as and when it is needed.
- Current PDM systems cope with this requirement with varying degrees of success. One approach is that which emulates paper-based processes by using what are known as ‘user packets’.
- The packet allows the engineer to manage and modify several different master documents simultaneously as well as provide various supporting documents for reference.
- This approach also supports the concurrent engineering principle. For example, although only one user can be working on a ‘master’ design, colleagues working on the same project can be instantly notified that there is an updated master design, and reference copies of it will be made available to them in their own packets.
- A given packet can be worked on only by the user to whom it is logged out, but its contents can be looked at and copied by everybody with the necessary access permissions.

4.10 Workflow Management

During the development of a product, thousands of parts may require to be designed. For each part, files need to be created, modified, viewed, checked and approved by many different people, perhaps several times over. What’s more, each part will call for different development techniques and different types of data-solid models for some, circuit diagrams for others, FEA (Functional Economic Analysis) data for others. There needs to be continuous cross checking, modification resubmission, and rechecking. With all these overlapping changes, it is all very easy for an engineer in one discipline to invest considerable time and effort in pursuing the design, which has already been invalidated by the work someone else has done in another part of the project. Bringing order to this highly
complex workflow is what product data management systems do the best. In particular, they keep track of thousands of individual decisions that determine who does, what next. Most PDM systems allow the project leader to control the progress of

the project via ‘states’ using pre-determined ‘triggers’ and a routing list, which may vary according to the type of organisation or the development project, which is involved. The way systems differ is in how much flexibility they permit with the framework discipline. The most rigid systems are based on procedures Event individual or group of individuals is made to represent a state in procedure ‘Initiated’, ‘Submitted’, ‘Checked’, ‘Approved’, ‘Released’. A file or record cannot move from one individual or group to the next without changing states.

Some systems make it possible to give the task an identity of its own, separate from the people working on it. For example, suppose an engineer working on a design wants to confer with colleagues to establish the best way to approach the design. So long as the master model and all the associated reference files are contained in and controlled by a packet it is simple to pass the entire job across to any number of other people without triggering a change of state. The formal workflow procedure is not compromised by this informal rerouting because the authority to change the file’s state does not move around with the packet. It remains with the designated individual.

When packets of data and files are passed around, they may be accompanied by instructions, notes, and comments. Sonic systems have redlining capability; others even have provision for informally annotating files with the electronic equivalent post-it notes. In other words, the process management system could be seen as a way of loosening up our working environment instead of constraining it.

• The challenge is how far we can allow informal teamwork and cross-fertilisation to carry on and still keep overall management control of project costs and deadlines.

• Most systems allow the up-to-date status of the entire task with all supporting data to be tracked and viewed by authorized individuals at all times. Of course, a packet represents one task in a product development project, which may consist of many thousands.

• Each packet follows its own route through the system, but the relationship between packets also needs to be controlled.

• To co-ordinate such a complex workflow effectively, we should be able to define the interdependence of tasks to match the way our individual project is structured.

• It is not possible to customise all systems using this way. The systems, which can be customised, have the ability to create a hierarchical relation ship between files. For example, one could instruct the system to prevent an engineer from signing off an assembly for release until all its parts have been individually released.

4.11 Work History Management

• As we have seen, the product data management systems should not just keep comprehensive database records of the current state of the project; they should also record the states, which the project has been through.

• This means that they are a potentially valuable source of audit trial data. The ability to perform regular process audits is a fundamental requirement for conformance to international quality management standards such as ISO 9000, EN 29000 and 855750.

• But project history management is also important to allow us to tack track to specific points in a projects development to a point from where a problem arose, as one can start a new line of development from it.

4.12 Make-To-Order (MTO) and Make-To-Stock (MTS)

Make-to-order:

• Traditional production systems produce products and stock them as inventory until they are sold.

• In order to reduce inventory and increase the level of customisation, some firms have designed their production systems to produce a product only after it is ordered. Such systems are referred to as make-to-order.
The following factors are to be considered while evaluating the make-to-order:

- value of a custom product
- customer patience
- cost of stock outs
- inventory holding cost
- modularity
- manufacturing lead time
- manufacturing setup cost

**Make-To-Stock (MTS)**

- Make-to-stock is exactly opposite to make-to-order (MTO) company, which manufactures products and places them in inventory before it receives customer orders.
- Either the customer purchases the products directly from the inventory at a retail outlet, or the company ships the product off-the-shelf from the finished goods inventory at the factory or at a distribution centre. The MTS companies rely heavily on market analysis and demand forecasting in planning the production of their products with respect to the product mix and volume.

**4.13 Assemble-To-Order (ATO)**

- Assemble to order is a production method that occurs when an item is assembled after receipt of a customer's order.
- The key items used in the assembly or finishing process are planned and usually stocked in anticipation of a customer order. Receipt of an order initiates assembly of the customised product.

**4.14 Engineer-To-Order (ETO)**

- Engineer-To-Order (ETO) is a manufacturing philosophy whereby finished goods are built to unique customer specifications.
- Assemblies and raw materials may be stocked but are not assembled into the finished good until a customer order is received and the part is designed.
- Engineer-To-Order products may require a unique set of item numbers, bills of material, and routings and are typically complex with long lead times.
- Customers are heavily involved throughout the entire design and manufacturing process for engineer to order products.
- Big Machines LFE can dramatically improve the selling efficiency of companies that sell both Engineer-To-Order (ETO) and Configure-to-Order (CTO) products.

**4.15 Configure-To-Order (CTO)**

- Configure-To-Order (CTO) is a method of manufacturing which allows company or desired customer, to select a base product and configure all the variable parameters associated with that product, Based on the configurable items on each quote or order.
- Configure-To-Order (CTO) systems typically generate the manufacturing routing and/or bill of materials based on features and options such as colour, size, etc.
- To retain their competitive advantage, leading organisations must examine and improve their process for providing completely customisable products and services to their customers.
Summary

- The chapter gives an introduction of the manufacturing perspective of the use of ERP.
- In manufacturing operations the CAD, CAM and CAE are the new technologies that bring engineers and designers a new platform for their respective work by which they can work more efficiently.
- In MRP, the key elements of an MRP system are Master Production Schedule (MPS) and Bill of Material (BOM). MRP is considered as an improvement over traditional inventory control systems.
- The key to MRP is time phasing of requirements for components based upon the structure of the BOM. If we have the idea of the estimated time required for either manufacture or purchase components (lead-time), we can determine when the orders should be released to the shop floor or outside suppliers to ensure that the required components will be available when needed.
- The manufacturing segment accounts for nearly 25% of the total IT spending in the country, which makes it the largest segment using IT.
- ERP is the watchword in the manufacturing industry and more and more companies are turning to ERP solutions.
- With almost all the global players establishing and consolidating their presence in the country, the Indian manufacturing sector is seeing the proliferation of ERP and ERP integrated applications.
- The chapter also explains ERP and all related enabling technologies like CAD?CAM, TQM, JIT and kanban, PDM etc., their uses, advantages and disadvantages and how they make the operations of a manufacturing industry efficient and productive.
- The chapter also looks at the technologies that led to the development of ERP such as BOM, MRP, closed loop MRP, MRP-II and so on.
- There are many topics that discusses the various manufacturing methods— make-to-order(MTO), make-to-stock (MTS), assemble-to-order (ATO), engineer-to-order (ETO) and configure-to-order (CTO)— their advantages and disadvantages.

References


Recommended Reading

Self Assessment

1. __________ contributes to reverse engineering.
   a. Computer aided design
   b. Computer aided engineering
   c. Digital product development
   d. Product data management

2. ______ is one part of the whole Digital Product Development (DPD) activity within the Product Lifecycle Management (PLM) process.
   a. CAM
   b. CAE
   c. CAD
   d. FEA

3. It is a computerised information system which captures the product structure associated with a product.
   a. PDM
   b. CAD
   c. CAM
   d. MRP

4. Reduce inventory levels and improve customer service is the key benefit of__________.
   a. MPS
   b. MRP
   c. CAD
   d. BOM

5. ______ extends the logic of MRP into the physical distribution system, provides a mechanism for integrating the physical distribution system with the production planning and scheduling system.
   a. MRP-II
   b. DRP
   c. BOM
   d. MPS

6. Disposal of any activity that is not value added, but only after identifying that activity is known as __________.
   a. elimination of waste
   b. total quality management
   c. JIT
   d. Kanban

7. _______________ tries to reduce inventory levels of work in process (WIP), raw materials, and finished goods.
   a. Kanban
   b. JIT
   c. TQM
   d. Total production management
8. Data management systems should be able to manage both attributing and ________ product data.
   a. relational
   b. purchase
   c. distributed
   d. documentary

9. Which of the following system supports concurrent task management?
   a. Product Data Management
   b. Process Management
   c. Work Management
   d. Workflow Management

10. Which is a method of manufacturing which allows company or desired customer, to select a base product and build up all the variable parameters associated with that product?
    a. Make-to-order
    b. Configure-to-order
    c. Engineer-to-order
    d. Assemble-to-order
Chapter V
ERP Modules

Aim
The aim of this chapter is to:

• introduce ERP modules
• introduce sub-systems of ERP modules
• specify different modules in integrating business activity

Objectives
The objectives of this chapter are to:

• understand the various modules of ERP system
• explain the need of various ERP modules
• elucidate the use of different modules in integrating business activity
• explicate the flexibility of the modules in developing the business

Learning outcome
At the end of this chapter, students will be able to:

• understand about ERP modules applicable to various department of business enterprise
• acknowledge the benefits and limitations of modules
• understand the importance of each and every module
5.1 Introduction

ERP packages contain many modules. The number and features of the modules vary with the ERP package. In this chapter, we will see some of the most common modules available in almost all packages:

- Finance
- Manufacturing Production Planning
- Sales and Distribution
- Plant Maintenance
- Quality Management
- Materials Management

This is by no means a comprehensive list. Some packages will have a subset of this and some will have more modules and/or features.

For detailed information, we will have to consult the product literature of the specific ERP system.

![Various modules of ERP](image_url)

5.2 Finance Modules

- The entire concept of information technology is based on the principle that providing the right information to the right people at the right time can make a critical difference to the organisation.
- Much of this key information could be taken from the financial data. But merely having the financial data is not enough.
- We need a set of processes and views of our data, which provides up to the-minute financial information in exactly the form it needs to make that critical difference and help with that crucial decision.
- Accounting software needs access to information in each area of our organisation from RandD and market research through in manufacturing, distribution, and sales.
- The financial solution must provide the management with information that can be leveraged for strategic decisions, in order to achieve competitive advantage.
- Whatever are the financial goals of the organisation, the financial application components of the ERP solutions work hand-in-hand to improve the bottom line.
• This is true because the financial functionality is tightly integrated across all business areas and all geographic areas. This tight integration includes all the other different modules, from materials management to human resources to logistics.

• Because the ERP system automatically links related areas; it eliminates the need to repeat procedures. We enter the data once only within the ERP system and all of the areas will work in correct and efficient way, creating a new level of efficiency in handling the financial data.

• The finance modules of most ERP systems provide financial functionality and analysis support to thousands of businesses in many countries across the globe.

• These ERP systems not only include financial application components, but Human Resources, Logistics, Business Workflow, and links to the Internet. Hundreds of business processes are covered in these systems.

The finance modules of most ERP systems will have the following five sub-systems:

• Financial Accounting (General Ledger, Accounts Receivable/Payable Special Ledgers, Fixed Asset Accounting, Legal Consolidation).

• Investment Management (Investment Planning/Budgeting/Controlling, Depreciation Forecast/Simulation/Calculation).

• Treasury (Cash Management, Treasury Management, Market Risk Management, Funds Management).

• Controlling (Overhead Cost Controlling, Activity-Based Costing, Product Cost Accounting, Profitability Analysis).

• Enterprise Controlling (Executive Information System, Business Planning and Budgeting, Profit Centre Accounting).

General ledger

• The General Ledger (GL) is essential both to the Financial Accounting System and to strategic decision-making.

Fig. 5.2 Finance modules with their sub-systems
Through active integration with business processes in logistics and in the accounting sub-ledgers, the GL serves as a central pool of financial data for financial reporting as well as for other accounting areas.

However, the origin of centrally stored data can still be traced at any time by drilling down on data from a given transaction.

The General Ledger supports all the functions needed in a financial accounting system. This includes flexible structuring of the chart of accounts at the group and company level, distributed application scenarios, real-time simultaneous update of sub-ledgers and the general ledger, elimination of time-consuming reconciliation, and parallel views of data, in both the general ledger and the managerial accounting applications.

The GL provides document parking, posting, reporting, and an integrated financial calendar for automating periodic activities.

The system also provides summary information from other components at a user-defined level of detail.

By creating combinations of entered data, data summaries are generated, which can be used in planning, allocation, distribution, and reporting. Usually, the GL has features that allow us to take advantage of functions in General Ledger and in Cost Centre Accounting.

Accounts receivable and payable

ERP systems offer a financial overview of global business partner relationships in the Accounts Receivable and Payable functions.

These sub-ledgers are integrated, both with the General Ledger and with areas in Sales and Distribution and Materials Management, where financial data originates.

Accounts Receivable and Payable transactions are performed automatically, when related processes take place in other modules. This module uses standard business rules for procedures ranging from data entry and reporting, to processing payments and bank transactions.

Accounts Receivable and Payable functions include Internet integration, document management, and full support for EDI processing, including automatic integration with cash management and flexible reporting using customer and vendor information systems.

The module also provides enterprise-wide credit management with workflow integration, payment automation with EFT, and check processing and document parking with various approval procedures.

Asset accounting manages the company’s fixed assets. Within the Financial Accounting system, Asset Accounting serves as a sub-ledger to the General Ledger providing detailed information on asset-related transactions.

Significant features include country-specific charts of depreciation complying with local legal requirements, full support throughout the asset life cycle from acquisition to retirement, depreciation simulation, and interest calculation, and integration with project management and order accounting for management of capital assets.

Asset Accounting also provides integration with Plant Maintenance for management of machinery and equipment, management of leased assets and assets under construction, mass processing with workflow integration, and interactive reporting.

Legal consolidation

Consolidated financial statements need to be integrated effectively with operational data at the individual company level.

By using different valuation methods, we can plan balance sheet strategies to suit the company’s requirements.

The Legal Consolidation sub-system is closely linked to the Financial Accounting System, permitting direct data transfer from individual statements into the consolidated report. This eases the workload of the staff and reduces data entry errors.

In addition to the consolidated statements required by law, Legal Consolidation also allows us to create multiple views of the consolidation data. With these views one can generate reports about legal entities or segments of the business.
Controlling
- The controlling system gathers the functions required for effective internal cost accounting.
- It offers a versatile information system with standard reports and analysis paths for the most common questions. In addition to this, there are features for creating custom reports to supplement standard reports.

Overhead cost controlling
- Many organisations experience a significant increase in the percentage of indirect costs, which cannot be directly assigned to either the products manufactured or to the services rendered.
- While cost monitoring and optimisation may be quite advanced in production areas; transparency is often lacking in overhead cost areas.
- The Overhead Cost Controlling subsystem focuses on the monitoring and allocation of overheads.

Cost centre accounting
- Cost centre accounting analyses where overheads occur within the organisation. Costs are assigned to the sub-areas of the organisation where they originated.
- The system offers a wide variety of methods for allocating posted amounts and quantities. In particular activity, accounting permits the allocation of great many costs to products based on cost sources and enabling assignments, which were not previously possible.

Overhead orders
Overhead orders subsystem collects and analyses costs, based on individual internal measures. This system can monitor and automatically check budgets assigned to each measure.

Activity-based costing
- The goals of the entire organisation should come before the goals of individual departments, when it comes to business process re-engineering.
- The Activity-Based Costing module is a response to the growing need for monitoring and controlling cross-departmental business processes.
- In addition to functions and products, seeing costs from a new perspective substantially enhances organisational transparency in overhead areas.
- The system automatically determines the utilisation of business processes by products, customers, and other cost objects based on the cost drivers taken from the integrated accounting environment. This significantly reduces the effort involved in maintaining a business process model in a separate system.

Product cost controlling
- Product cost controlling module determines, the costs arising from manufacturing a product, or providing a service.
- Plan and standard values serve in valuating warehouse stock and for contrasting revenues received with costs.
- In addition, the values in Product Cost Controlling are crucial for determining the lowest price limit for which a product is profitable. Simulations illustrate the effects of changes in production methods on the cost of goods manufactured.

Cost object controlling
- Cost object controlling helps to monitor manufacturing orders. Integration with the logistics components results in a logistical quantity flow, which provides instant information on actual cost object costs, allowing ongoing costing calculations at any time.
- Follow-up calculations determine and analyse the variances between actual manufacturing costs, and the plan costs resulting from Product Cost Planning.
Profitability analysis

- Profitability analysis subsystem examines the sources of returns.
- As part of sales controlling, profitability analysis is the last step in cost-based settlement, where revenues are assigned to costs according to the market segment.
- One can define any market segment - distinguishing, for example, between products, customers, orders, sales organisation s, distribution channels, and business areas; and evaluate it according to contribution and revenue margins.
- Information from profitability analysis frames important decisions in areas such as determining prices, selecting customers, developing conditions and choosing distribution channels.

Investment management

- Investment management provides extensive support for investment processes right from planning through settlement.
- Investment management facilitates investment planning and budgeting at a level higher than that needed for specific orders or projects.
- Investment management provides tools enabling to plan and to manage the capital spending projects right from the earliest stage.
- In the initial stage of the capital spending process, we enter the application for the spending project as an appropriation request.
- Depending on their complexity, investment measures, which need to be monitored individually, can be represented either as internal orders or projects. These internal orders or projects provide the means for actually carrying out the capital investment, i.e. they serve as the objects for collecting primary and secondary costs for calculating overhead and interest, for managing down payments and commitments, and for handling other related tasks.
- As the result of having an asset under construction assigned to it, the investment measure also benefits from the entire required asset accounting functions. Settlement is both flexible and almost fully automatic.
- This kind of settlement ensures a complete integration with business planning and control, and provides consistently up-to-date values.
- Investment Management module recognises the importance of the asset accounting aspects of investment measures. The system automatically separates costs requiring capitalisation from costs that are not capitalised, debiting the correct costs to the asset under construction.
- For different accounting needs, the system can use different capitalisation rules for making the split.
- At its completion, the investment measure can be settled to various receivers by line item. Asset accounting provides precise proof of origin for all transactions affecting acquisition and production costs.
- Budgeted balance sheets and cost planning are always based on current values. Planned depreciation values for investment measures and appropriation requests can be transferred directly to ongoing overhead cost planning. The system recalculates expected depreciation amounts whenever planning data is updated.

Treasury module

- One can gain a significant competitive advantage by efficiently managing the short, medium, and long-term payment flows and the resulting risk exposure.
- Tasks such as short-term monitoring and concentration of bank account balances, medium-term planning, and forecasting of incoming and outgoing resources in accounts receivable and payable to a long-term view of areas such as materials management and sales, underline the importance of integrating information from various company divisions.
- Linking these operating divisions to realise and planned financial transactions and positions in treasury has a significant impact on the company’s success. Such integration also facilitates management and control of cash flows and risk positions through all the divisions in the company.
- The Treasury component provides us with a basis for effective liquidity, portfolio, and risk management.
Cash management

- The cash management subsystem allows analysing financial transactions for a given period. Cash management also identifies and records future developments for the purpose of financial budgeting.
- The company’s payment transactions are grouped into cash holdings, cash inflows and cash outflows.
- Cash management provides information on the sources and uses of funds to secure liquidity in order to meet payment obligations when they become due.
- Cash management also monitors and controls incoming and outgoing payment flows and supplies the data required for managing short-term money market investments and borrowing. Depending on the time period under review, a distinction is made between cash position, short-term cash management and medium and long-term financial budgeting.
- The Cash management component thus ensures that all information relevant to liquidity is available to us for analysis purposes, creating a basis for the necessary cash management decisions.

Treasury management

- In the role of treasurer, the results of the current liquidity, currency, and risk positions are taken and the conditions prevailing on the money and capital markets are considered before implementing concrete decisions in the form of financial instruments in Treasury Management. The treasury management component offers functions for managing financial deals and positions, from trading to transferring data to financial accounting.
- Treasury management also supports flexible reporting and evaluation structures for analysing financial deals, positions, and portfolios.
- For short-term liquidity and risk management, we can use the money market or foreign exchange transactions to smooth out liquidity squeezes and gluts or to eliminate currency risks. Securities and loans come into play in the medium and long-term. Derivative financial instruments facilitate active management of interest rate and currency risks.
- The trading area contains functions for recording financial deals, exercising rights, performing evaluations, and calculating prices (for example, option price calculator).
- In back office processing, we enter the additional data required for processing deals (such as account assignment and payment details) and generate automatic confirmations. Position management functions, such as securities account transfers or corporate actions relating to securities are also supported in the back office area.
- The general ledger is updated in the accounting area, which also offers flexible payment processing functions in addition to valuation and accrual-deferral methods. By using common organisational elements throughout, various organisational structures can be represented in the system, such as a central enterprise-wide treasury department or ‘in-house banks’. This also ensures full integration of Treasury into other modules of the system.

Market risk management

- Market risk management plays a vital role within treasury, in ensuring our company’s competitiveness.
- The process involves a complex feedback loop encompassing data collection, risk measurement, analysis, and simulation as well as active planning of financial instruments. This process dovetails closely with other treasury and corporate functions.
- Market risk management acts as an integrated, central risk control station with monitoring and management functions. Access to information on current and future cash flows and on financial deals already processed is an absolute must.
- As a result, cash management, which pools all cash flows from the business sectors, such as sales and distribution or purchasing forms the basis.
- Consequently, all cash flows from the company’s operating business can be accessed for the purposes of risk management.
- Furthermore, all financial transactions managed in treasury management can be evaluated together with the cash flows generated by the various operating divisions.
• The component provides various measurements for analysing and assessing interest rate and currency risks. Market-to-market, effective rate and effective yield calculations are based on up-to-the minute market data, uploaded via data feed, and financial transactions or positions.

• By simulating market data, we can determine the risk structure of ‘what-if’ analyses (such as crash scenarios or worst-case scenarios).

• One can also measure and compare the impact of alternative hedging strategies using simulated transactions.

Funds management
• Funds management subsystem supports our funds management process from budgeting all the way through to payments including monitoring expenditures, activities, resources and revenues. Budgets are entered for areas of responsibility that can cover as many management levels as we require.

• Funds centres and their hierarchical structure provide the base for top-down budgeting and represent responsibility areas within budget control.

• The system enables controlling various funds commitments and determines how much of the budget has already been utilised via availability checking.

• The information system can supply with information at any time, on when, where, and how funds commitments arose. Analyses by responsibility area and commitment items allow us to identify any budget bottlenecks.

Enterprise controlling
• Enterprise controlling comprises of those functions that will optimise shareholder value, while meeting internal objectives for growth and investment.

• These modules usually include executive Information System, Business Planning and Budgeting, Consolidation, and Profit Centre Accounting.

Executive information system
• The executive information system provides an overview of the critical information necessary to manage the organisation. This component integrates data from other ERP components, and non-ERP data sources both inside and outside the enterprise.

• Drill-down reporting and report portfolio are available to evaluate and present the data. In drill-down reporting, one can analyse the data interactively.

• Exceptions can be defined in order to highlight areas of concern. The drill-down reports can also be made available in the graphical report portfolio for less experienced users.

• The report portfolio is aimed at users with basic knowledge of the system, who wish to access information put together for their specific needs.

Business planning and budgeting
• Business planning and budgeting supports the management teams of business units and groups in the calculation business targets, such as return on investment.

• This module also supports central investment planning, budget release and tracking. This module automatically transfers data about investment requirements from transaction applications, and provides extensive analysis functions for budget monitoring.

Profit centre accounting
• Profit centre accounting analyses the profitability of internal responsibility centres. Organisation al structure of a company is represented in the form of a profit centre hierarchy with the profit centre as the smallest unit of responsibility.

• All business transactions in Financial Accounting, Materials Management, Asset Management, and Sales and Distribution, which affect profits, are automatically reflected in Profit Centre Accounting.
It is also possible to analyse selected balance sheet items by profit centre and use them for calculation of ratios (such as ROI).

Profit centre planning is part of total corporate planning. Profit centres, in particular, emphasise the integration aspect of corporate planning, as plans from other application areas can be combined, extended and altered in this module.

Profit centre related postings could be analysed through the standard reports of the system and facility to create cost win reports for special analyses. There is also a provision to provide profitability information to appropriate management and controlling departments.

5.3 Sales and Distribution Modules

In today’s global business environment, one thing companies can count on is rapid change and the new opportunities and challenges that change in is sure to bring.

New competition pushes businesses to achieve higher levels of service, while evolving technology compresses product life cycles and forces companies to adopt new technologies or risk losing market share. In this ever-changing environment, keeping a competitive edge means being able to anticipate and respond quickly to changing business conditions.

To keep pace with these rapid changes, companies need an integrated and flexible enterprise system that supports all aspects of their business with state-of-the-art functionality.

This innovative solution should upgrade effortlessly and interface easily with third-party applications, as well as have the ability to incorporate existing systems while extending its reach to the Internet and e-commerce.

With today’s business environment characterised by growing competition, shrinking cycle times, and the accelerating pace of technological innovation, companies are increasingly being forced to streamline business processes.

In a world, in which it is no longer enough to simply have the best product, these companies are focusing on core competencies and closer partnerships over the whole supply chain.

Here, increased efficiency in sales and distribution is a key factor to ensure that companies retain a competitive edge and improve both profit margins and customer service. In helping business to ‘beat them on delivery’, the sales and distribution modules of many ERP vendors offer a comprehensive set of best-of-reed components for both order and logistics management.

Many of these systems are tightly integrated with the Distribution Requirements Planning (DRP) engine of the ‘for just-in-time’ deliveries.

This integration enables the mapping and supply of single-site or multi-site organisation s and the definition of relationships in a company’s internal supply chains.

Developing precise logistics planning for just-in-time deliveries, this system can also generate replenishment orders by using defined warehouse requirements.

The following are the 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
During sales order processing, the following basic functions are carried out:

- inquiry handling
- quotation preparation and processing
- contracts and contract management (order management)
- monitoring the sales transactions
- checking for availability
- transferring requirements to materials planning (MRP)
- scheduling the delivery
- checking credit limits
- invoicing / billing

Creating printed or electronically transmitted documents (confirmations, and so on). Depending on how the particular system is configured, these functions may completely be automated or also may require some manual processing. The iota that results from these basic functions (for example, shipping dates confirmed quantities, prices and discounts) and is stored in the system where it can be displayed and in some cases changed manually during subsequent processing. The sales and distribution module very actively interacts with the Material Management and Financial Accounting modules for delivery and billing.

Typically, a Sales and Distribution module will contain the following nine sub systems:

- master data management
- order management
- sales order management
- warehouse management
- inventory reporting
- inventory analysis
- lot control
- data collection
- shipping
- billing
- pricing
- sales supports
- transportation
- foreign trade

Master Data Management

- Every company will have products, customers, and will require raw materials and will have suppliers.
- The task of the Master Data management module is to keep information about all these entities, so that these can be made available to the decision-makers and for the automatic generation of reports, contracts, invoices, and so on.
- In sales and distribution, products are sold or sent to business partners or services are performed for them. Data about the products and services as well as about the business partners forms the basis for sales processing.
- inquiry
- sales quotation
- contracts
- order
• shipping delivery materials management
• billing invoice
• financial accounting
• Automatic sales processing, using an ERP system, requires that the master data has been stored in the system.
• In addition to sales and distribution other departments of the company, such as, accounting or materials management access the master data.

Order management
• This module usually includes Sales Order Management and Purchase Order Management and supports the entire sales and purchase processes from start to finish.
• With companies today being confronted with increasingly demanding customers and increasingly complex buying and selling organisations, both internally and externally, Order Management combines the provision of efficient management solutions with the possibility of anticipating and respond quickly to changes in global business conditions.

Sales order management
• Applications in sales order management represent a company’s most important point of contact with the customer.
• These applications allow the company to manage sales operations quickly and efficiently and provide comprehensive solutions for the management of quotes, orders, contracts, prices, and customer discounts. With use of templates, the system streamlines order entry procedures to manage products ranging in complexity from standard stocked items to those that are engineered-to-order.
• The system can also customise and streamline order entry procedures to the specific requirements of both an individual business and its customers.
• Intelligent pricing and discount strategies, which are accompanied by simulation capabilities to support ‘what-if’ scenarios’ are available for multi-currency environments.
• Online available-to-promise calculations ensure that there is sufficient product availability for a specific customer and if so to identify exactly where and when that product is available built-in contract, and release management system evaluates whether or not customer contract agreements are being met with and incorporates multilevel customer credit reviews and substantial order blocking functionality.
• Evaluation of sales performance is possible through extensive report capabilities that retrieve both current and past information that concern orders, cancellations, budgets, and revenues.
• Rebate and commission control enables the automatic calculation of employee and supplier commissions to reward achieved targets based on predefine agreements and customer bonuses, or rebates to reward customers for purchasing certain quantities.
• Electronic Data Interchange (EDI) streamlines communication throughout a company’s entire supply-chain from customer to supplier.
• The system should support standard business documents such as orders and invoices, along with general information such as project information and product specifications.
• A good system will have tools and features for Sales Force Automation (SFA) and customer service. These tools include the tracking and tracing of appointments, schedules and follow-ups, plus product and sales feasibility information.

Purchase order management
• Purchase order management is increasingly essential in today’s ever more competitive business environment because it enables a company to make the purchase decisions about quality and price, where quality refers to supply lead-time as well as to the (to be purchased) product itself.
• Purchase order management includes online requisitioning, centralised contract management, just-in-time schedules, and vendor management.
• Offering access to an approved supplier list, purchase order management enables a purchase quotation to be sent to multiple suppliers. The purchase contract information is made available to the people in the purchasing department.

• This information will help in supplier selection and provide an insight as to which suppliers can supply items with the right specifications in the shortest period. The system will have facility to generate purchase contracts.

• Purchase requisition is a function that is used in the purchase process. Purchase requisitions allow companies to enter non-system-planned requirements for various types of items. Requisitioning can be linked to workflow for authorisation purposes and to approve suppliers.

**Schedules can be used instead of orders to provide detailed purchase and delivery information:**

• These schedules are generated in contracts in just-in-time environments in which customer service, in-time delivery, and cost reduction are important and can be sent through the supply chain by means of EDI communication.

• In addition, schedules are fully linked with other modules of the system. Sophisticated vendor management tools allow companies to check the reliability and performance of vendors.

• The vendor rating system can handle both objective and subjective criteria.

• Objective criteria are tracked and traced automatically by the system and can include information about receipts, quality approval, invoicing and purchase order confirmation.

• Subjective criteria are determined by the user. Together these criteria enable companies to make the right purchase decisions with regard to quality, price, and delivery.

• Purchase order analysis enables historical as well as statistical data to be used to assist in the analysis of purchase activities.

**Warehouse management**

• This module provides real time information about inventory levels across the enterprise and the tools manage the daily operational needs of single site or multiple site four wall warehouses.

• Coordination of an organisation’s warehouse network is one of today’s most important business needs and requires an understanding of the relation ship among the different organisation al units such as warehouses, production facilities, sales offices, and purchase offices.

• While the mapping of a single site or multi-site organisation and the definition of relationships in the internal supply chain can be undertaken with the help of the Distribution Requirements Planning (DRP), the actual transfer of goods can be handled through the warehouse management application.

• Various components of a good warehouse management application will be designed to meet a wide range of warehousing needs such as, the mapping of internal goods flow within warehouses and the monitoring of all warehouse inventory transactions.

• In addition, these components are centralised for areas that include production, sales, purchase projects, and provide companies with the tools to inform customers about where the company’s or the customers goods are located, the number of goods on hand, current storage conditions and projected delivery schedules.

• The warehouse Management application should also offer expanded capabilities such as cross-docking, rules based inventory replenishment, picking optimisation, multi-level packaging, and consigned goods management.

• These capabilities also allow for easy integration with financial tools to provide greater enterprise-wide insight into costs.
Components of a good warehouse management application include the following:

- **Inventory planning** comprises all planned inventory movements, which enable the accurate forecasting of trends and the consequent adjustment of reordering points, safety stock, lead times for orders and service levels.
- **Inventory planning** also allows the commitment of inventory to a specific customer order-hard allocation so that customers receive the right order in the right quantity at the right time.
- **Inventory handling** allows for monitoring of all warehouse order scenarios such as the receipt issue and transfer of inventory functions include the previously mentioned expanded capabilities such as cross-docking receipt by back-flushing, rules-based replenishment of inventory, picking and wave picking optimisation, assembly and multi-level packaging.
- To ensure fast communication with suppliers and customers, advanced shipping notifications can be received or sent by means of electronic data interchange (EDI), which enables shipments to be received and allocated ahead of time.
- **Intelligent location assignment** used to create intelligent storage put away lists, which enable the storage of goods, which are automatically inspected for quality and the detection of dedicated locations by criteria such as item, storage conditions, packaging definitions, size rostra lions, and location availability.

**Inventory reporting**
- This function permits full visibility of inventory at a single or multiple sites and provides the company with tools to give customers accurate delivery dates.
- The system’s extensive reporting capabilities also enable consigned goods management.

**Inventory analysis**
- This module enables the analysis of information, which results from warehousing activities and the use of feedback in process optimisation.
- In addition, inventory analysis supports inventory forecasting, inventory valuation, ABC analysis and slow-moving analysis.

**Lot control**
- This facility offers lot tracking and tracing so that a company can trace all the raw materials and finished goods, which its products require.
- In a business world, where customers demand product responsibility, lot control helps to store product quality data and meet ISO 9001 certification standards.
- **Distribution Limbs**

**Data collection**
This is an essential element in paperless warehousing, which provides the communications link between storage and shipping systems and warehousing equipment like bar-coding scanners.

**Shipping**
The shipping module supports the following functions:
- monitoring dates of orders due for delivery
- creating and processing deliveries
- planning and monitoring work lists for shipping activities
- monitoring material availability and processing outstanding orders
- picking (can be linked to the warehouse management system)
- packing deliveries
- information support for transportation planning
- support for foreign trade requirements
• printing and sending shipping output
• data update in goods issue
• The ‘Delivery note’ is the central shipping document. When a delivery is created (at the shipping point), shipping activities such as picking and delivery scheduling are initiated and monitored, and the data generated during shipping processing is recorded.
• A delivery note can refer to a sales order or to a transportation order for stock transfer. Depending on our requirements, we can create deliveries automatically using work lists.
• We can make agreements with our customers for complete and partial deliveries and for order combinations. The monitoring functions allow us to monitor created deliveries and outstanding sales activities.

Billing
• A business transaction is completed for Sales and Distribution when it has been billed.
• The ERP systems support billing functions like issuing of invoices on the basis of goods and services, issuing of credit and debit, memos based on corresponding requests and performal invoices, cancelling billing transaction, giving rebates, transferring billing data to financial accounting, purchasing and so on.
• The billing system is integrated with the other modules like financial accounting, so that the documents are automatically generated.

Pricing
• The term pricing is used broadly to describe the calculation of prices (for external use by customers or vendors) and costs (for internal purposes, such as cost accounting).
• The pricing module keeps the information about the prices of the various items, the details about the quantity discounts, the discounts to the different customer categories and so on and enables the organisation to at generate documents like quotations, delivery notes, invoices and so on.
• In addition, since this information is available to all the sales people, they can make better decisions thus improving the sales performance.

Sales support
• The Sales Support component helps the sales and marketing department to support our existing customers and, at the same time, to develop new business.
• Sales Support provides an environment where all sales personnel both the sales people and the staff in the sales office - can contribute to and access valuable information about customers, sales prospects, competitors and their products, and contact people.
• The Sales Support function has a rich tool set that will help in creating direct mailings to develop new business as well as to consolidate the existing customer base on the basis of the sales information already stored in the system, we can create address lists of the customers and sales prospects whom we wish to target with our direct mailing campaign.

Transportation
• Transportation is an essential element of the logistics chain. It effects both inward and outward movement of goods.
• Effective transportation planning is required to ensure that shipments are dispatched immediately and that they arrive on schedule.
• Transportation costs play a considerable role in determining the price of a product. It is important that these transportation costs should be kept to a minimum, in order to keep the price of a product competitive. Efficient planning and processing of transportation contributes to keeping these costs down.
• The aim of the transportation element of the SD system is to provide basic functions for transportation, like transportation planning and processing, freight calculation, freight settlement, customer freight calculation,
customer freight invoicing as well as functions for service agent selection.

- The transportation functionality fulfils the requirements in the areas of transportation planning and processing, for both inbound and outbound shipments.
- We can control and monitor the entire transportation process from the planning stage right through to the dispatch of the goods from our shipping point (outbound shipment) or the vendor location (inbound shipment) and their arrival at the customer location (outbound shipment) or our plant (inbound shipment).

**Foreign trade**

- In domestic, and increasingly, in international trade, we are required by the authorities to adhere strictly to the laws and regulations.
- The growing tendency towards the formation of trade areas is a further challenge to a company a worldwide basis.
- The entire logistics chain from the import of raw materials finished and unfinished goods to the sale of goods and the transfer of data to materials management and financial accounts is significantly influenced by foreign trade activities.
- These main tasks in foreign trade processing can be carried out using the foreign trade system.

### 5.4 Manufacturing Modules

- Competition in the next millennium places an increased emphasis upon time, as expressed by speed, quality, service, and global focus.
- Manufacturers are measured by their ability to react quickly to sudden, often unpredictable change in customer demand for their products and services.
- To compete successfully beyond the year 2000 requires manufacturing applications that are time and activity based and above all else focused on the customer.
- Increasingly, these manufacturing applications are centre point within the spectrum of a supply chain running from the customer to a supplier and encompassing the entire enterprise.
- A good manufacturing system should provide for multi-mode manufacturing application that encompasses full integration of resource management.
- These manufacturing applications should allow an easier exchange of information throughout the entire global enterprise, or at a single site within a company.
- Regardless of how big or small an enterprise is these applications should provide a wealth of feature/function, broad scope of coverage, operational stability and a platform-independent architecture. These capabilities empower an enterprise to achieve productivity gains, adopt forward – thinking technologies and implement process reengineering.
- As a company’s internal processes become more sophisticated or as market forces change, these
- Solutions should lie capable of meeting the challenge.
- The manufacturing system should be integrated with the other modules of the package. A robust system of manufacturing planning business process and execution must satisfy a variety of business practices and production methods.
- These business practices and production methods place stringent demands on time manufacturer. Regardless of how manufacturers view their internal operations to the customer, it boils down to quick response to customer demand in two fundamental ways-manufacturers either make products to stock prior to receipt of a customer order or they make and ship the products upon the receipt of a customer order.
- Manufacturers must accomplish this task quickly efficiently and cost effectively to remain profitable and competitive.
- Today, companies must be able to deliver customer-specific producers with the lead-time of standard, off-the-shelf products. To help manage product and market shifts, the manufacturing module provides the freedom to change manufacturing anti-planning methods as and when they need a change.
The manufacturing modules of most ERP vendors do not limit businesses to a single manufacturing method, such as, make-to-stock or make-to-order; instead, many manufacturing and planning methods can be combined within the same operation with unlimited flexibility to choose the best methods or combination of methods for each product, at each stage throughout its life cycle.

In addition, this control and visibility comes without having to sacrifice the functionality needed to manage different types of production efficiently.

These systems support the entire range of production strategies—only one system is needed to manage all manufacturing activities. Engineer-to-order products can be planned using the system, while the system’s forecasting and distribution-planning features handle make-to-stock items.

Products that are assembled-to-order can be planned using advanced features available in the manufacturing module. All demands can be aggregated into user-definable plans at a detail or summary level.

Enterprise requirements then flow into consolidated production schedules and material and capacity plans, and all product activity be scheduled and tracked through shop floor control systems.

The manufacturing module should enable an enterprise to marry technology with business processes to create an integrated solution. It must provide the information base upon which the entire operation should be run. It should contain the necessary business rules to manage the entire supply chain process, whether within a facility, between facilities, or across the entire supply chain.

Control and execution can be performed at strategic, tactical, and operational levels within the business. These require effective planning to support contract commitments throughout supply chain control over intermediate range planning in horizons and time fences, and execution over the short range of frozen scheduling required by the shop floor.

Whether a single-site to implementation, or several sites within one country, or hundreds covering entire globe the manufacturing system should provide the foundation for creating concurrent business processes across the supply chain and achieving Return on Assets (ROA) improvement.

How does manufacturing respond to the customer? Manufacturers must respond quickly and effectively to customer demands.

While agility is desirable, agility without an effective enterprise manufacturing system results in speed without purpose. The very heart of an enterprise manufacturing system centres on its integrated planning, business process and execution capabilities.

Traditional Closed Loop MRP concepts have long heralded the importance of effective planning, business process understand inventory execution.

Strategically, effective-planning results in improved inventory turns, increased productivity and improved return on assets. Tactically, effective business processes provide improved customer satisfaction, reduced time to market, and improved market share.

Effective execution provides short cycle time, quality assurance, continuous improvement, and quick response to process variability.

All three elements contribute to a management’s decision to install an enterprise-wide manufacturing manage merit system. Some of the major subsystems of the Manufacturing module are:

- Material and Capacity Planning
- Shop Floor Control
- Quality Management
- JIT/Repetitive Manufacturing
- Cost Management
- Engineering Data Management
- Engineering Change Control
- Configuration Management
- Serialisation/Lot Control
- Tooling
Material and capacity planning

- Today’s customer-focused business environment makes it more critical than ever for manufacturers to have an effective production plan for managing material and capacity.
- Customers want accurate shipment dates – sometimes to the hour even when there are schedule and product changes. The Planning systems of ERP packages are designed to provide the responsiveness. Our company needs to meet those customer requirements.
- With these systems, planners can simulate alternative plans; gaining the information, which they need to determine which parts and assemblies to make i.e. which to buy and when to manufacture or increase.
- Most packages have features to generate recommendations for purchases and production and wherever necessary recommend changes to current plans to prevent under or over-utilisation of work centres. If requirements change often, exception-based planning features can on continuously, providing virtually real-time visibility of the ‘hanging plans, using item time fences to avoid erratic production plans.
- Material plans can be developed from a wide variety of sources that include the master schedule, sales forecasts and dependent and independent demand. An extensive selection of order modifiers provides even greater control and flexibility.
- For analysis, planners can create unlimited number of simulations. The company can customise planning processes because input is described by system parameters that are easily changed.
- To reduce effort and accelerate communication across the supply chain, planned orders can be confirmed and converted automatically (or manually) into production and purchase orders.
- In addition, graphical reporting makes potential material and capacity problems easy to identify.
- Meeting our business goals requires detailed production planning and effective execution control.

Shop floor control

- The ERP packages give our company full control with flexible scheduling and sophisticated shop floor functionality. They also offer extensive freedom for defining production processes in the most appropriate way.
- Depending on the requirements of the company’s product and processes, production can be scheduled using work orders or repetitive build schedules.
- With the repetitive planning feature, companies can implement just-in-time techniques to streamline material issue and production reporting.
- Using the shop floor control facility, the company has the visibility necessary for managing lead-times and for carefully controlling the amount of work-in process and the timely release of production orders.
- Most of these systems are flexible enough to enable the company to establish order-processing priorities that reflect business priorities.
- For achievable supply chain plans, both internal and external operations - and their relationships - are considered by the system before creating production plans and assigning priorities.
- The Electronic Planning Board provides a graphical production management tool that delivers immediate visibility of changes in capacity utilisation. The planning board shows all scheduled production, current production status, utilisation, materials, and capacity availability.
- Shop Floor Control with increasing emphasis being placed upon reducing manufacturing time in support of the need to reduce product time to market, manufacturers have turned greater attention to evaluating their shop floor activities.
- Process reengineering efforts and the elimination of waste have necessitated greater reliance upon powerful, user-friendly, flexible shop floor planning and control systems.
- Management needs timely, accurate information and the ability to manage the shop floor by exception. Cost information must be flexible as well.
- Factories are being realigned to reduce material travel time through a facility. This realignment places an added burden upon the supporting systems.
Managers must often time experiment with trial-and-error approaches in the never-ending search for process improvement. Shop floor control systems must be flexible and adaptable to changing needs.

A shop order can be reprinted at any time with user selection of whether to reallocate material. This reprinting gives a shop supervisor the flexibility to print a duplicate copy when an order is split between operators. This feature also gives the shop scheduler the ability to reprint the shop packet and to reflect new material allocations that correct previous shortages.

Every shop order can be maintained throughout its life. All systems provide a full function shop-order-maintenance capability allowing the user to evaluate and adjust operation steps and components.

Orders can be rescheduled either backward or forward.

For example, an operation’s start date can be overridden to reflect changed events and then the order can be forward scheduled to reflect the impact upon future operations.

Quality management

With product quality under the microscope in all industries today, every company strives for superior quality in its products and services.

All manufacturing modules track quality control activities across the enterprise from intermediate producers to finished goods. These systems allow a wide variety of characteristics and parameters to be specified in test and inspection operations and maintain an extensive history to improve product quality and identify recurring problems.

Elimination of defects in standard product designs and manufacturing methods, before production, is just as important as eliminating defects during production.

In fact, to achieve quality levels, manufacturers must focus on identifying and correcting defects in underlying product designs and production methods and not simply inspect the in-coming material and finished goods.

The Quality Management Systems usually support the benchmarking and use of optimal product design, process engineering and quality assurance data by all functional departments within the manufacturing enterprise, thereby facilitating definition of repeatable processes, root cause analysis and the continuous improvement of manufacturing methods.

This documentation supports the job functions of the quality assurance and production managers validating the manufacturer’s conformance to 180 9000, Good Manufacturing Practices (GMP) worldwide, MIL-Q-9858 in the United States, and a variety of country specific industry standards of quality assurance.

Specification Control in the Quality Management System offers a state-of-the art approach for documenting specifications and enables an organisation to standardise and simplify its quality assurance and control functions.

Sample types, sample rules, and testing levels are completely user-defined for maximum flexibility and ease of use. Maintenance of standard specifications detailed sampling instructions and testing procedures is performed online.

Cyclic, subsequent, and repeat testing options are available to support the material acceptance function with breakdowns of test procedures into multiple dispositions to improve inventory turnover and reduce inspection lead-times.

The system database eliminates redundant specifications and ensures that a single change to standard procedures takes effect immediately throughout the organisation. User-defined review and commitment controls ensure maximum accuracy.

The Material Procurement subsystem provides tools for implementing Total Quality Management programs within an organisation. Original manufacturers may be defined independently from vendors, so that businesses can strictly adhere to quality assurance and control functions without preventing their buyers from seeking the best possible price and delivery terms.

Each item supplied by an original manufacturer may be linked to a standard product specification. Actual test results and material disposition histories are retained by item, lot, original manufacturer and specification for in-depth quality performance review and analysis.
Material Inspection subsystem offers a wide range of capabilities for process supervision and control. These capabilities are fully integrated with the other modules like purchasing, inventory management and shop floor control functions to ensure that the right quality control procedures are followed.

Capabilities include online maintenance of product specifications by production method and customer, event driven sample requests, sample login, test results entry, quality performance analysis and equipment calibration support.

Product quality metrics are collected and archived in a manner that offers full support for statistical process control techniques.

Material Disposition is another feature available in many systems that offers advanced material review and disposition functions that ensure the right quality control decisions are made and leave an audit trail of decisions for compliance purposes.

Capabilities include automated material review and approval, automated material disposition, sub-lot control, optional automatic second disposition, optional.

Automatic repeat testing, grading, re-designation, and implementation of user defined policies and procedures for authorisation and control. Production Reporting supports complete production reporting. Both employee and crew labour reporting is possible, with crew reporting automatically allocating efficiencies between crewmembers.

User defined shift teams can be entered to support quality circles and subsequent reporting of results. Employed clock maintenance provides for designation of employees and teams. Both labour grades and labour rates can be designated. Labour grades entered by employees override those designated for the work centre. Labour rates enable the entry of actual cost data, even when labour grades have not been established. The Shop Floor Control system is fully integrated with Cost Accounting and Control.

Both production reporting and employee/clock maintenance contribute data that is summarised at the time of shop order close with full variance analysis reporting made available to the user.

Shop Floor Control also makes use of a powerful and flexible shop calendar facility, which can be global with overrides reflecting each facility and each work centre within the facility.

Just-in-time/repetitive manufacturing

The past decade has seen a surge of interest in the adaptation of Just-in-time (JIT manufacturing techniques), while companies have embraced the concepts of waste elimination, product factory layout, manufacturing cells and Kanban signalling, many implementations have struggled due to lack of software tools to effectively support the transition.

Many systems not only provide high volume repetitive manufacturing functionality, but also provide for the transition to rate based production by allowing the use of repetitive scheduling, even for products that are not rate based. This allows a production facility to transition products from discrete manufacture into a JIT/Repetitive focus.

For example, when the demand pattern for an item begins to stabilise and show a repeatable/predictable pattern, then a production schedule can be initiated even though the item may not be designated as rate-based.

Over the time, as the item’s demand pattern grows, the item can be switched to lull rate based production scheduling. This transition capability enables production facilities to adopt process reengineering, setup reduction programs, single minute exchange of die (SMED) programs, Employee Empowerment Work Teams, etc. with the confidence of knowing that the planning and control system will effectively support their efforts. JIT/Repetitive in eludes strong analytic capabilities.

A production inquiry presents both cut rent production status and history. The history provides current day, month to date, and year to date results as well as calculations of maximum and average production results per hour.

A purchase/production plan report shows current on hand quantity and scheduled receipts by planning period.

A cumulative production report shows production status information by item, which includes quantity ordered, received, remaining and due, as well as quantity allocated and year to date receipts.

A downtime analysis report highlights all causes of downtime by reason code. A quality control/reject analysis report tracks all rejections by reason code.
• A yield analysis by operation identifies where loss in productivity is occurring. A cumulative purchasing report shows total procurement needs by item, effectively displaying daily delivery performance and summed delivery results.

• An item allocation report provides details regarding on-hand and allocation status for child items, including lot number and lot tracing status for lot-controlled items.

• A JIT work list compares the production plan to the capacity plan for rate-based items. This tool quickly identifies discrepancies based upon actual performance, so that production rates and/or daily output goals can be adjusted proactively and monitored on a timely basis.

• Reports covering employee efficiency and detailed cost by item are also provided together with lot tracing status for lot-controlled items.

Cost management

• With competition increasing the pressure on margins, a business needs accurate and detailed manufacturing cost reporting for effective business management.

• ERP packages provide extensive cost information at several levels that helps businesses identify cost drivers and reduce product costs. They support multiple inventory valuation methods, so that we can choose the costing method that best reflects our company’s business.

• We can choose standard, LIFO (Last in First Out), FIFO (First in First Out), moving average unit, or lot costing method and costing methods can be assigned by item.

• To reduce administrative overhead, prevent input errors, and provide faster and more accurate information for planning, these systems provide detailed records of time and materials data on the shop floor.

• For example, many systems have features that let our company compare estimates and production costs for different work centres, machines, employees and order quantities while monitoring overtime, indirect hours, subcontracted jobs and other costs.

• Moreover, to provide even more accurate production and inventory planning, these systems can track material usage for each job. And, if the activity is associated with a project, project information is automatically updated.

• Many vendors also support Activity Based Costing (ABC) with activity visibility by cost object as well as costs for user-defined groupings, such as departments.

• There will be provisions that allow employees to report non-production activities such as maintenance, holidays and illnesses.

• Manufacturing system provides extensive information about production costs at several Levels, which give us the visibility that we need to identify cost drivers and reduce product costs.

Engineering data management

• The first step to shorter product development cycles is increased efficiency in design and development activities.

• Engineering Data Management is designed to help-reduce errors and increase design productivity by providing an automated link between engineering and production information.

• Most packages allow a smooth integration, with popular CAD packages, to simplify the exchange of information about drawings, items, BOMs and routings.

Engineering change control

• By using Engineering Change Control, businesses can gain effective control over engineering change orders. Our company can define the authorisation steps for approving and implementing an Engineering Change Order.

• When these steps are completed, the system automatically implements the change in the production database.
Configuration management

- The Configuration Management dramatically reduces order cycle time by eliminating the lengthy engineering review, typically associated with determining feasibility and the costs associated with the configured end item.
- This reduction is achieved by creating a flexible user-defined knowledge base that is accessed by a powerful analytic engine.
- The knowledge base contains the sales and engineering expertise of the organisation. Product attributes and variables, such as height, width, or cubic pounds of pressure entered in the knowledge base in the form of an option matrix.
- The knowledge in the option matrix structure can also be augmented by user defined calculations, such as Height x Width = Area and by Boolean rules. Boolean rules allow definition of complex product relationships.
- For example, ‘If refrigeration and insulation are chosen under trailer options and the total area is greater than 120 feet, and then double axle must be chosen under axle options’.
- The analytic engine interprets the knowledge base in conjunction with user selections, to ensure that the customer specified product could be built and sold.
- As a result, the order entry process is a dynamic conversation between the order taker and the customer that culminates with a fully priced and coasted product on the sales order, as well as the related manufacturing detail necessary to move the order directly into production.
- The process starts with an attribute master containing configuration related questions and answers. Attributes are the building blocks of a configuration structure.
- The configuration structure categories and sequences attributes to create a flow of questions and possible answers, drawing the entry of sales orders for configured products.

Serialisation / lot control

- Many systems will provide the facility for the designation of raw material lots and the serialisation of component parts made from those lots.
- This serialisation is applicable to commercial aviation, defence industry suppliers, and capital equipment manufacturers who provide service over the life of their products on an individual unit-by-unit basis. Examples include heavy machinery, off road equipment, and highway tractor/trailers.
- Manufacturers, who use lot control often, must allocate production prior to its completion. The lot control system provides for the pre-allocation of lot numbers. This feature is available throughout the product offering and includes MRP, shop floor control, order processing and JIT.
- Many systems allow production orders to be pre-assigned with lot numbers for the parent item. When the shop order is released, the lot master record will be created and allocations to higher level parents will be permitted.
- The manual pre-allocation of reassigned lots is possible for both customer orders and shop orders with visibility to planned and actual production, as well as existing inventory.

Tooling

- For many manufacturers, ensuring that proper tooling is available is just critical to production schedules as the availability of material.
- The ERP systems extend capacity and inventory management to include these valuable resources. These systems help to ensure that tools and materials arrive together at scheduled operations by storing tools in inventory, planning, and allocating the required tools as part of the production order.
- They al provide visibility of tool use, calculate the remaining useful life of a tool and automatically route tools for maintenance based on usage.
5.5 Human Resources Modules

- Human resources management is an essential factor of any successful business. The competitive environment of the next millennium with its economic and technological challenges will affect the HR department in the same way, it will all the other areas of our enterprise.
- In short, HR managers must continually review and optimise their business processes. The HR modules of most ERP systems have a set of rich features, and will integrate seamlessly with the other modules and are thus, invaluable aids in improving productivity.
- They offer company-wide solutions for HR departments and make it possible for other departments to access specific employee data.
- A human resource management system has to be adaptable to company specific requirements, and should constantly grow with increasing HR requirements. It should cover all the functions required in business practices.
- It should be flexible enough to allow us to optimise our business processes by tailoring the ERP solution to suit our organisation’s needs.
- Today, many businesses cross boundaries. The system should support the organisation’s international needs with country-specific versions of the HR components.
- Apart from languages, currencies and legal requirements, accounting systems often vary from country to country as well, making this a vital feature. A flexible structure enables quick and easy customisation of the system to suit our requirements.
- When we log on in a particular language screens, messages and documents appear in the language we specify. We then have access to the systems complete functionality.
- The different ERP systems offer many different subsystems under the HR umbrella. Listed below are some of the most common subsystems. Here again, the idea is not to be comprehensive but to give us an idea about the options available.

The various subsystems under the HR module are:

- **Personnel Management** (HR master data, Personnel administration, Information systems, Recruitment, Travel management, Benefits administration, Salary administration)
- **Organisational Management** (Organisational structure, Staffing schedules, Job descriptions, Planning scenarios, Personnel cost planning)
- **Payroll Accounting** (Gross/net accounting, History function, Dialog capability, Multi-currency capability, International solutions)
- **Time Management** (Shift planning, Work schedules, Time recording, Absence determination) Personnel Development (Career and succession planning, Profile comparisons, Qualifications assessments, Additional training determination, Training and event management)

5.5.1 Personnel Management

- Personnel management includes numerous software components, which allow us to deal with human resources tasks more quickly, accurately, and efficiently.
- We can use these components not only as part of the company-wide ERP solution, but also as stand-alone systems.
- Personnel Administration Information is no longer owned by specific departments, but is shared by multiple entities across an organisation. This eliminates duplicate entries, reduces the chance for error and improves data accuracy.
- The HR modules provide a global, fully integrated data structure for the enterprise without compromising our control over individual segments of the operations.
Employee master data

- Human Resource module has a centralised database with integration to multiple components for processing employee information.
- The system provides tools to save time and help us tailor the system to fit our needs. The HR module contains features for storing any desired information about our employees. Most systems have the facility to scan the original documents for optical storage.
- The HR Information System displays graphical information such as organisation charts or employee data. The system can produce charts and reports-both standard and customer-defined.

Recruitment management

- This function helps in hiring the right people with the right skills. Reducing the cost of recruiting and hiring new employees is a challenge for the HR professional, who is responsible for placing people in the right job, at the right time, and with the right skills and education.
- These requirements are fulfilled only through effective automation of the entire recruitment process. The recruitment component is designed to help meet every facet of this challenge.
- This component includes processes for managing open positions requisitions, applicant screening, selection and hiring, correspondence, reporting and cost analysis.
- Effective management of the organisation’s job openings helps the HR recruiters, managers, and interested candidates.
- The HR Recruitment component allows direct access to data stored in other components of HR including Personnel Administration, Payroll and Personnel Planning. These links eliminate duplication of data entry and improve our productivity.
- Some examples of shared data related to job openings include position open date, location and reporting specifics, job descriptions, and skills and education requirements. This information can be used for both internal job postings and external advertisements in newspapers, magazines, colleges or recruitment firms. We match employee and applicant qualifications with the requirements of the job to select candidates. HR Recruitment interfaces directly with word processing packages to generate standard applicant letters.
- In some systems, there is even the facility to send e-mail messages. Many systems provide tools to analyse costs incurred during advertising and interviewing for each open position. With the HR Recruitment component we can efficiently manage our job openings, our applications and applicant data, costs, and the hiring process.
- Once a selection has been made and an applicant has been hired, the data gathered during the recruitment process becomes new hire information.
- Duplicate data entry is eliminated along with the possible introduction of errors if the data had been re-entered.

Travel management

- This module helps us in processing the travel expenses effortlessly, in several currencies and formats. HR Travel Management allows us to process a business trip from start to finish from the initial travel request right through to posting in Financial Accounting and Controlling.
- This includes any subsequent corrections and all retroactive accounting requirements. Integration with the other modules ensures correct posting, taxation and payment of trip costs.
- Travel data can be entered by the person travelling, or by a secretary or by the relevant department, either before or after the trip.
- The entry of a travel request automatically generates a workflow that makes the administrator’s work much easier.
- Business, employee, and country specific trip provisions can be implemented via system settings. Travel Management automatically calculates the tax. It also automatically processes credit card transactions for a particular trip.
• The receipts can be entered in any currency and include supplementary receipt information. An optical archive is available for the long term archiving of travel receipts.
• Travel costs can be divided into different levels (employee, trip destination and receipt). Expenses can be posted to numerous account assignment objects, for example, cost centre, order, project, or cost object.
• We reimburse costs incurred during a trip through payroll accounting, accounts payable accounting, or by data medium exchange.
• In addition, Travel Management provides multiple report formats. We can enter receipts in any currency and then print reports in our native currency.
• Travel Expense Accounting provides us with self-explanatory forms, statements and an electronic approval process to improve communications and reduce unnecessary calls to the HR department.

Benefits administration
• This system brings flexibility and power to our benefits program. As organisations continue to grow, as laws change and employee requirements expand, we need a flexible system to satisfy all our requirements.
• The Benefits Administration component provides us with the capabilities and flexibility to manage effectively benefits programs for diverse employee populations.
• Benefits Administration uses a hierarchical structure that gives us the ability and flexibility to add new programs at any time.
• This system can maintain an unlimited number of benefits types and individual plans that are offered to the employees.
• With Benefits Administration, we can establish benefits groups based on specific employee demographics. A company needs options for enrolling employees in benefits programs.
• This module furnishes us with real-time processing, allowing us to prepare employee specific enrolment forms, using all employee data.
• Using the Benefits Administration component, we can define eligibility groups and rules based on a wide range of factors. We can determine the variables, rules and cost formulas for each benefits plan.
• We can design the types of benefits plans that best fit our employee demographics.
• We determine the options to offer employees and the Benefits Administration component provides the framework to administer them efficiently. The costs associated with each benefits plan option are automatically calculated to ensure consistent and accurate reports.
• With the Benefits Administration feature, we can maintain an unlimited amount of savings plans for our employees to consider.
• The Benefits Administration component gives us the capability to maintain both deferred and non-deferred options, as well as employer-matched and unmatched contributions. The component tracks employee changes and investment histories.
• These systems have powerful querying and reporting features that can provide us with standard reports, to assist us in administering our programs and help us respond to requests quickly, accurately and confidently. The employees can also have direct access to their individual benefits information flow eliminating many time consuming questions that the HR staff would otherwise have addressed every day.

Salary administration
• This function helps us in simplifying the process of rewarding our employees. Administration of salaries is an ongoing process within our human resources department.
• It is particularly important during the review process, when our goal is to reward good performance justly. The Salary Administration module assists us in the salary review process by taking into account standard salary changes within the company, as well as individual compensation exceptions.
5.5.2 Organisational Management

- This module will assist us in maintaining an accurate picture of our organisation's structure, no matter how fast it changes.
- In many cases, graphical environments make it easy to review any moves, additions, or changes in employee positions. We can also create multiple simulations for the organisation, as we explore our options for making adjustments in personnel.
- Planning features designed to assist us include graphical organisation charts; staffing schedules by headcount, percentage and working hours; job and work centre descriptions and job tasks and descriptions. Personnel costing are a strategic success factor for every company.
- Accurately forecasting personnel costs provides our management team with a more complete cost picture to assist them in making informed decisions.
- The Personnel Cost Planning functions enable us to perform cost comparisons between target and actual personnel costs and create cost previews.
- We can forecast wages, salaries and other cost elements for open and filled positions, based on simulated, planned, or actual payroll figures.

5.5.3 Payroll Accounting

- The Payroll A/c counting system can fulfil the payroll requirements and provide us with the flexibility to respond to our changing needs.
- Payroll Accounting should address payroll functions from a global point of view. We should be able to centralise our payroll processing, or decentralise the data based on country or legal entities.
- Most Payroll Accounting systems give us the options and capabilities to establish business rules without modifying the existing payroll. Many systems have the features to remind us when transactions are due for processing.
- When the process is completed, a built in audit trail date stamps the record for future reference. The system automatically creates a history record for every payroll transaction. With Payroll Accounting, we have the ability to tailor the system to our organisation’s requirements.
- When policy or legislative changes occur, we can adapt the system. The system maintains information on employees in a master file shared with all other modules.
- Whether our business operates solely in one country or has expanded to international locations, most ERP vendors have incorporated features that will satisfy our requirements.
- With country-specific versions of Payroll Accounting, we can fulfil language, currency and regulatory requirements.

5.5.4 Time Management

- This module assists us in simplifying the administration and evaluation of time data. Time Management is a powerful tool that helps us administer and evaluate data related to the time our employees spend working. This component can simplify our efforts irrespective of whether the organisation uses centralised or decentralised data to determine employee-working hours.
- Time Management manages work schedules efficiently and effectively by automating schedule generation and allowing flexible definition of time models and schedules per location and organisation level.
- With Time Management, we can set flexible working hours and process work notices as times are recorded. Individual and group piecework calculation for employee incentive wages is also available through the incentive wages feature.
- The Time Evaluation component allows daily processing of employee time data. It is a flexible tool designed to handle complicated evaluation rules to fulfil regulatory requirements and determine overtime and other time-related data.
- The Time Evaluation component stores our organisations’ business rules and automatically validates hours worked and wage types.
• The results of time evaluation can be shown on a time sheet that provides a detailed overview of daily balances and time wage types.
• Most packages provide a review feature that will provide all necessary information and tools to review and maintain employee time data.

**Shift planning**
• Shift planning module helps us to plan our workforce requirements quickly and accurately. We are able to arrange a target plan that can be drafted for any given period.
• We can plan our shifts according to our requirements, taking into consideration all criteria, including absences due to leave or sickness and employee requests for time off.
• Shift planning keeps us informed at all times of any staff excess or deficit; a convenient planning hoard is provided to guide copying shifts and us when entering for any designated period.
• Furthermore, we can check the plans at any time against rules governing employees’ working time, for example, to detect non-compliance with relevant legislation.
• All time data relating to our employees is centrally administered. Also short term changes to our shift plan brought about by for example, sickness or over time are relayed directly to the Time Management component.
• Another advantage of Shift Planning is that it enables us to temporarily assign an employee or employees to another organisational unit where they are needed, allowing for a temporary change of cost centre.

**Personnel development**
• This function helps in selecting the best people and enhancing careers more effectively. The system provides advanced tools to automate the labour intensive process of matching internal job requirements to qualified candidates. We can profile predefined tasks and prerequisites of each position in our organisation. Additionally, we can profile the qualifications of employees and external candidates under consideration for each position. A comparison of qualifications and profiles assists us in selecting individuals for further consideration.
• Consideration in Effective personnel development planning ensures that the goals of the organisation and the goals of the employee are in harmony.
• The benefits of such planning include improvements in employee performance, employee potential, staff quality, working climate and employee morale. A good system should provide organisations with a method of modelling suitable career opportunities for employees within the company.
• There should be features to determine the areas in which employees need further training. Once this is established, we can draw up individual plans for further education.
• Training and Event Management Every successful organisation should plan the training and events faster than ever before.
• A good HR system will have features to assist us with planning, managing and analysing our scheduled seminars, training courses and business events.
• Detailed information for each of the events is maintained to facilitate production of event catalogue and schedules.
• There should be tools to maintain information on the internal or external organisers of each event, as well as details such as prerequisites, objectives, content, time schedule prices, capacity, locations, attendee billing information, and budgets resources such as instructors, rooms, equipment and course materials an automatically suggested, saving us a great deal of data entry time.
• On completion of a training course, appraisal forms can be automatically issued. Appraisals can be carried out for instructors, attendees, business events and training courses.
• There will be features for providing the training coordinator with reports on event data, ranging from catering requirements to registrant qualifications for each business event. The reporting feature provides measurements of education and training performance.
5.6 Plant Maintenance Modules

- The achievement of excellent performance demands delivery of quality production expeditiously and economically.
- Organisations simply cannot achieve excellence with unreliable equipment. The attitude towards maintenance management has changed because of quick response manufacturing.
- Just in Time reduction of work in process inventory and the elimination of wasteful manufacturing practices. Machine breakdown and idle time for repair was once an accepted practice.
- Times have changed. Today when a machine breaks down, it can shut down the production line and the customer’s entire plant.
- The Preventive Maintenance module provides an integrated solution for supporting the operational needs of an enterprise-wide system.
- The Plant Maintenance module includes an entire family of products covering all aspects of plant/equipment maintenance and becomes integral to the achievement of process improvement.
- The major subsystems of a plant maintenance module are:
  - Preventive Maintenance Control
  - Equipment Tracking
  - Component Tracking
  - Plant Maintenance Calibration Tracking
  - Plant Maintenance Warranty Claims Tracking

Preventive maintenance control

- Preventive Maintenance Control provides planning, scheduling, and control of facilities and equipment. Equipment lubrication, component replacement, and safety inspection can be planned scheduled and monitored.
- Maintenance tasks can be tracked for each machine or piece of equipment by two user defined modes, as well as calendar day frequency.
- These modes could include tracking by hours of operation, units of production produced, gallons of fuel consumed, or the number of days in operation since the last service interval.
- Preventive Maintenance Control enables organisations to lower repair costs by avoiding downtime, machine breakage and process variability.
- Companies achieve higher machine utilisation and improved machine reliability and tolerance control along with higher production yields.

Equipment tracking

- Equipment is an asset that needs to be monitored and protected. In many situations, equipment maintenance costs constitute the single largest controllable expenditure of an organisation.
- All facets of plant location history and utilisation history are described and tracked. This history includes acquisition and disposition information and associations between different pieces of equipment to pinpoint operational dependencies.
- Running totals for operation units to date (miles, hours, days, units of production, etc.) are also provided. Each piece of equipment is defined by a model and serial number.
- User defined data sheets can be developed which allow for the grouping of user data into formats that can be linked to equipment records.
- All of this information can be used to create equipment specifications, which provide detailed information for technical specialists working in equipment operations, maintenance and transportation control.
Component tracking

- Components are, typically, subsets of larger equipment and deserve the same amount of cost controlling scrutiny.
- Component tracking enables equipment managers to identify components with chronic repair problems. They can determine whether a repair or replacement should be covered by warranty.
- Planning component replacements, rather than waiting for component failures to occur, reduces unscheduled equipment downtime.
- Component tracking includes repair/exchange history and component service life.

Plant maintenance calibration tracking

- Plant Maintenance Calibration Tracking allows organisations to leverage their investment in the Plant Maintenance module by providing for the tracking of equipment calibration in support of ISO:9000 requirements.

Plant maintenance warranty claims tracking

- Plant Maintenance Warranty Claims Tracking is an administrative system designed to provide control of all items covered by manufacturer and vendor warranties.
- It enables plant management to recover all of the warranty, reimbursements to which they are entitled but have not been able to recover in the past.
- Features include the ability to establish the type and length of warranty, for example, elapsed day, months, mileage stipulation, or operating units.
- A complete history is performed for each item covered by the warranty, and complete information regarding the warranty service provider is generated.

5.7 Quality Management Modules

- Just as the requirements for quality management systems have changed because of the ISO: 9000 standards, the term Computer-Aided Quality Management (CAQ) must also be redefined.
- Computer-Integrated Quality Management (CIQ) is a more appropriate term because an isolated CAQ system cannot carry out the comprehensive tasks of a quality management system.
- The ERP system considers this by integrating the quality management functions into the affected applications themselves (for example, procurement, warehouse management, production and sales/distribution), instead of delegating them to isolated CAQ systems.
- As a result of this approach, the processes described in the quality manual can be implemented and automated in the electronic data processing (EDP) system.
- The representation of the elements of a quality management system within the ERP system is not only the responsibility of the quality management module.
- Instead, the ERP system must be considered as a whole in which all integrated modules contribute their part. Within the framework of the system, for example, the human resources module handles personnel related matters, the Controlling module handles the management if quality related costs and the plant maintenance module handles the monitoring of test equipment.
- As a part of the logistics application, the quality management module handles the traditional tasks of quality planning, quality inspection and quality control.
- For example, it supports quality management so procurement, product verification, quality documentation and in the processing of problems.
- The Quality Management module’s internal functions do not directly interact with the data or processes of other modules.
- The ISO: 9000 series of standards defines the functions of quality management and the elements of a quality management system.
- The functions in the Quality Management module support the essential elements of such a system. The other integrated modules in the system complement this functionality.
• The ISO standards require that quality management systems penetrate all processes within an organisation. The task priorities according to the quality loop, shift from production (implementation phase) to production planning and product development (planning phase), to procurement and sales and distribution, as well as into the entire usage phase.
• In the area of production, quality assurance is no longer viewed in terms of inspection and the elimination of defects alone. Instead, the production process itself becomes the focus of attention.

**The quality management module fulfils the following functions:**

• Quality Planning (Management of basic data for quality planning and inspection planning, Material specifications, Inspection planning)
• Quality Inspection (Trigger inspections, Inspection processing within section plan selection and sample calculation, Print shop papers for sampling and inspection, Record results and defects, Make the usage decision and trigger follow-up actions)
• Quality Control (Dynamic sample determination on the basis (If the duality level history, Application of statistical process control techniques using quality control charts, Quality scores for inspection lots, Quality notifications for processing internal or external problems and initiating corrective action to correct the problems, Inspection lot processing and problem processing, Quality Management Information System for inspections and inspection results and quality notifications)

**5.7.1 Computer Integrated Quality Management (CIQ)**

• The integration of Quality Management in the ERP systems provides considerable advantages because only an integrated system can support all the elements of a quality management system, according to ISO 9000. The integration allows the quality management functions to influence all processes within company, thereby affecting all phases of a product’s life cycle.
• The Quality Management module uses the system’s integration to link the tasks of quality management with those of the other applications, such as materials management, production, sales/distribution and cost accounting.
• An Inspection that is triggered automatically upon goods receipt is an example of this.
• The Quality Management module is integrated with the master processes of the following applications:
  • materials management (purchasing, inventory management, warehouse management, material requirements planning)
  • production (work scheduling, shop floor control)
  • sales and distribution (delivery, creation of quality certificates)
• The Quality Management module supports the exchange of data with other applications in order to prevent related data from being recorded and stored redundantly.
• For example, the information provided by a goods receipt posting relating to the material, vendor and lot size is automatically transferred to the inspection lot data record when an inspection is triggered.

**5.8 Materials Management**

• The Materials Management module optimises all purchasing processes with workflow driven processing functions, enables automated supplier evaluation lowers procurement and warehousing costs with accurate inventory and warehouse management and integrates invoice verification.
• The main modules of the Materials Management module are:
  • Pre-purchasing Activities
  • Purchasing
  • Vendor Evaluation
  • Inventory Management
  • Invoice Verification and Material Inspection
Summary

- ERP software is made up of many software modules. Each ERP software module mimics a major functional area of an organisation.
- Common ERP modules include modules for product planning, parts and material purchasing, inventory control, product distribution, order tracking, finance, accounting, marketing, and HR.
- Organisations often selectively implement the ERP modules that are both economically and technically feasible.
- Some of the major subsystems of the Manufacturing module are, Material and Capacity Planning, Shop Floor Control, Quality Management, JIT/Repetitive Manufacturing, Cost Management, Engineering Data Management
- HR managers must continually review and optimise their business processes. The HR modules of most ERP systems have a set of rich features, and will integrate seamlessly with the other modules and are thus, invaluable aids in improving productivity.
- The various subsystems under the HR module are, Personnel Management, Organisational Management, Payroll Accounting, Time Management Personnel Development, Plant Maintenance Module.
- The ERP system considers this by integrating the quality management functions into the affected applications themselves (for example, procurement, warehouse management, production and sales/distribution), instead of delegating them to isolated CAQ systems.

References


Recommended Reading

Self Assessment

1. The concept of ________ is based on the principle that providing the right information to the right people at the right time can make a critical difference to the organisation.
   a. ERP
   b. MIS
   c. Information Technology
   d. Management System

2. Executive Information System and Business Planning are the part of___________.
   a. financial accounting
   b. treasury management
   c. controlling
   d. enterprise controlling

3. _______ provides document parking, posting, reporting, and an integrated financial calendar for automating periodic activities.
   a. EDI
   b. EFT
   c. General Ledger
   d. Workflow Integration

4. Asset accounting manages the company’s___________.
   a. fixed assets
   b. variable assets
   c. leased assets
   d. non-working assets

5. In financial module the _______ sub-system determines the utilisation of business processes by products, customers, and other cost objects based on the cost drivers taken from the integrated accounting environment.
   a. general ledger
   b. treasury
   c. activity based costing
   d. controlling

6. _______ component provides us with a basis for effective liquidity, portfolio, and risk management.
   a. Ledger
   b. Treasury
   c. Risk
   d. Workflow

7. Which module includes Executive Information System, Business Planning and Budgeting, Consolidation, and Profit Centre Accounting?
   a. Enterprise Controlling
   b. Executive Information System
   c. Business, planning and budgeting
   d. Profit Centre Accounting
8. Electronic Data Interchange (EDI) streamlines communication throughout a company’s entire supply-chain from ______ to ______.
   a. producer, supplier
   b. supplier, vendor
   c. vendor, supplier
   d. customer, supplier

9. _________is a function that is used in purchase process, it allow companies to enter non-system-planned requirements for various types of items.
   a. Purchase order
   b. Purchase requisition
   c. Purchase notice
   d. Purchase lead

10. Inventory reporting, Inventory analysis, Lot control and data collection are the sub-systems of__________.
    a. workflow processing
    b. inventory management
    c. warehouse management
    d. manufacturing module
Chapter VI
Advantages and Disadvantages of ERP

Aim

The aim of this chapter is to:

- describe essential qualities of ERP
- state advantages and disadvantages of ERP systems
- illustrate the real time examples of ERP

Objectives

The objectives of this chapter are to:

- explain the strengths of an ERP system
- discuss the real time examples of ERP
- discuss about flexibility concepts of ERP system
- describe the limitations of ERP

Learning outcome

At the end of this chapter, student will be able to:

- explain benefits and major pitfalls of ERP
- understand the potential of ERP
- analyse any ERP system
- give an idea to create new modules to make ERP more efficient
6.1 Introduction

Installing an ERP system has multiple advantages – both direct and indirect. The direct advantages include improved efficiency, information integration for better decision-making, faster response time to customer queries, etc. The indirect benefits include better corporate image, improved customer goodwill, customer satisfaction, and so on.

In this chapter, we will see some of the benefits of the ERP systems such as:

- 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

6.2 Reduction of Lead-time

The time elapsed time between placing an order and receiving it is known as the lead-time. It plays a significant role in purchasing and inventory control. Most purchasing departments urge the managers to anticipate material demands well ahead of actual need. All inventory systems have safety mechanisms like safety stock; re-order level, and so on built into them to avoid the situation where the material is out of stock. The consequences of the non-availability of an item that is required for production can result in a lot of problems like missing the delivery schedules, losing the customer goodwill due to delayed delivery or even losing the customer to the competitor.

One can avoid this situation by requesting for the materials well in advance rather than when they are required (early requests), or by keeping a large buffer stock, or by maintaining a very high re-order level. But all of this means that larger inventories must be kept, which blocks the money. Also, the practical consequence of allowing longer times for delivery seems to be that the present lead-times just grow to take up whatever slack is allowed.

Perhaps this is due to the ‘squeaky wheel principle’ - buyers who expect the shortest lead-times complain the loudest when deliveries are late and thereby receive the most attention from suppliers. So the company should find out the minimum lead-time and should attempt to correct supplier’s delivery delays instead of automatically increasing existing lead-times. In order to reduce the lead-times, the organisation should have an efficient inventory management system, which is integrated with the purchasing, production planning, and production departments.

Some of the important aspects are:

- In this era of just-in-time manufacturing, the knowledge of the exact lead-times for each and every item is of paramount importance for uninterrupted production.
- For a company dealing with hundreds and thousands of raw materials and components, keeping track of the lead-times for each and every individual item manually, is practically an impossible task. The ERP systems help in automating this task and thus, make the inventory management more efficient and effective.
- Also, since the ERP system is integrated and the materials management module is integrated with other modules like sales, marketing, purchasing, manufacturing and production planning, the demand for a particular item can be known as early as an order is received.
- For example, consider that an order is received for supplying, say, 100 cars with air conditioners. As soon as the order details are entered into the system, a lot of actions are triggered. The system will check whether the items are available in the finished goods inventory. Then it will generate a BOM (bills of materials) for the order and will check whether all the items are available in the inventory.
Since all the records are kept in the system’s database and since every thing is up-to-date, finding out the parts that are to be ordered takes no time (a task which could have taken days in the case of a manual or non-integrated system).

Once the items that are to be manufactured are identified, and once the production planning system prepares a production plan, the material management module will prepare purchase orders for each and every item taking into account the lead-times and when the items are required for production.

If the purchasing process has to go through the ‘invitation of quotations, vendor selection, etc.’ the system also does that. Since most suppliers are also connected to the organisation’s system as soon as a purchase order or requisition is issued, the supplier’s system is updated with that information so that the supplier knows what items are to be supplied and when.

Since the activities like preparation of contracts, issuing of purchase orders and payments happen through the system electronically, the time saved is phenomenal.

ERP systems, by virtue of their integrated nature and by the use of latest technologies [(like Electronic Funds Transfer (EFT), Electronic Data Interchange (EDI)], reduce the lead-times and make it possible for the organisations to have the items at the time they are needed (just-in-time inventory systems).

6.3 On-time Shipment

Today, companies must be able to deliver customer specific products (made-to-order) with the lead-time of standard, off-the-shelf products.

The companies must be able to change the mode of production from make-to-stock to make-to-order, yet retain the cost and time advantages of off-the-shelf products.

Today, the ERP systems provide the freedom to change manufacturing and planning methods as needs change, without modifying or reconfiguring the workplace or plant layouts.

With ERP systems, businesses are not limited to a single manufacturing method, such as make-to-stock or make-to-order.

Instead, many manufacturing and planning methods can be combined within the same operation, with unlimited flexibility to choose the best method-or combination of methods-for each product at each stage throughout its life cycle.

In addition, this control and visibility comes without having to sacrifice the functionality needed to efficiently manage different types of production. Because these systems support the entire range of production strategies, only one system is needed to manage all manufacturing activities.

Engineer-to-order products are planned using these systems, while the forecasting and distribution-planning features handle make-to-stock items. Products that are assembled to order can be planned using the extensive production planning capabilities of these ERP packages.

Various production scenarios can be simulated using the simulation features and the best one can then be selected. Also, since the different functions involved in the timely delivery of the finished goods to the customer—purchasing, materials management, production, production planning, plant maintenance, sales and distribution are integrated and the procedures automated, the chances of errors are minimal and the production efficiency will be high.

Since all the information is available to the management at the desired level of detail, and since the system has exceptional handling features (which will issue warnings if things are going out of control), the management can keep track of things and can take corrective actions at the appropriate time.

Another step to shorter product development cycles is increased efficiency in design and development activities. ERP systems are designed to help your company trim data transfer time, reduce errors, and increase design productivity by providing an automated link between engineering and production information.

Most of these systems allow smooth integration with popular packages to simplify the exchange of information about drawings, items, and routings. Using the Engineering Change Control (ECC) system, businesses can gain effective control over engineering change orders.
The company can define the authorisation steps for approving and implementing an Engineering Change Order (ECO). When these steps are completed, the ERP system automatically implements the change in the production database.

Thus, by integrating the various business functions and automating the procedures and tasks, the ERP systems ensure on-time delivery of goods to the customers.

6.4 Reduction in Time Cycle

- Cycle time is the time between receipt of the order and delivery of the product.
- At one end of the manufacturing spectrum is the make-to-order operation, where the cycle time and cost of production are high.
- This is because in a make-to-order situation the manufacturer starts making the product or designing the product only after receiving the order.
- Manufacturer will procure the materials and components required for production only after getting the order. On the other end of the manufacturing operations, is the make-to-stock approach where the products are manufactured and kept in the finished goods inventory before the order is placed.
- In both cases, the cycle time can be reduced by the ERP systems, but the reduction will be more in the case of make-to-order systems.
- In the case of make-to-stock, the items are already manufactured and kept in warehouses or with distributors for the sales. Here, the cycle time is reduced not in the shop floor, but during the order fulfilment.
- In the earlier days, even for the made-to-stock items, the cycle time used to be high. This was because the process was manual and if computerised, not integrated. Suppose a customer places an order.
- The order entry clerk has to check whether the order is available in the warehouse nearest to the customer. If it is not available there, he will have to check whether it is available in any other warehouse or with any of the distributors. Then he will have to process the order, inform the concerned warehouse or distributor to ship the item, and inform the finance department to raise the invoice.
- All this used to take a lot of time few days or sometimes, even weeks, but with an ERP system, as soon as the order is entered into the system, the system checks the availability of the items.
- If it is not available with the nearest manufacturer, then the warehouse, which is closest to the customer and which has the item in stock is identified. The warehouse is informed about the order and the shipment details are sent to the distribution module, which will perform the necessary tasks like packaging and picking so that the delivery is affected.
- The finance module is also alerted about the order so that they can raise the invoice. All these actions are triggered by the click of a button by the order entry clerk.
- Since all the data, updated to the finites, is available in the centralised database and since all the procedures are automated, almost all of these activities are done without human intervention. This efficiency of the ERP systems helps in reducing the cycle time.
- In the case of make-to-order items, the ERP systems save time by integrating with CAD/CAM systems. Dramatic time and cost reductions are possible when CAD-engineered designs are converted automatically into software programs for computerised production machines using CAD/CAM systems.
- This automatic conversion eliminates the costly and time-consuming steps of having a person convert design drawings into a computer program for computer-controlled production equipment, such as robots or machine tools.
- These systems reduce cycle times by 30-50%. Combined with this, the automation achieved in material procurement, production planning and the efficiency achieved through the plant maintenance and production systems of the ERP packages go a long way in reducing the cycle times.
6.5 Improved Resource Utilisation

- As manufacturing processes become more sophisticated and as the philosophies of elimination of waste and constraint management achieve broader acceptance, manufacturers place increased emphasis upon planning and controlling capacity.

- The creation of an accurate, achievable production schedule requires the availability of both material and capacity. It is useless and indeed wasteful, to have financial resources tied up in material, if the capacity is insufficient or improperly planned. Waste not only raises costs, it also affects customer service levels and customer goodwill.

- The capacity planning features of most ERP systems offer both rough-cut and detailed capacity planning. The system loads each resource with production requirements from Master Production Scheduling, Material Requirements Planning, and Shop Floor Control (detailed capacity planning).

- All planned released production is evaluated and loaded against capacity definitions for each resource, and all capacity requirements are pegged back to the orders comprising the load.

- Capacity definitions are provided from work centre and machine records. Work centres can be facility specific or enterprise-wide.

- Any work centre can be designated as a critical work centre for evaluation by rough-cut capacity planning. This capability provides an easy and efficient way to designate bottleneck operations that act as system constraints.

- As the constraints change over time, the user can re-designate the work centres as critical or non-critical. High volume repetitive environments are further supported with both ‘from and to’ material movement location designations.

- These locations are used for pull system back flushing replenishment and can be designated by individual machines within the work centre. These systems provide further refinement of available capacity by providing definition for specific machines or pieces of equipment.

- Each work centre also has user-defined input/output control tolerance factors to control the level of action message sensitivity, a factor for average efficiency, separate speed factors for labour and machine, designation of shift/hours schedule, and maximum desired load percentage (with 100% as the default).

- Capacity minimums can also be designated for processes involving vessel size constraints and fixed cycle constraints (heat-treating, pickling, plating, sand blasting, paint dipping, etc.).

- The ERP systems also have simulation capabilities that help the capacity and resource planners to simulate the various capacity and resource utilisation scenarios and choose the best option.

- The efficient functioning of the different modules in the ERP system like manufacturing, materials management, plant maintenance, sales and distribution ensures that the inventory is kept to a minimum level, the machine down time is minimum, the goods are produced only as per the demand and the finished goods are delivered to the customer in the most efficient way.

- Thus, the ERP systems help the organisation in drastically improving the capacity and resource utilisation.

6.6 Better Customer Satisfaction

- Customer satisfaction means meeting or exceeding customers’ requirements for a product or service. Assessment of the degree of satisfaction is usually made on at least three measures:
  - whether the product or service includes the features that are most important to the customer
  - whether the company can respond to the customers’ demands in a timely manner, a criterion that is especially important for custom products and services
  - whether the product or service is free of defects and performs as expected

- ERP systems have proved that they can produce goods at the flexibility of make-to-order approach without loosing the cost and time benefits of made to-order operations.
This means that the customer will get individual attention and the features that he/she wants, without spending more money or waiting for long periods. Also with the introduction of the web-enabled ERP systems, the customers can place the order, track the status of the order and make the payment sitting at home.

The customer could get technical support by either accessing the company’s technical support knowledge base (help desk) or by calling the technical support. Since all the details of the product and the customer are available to the person at the technical support department, the company will be able to better support the customer.

All this is possible because of the use of the latest developments in information technology by the ERP systems, and this will go a long way in improving the customer satisfaction.

6.7 Increased Flexibility

Because competition is growing, companies must learn to respond more rapidly to customers’ requirements as well as changes in the market. They will need to design new products or redesign old products quickly and efficiently. Only then, will companies have the chance to capitalise on opportunities while they are available. The window of opportunity is often quite small.

The manufacturing process must be flexible enough to accommodate new product designs with minimal disruption or time loss. Flexibility is a key issue in the formulation of strategic plans in companies.

Sometimes, flexibility means quickly changing something that is being done, or completely changing to adjust to new product designs. At other times, flexibility is the ability to produce in small quantities, in order to produce a product mix that may better approximate actual demands and reduce work-in-progress inventories.

Regardless of the definition of flexibility, traditional fixed automation manufacturing facilities, while efficient, are often inflexible. Similarly, extremely flexible operations are often inefficient. An argument can be made for the relative merits of both efficiency and flexibility.

Actually, both are desirable. Product flexibility is the ability of the operation to produce efficiently highly customised and unique products. Manufacturers tried to introduce some amount of flexibility by using the assemble-to-order approach. This provided them with some sort of flexibility without increasing the production cost, but could not be applied to all the situations.

Along the broad spectrum of make-to-order manufacturing, there is a growing convergence between strictly assemble-to-order (limited options and features) and completely engineer-to-order (at a cost) environments. This evolving environment is often referred to as configure-to-order.

Most ERP systems have now also added this technique to their systems. Using rules based product configuration system, configure-to-order (CTO) manufacturers are able to simplify the order entry process and retain engineer-to-order (ETO) flexibility, without maintaining bills of materials for every possible combination of product options. How this is done and how this improves flexibility is explained in the chapter "ERP-A Manufacturing Perspective."

ERP systems not only improve the flexibility of the manufacturing operations, but also the flexibility of the organisation as a whole. A flexible organisation is one that can adapt to the changes in the environment rapidly.

Future challenges:

With the technological revolution, the rules of the marketplace are changing at a rapid pace. New competitors are emerging each day.

New and complex problems have to be tackled every day.

New market segments have to be penetrated not to succeed, but to stay in business.

New marketing strategies have to be devised and implemented at very short notices.

Companies have to find new ways constantly to keep the customer satisfied.

For doing all these, the company has to be flexible. The old methods of functioning will no longer work.
ERP systems help the companies to remain flexible by making the company information available across the departmental barriers and by automating most of the process, the processes and procedures, thus enabling the company to react quickly to the changing market conditions.

### 6.8 Reduced Quality Cost

- Quality is defined in many different ways—excellence, conformance to specifications, fitness for use, value for the price, and so on.
- Whereas manufacturing and design engineers are typically responsible for some of the technological issues in the quality assurance for products, operations managers often conduct the analysis of quality-related costs, which is an important task.
- Strategic opportunities or threats frequently motivate the launch of aggressive quality management initiatives. Analysing the cost of quality can provide the financial justification for implementing them. Typically, the quality costs are in the range of 20% of the cost of goods sold. Carefully planning quality improvement activities not only improves quality, but also lowers quality related costs.
- The American Society for Quality Control (ASQC) has developed a typology of quality related costs that are based on the work of several quality masters.
- Operations managers have found the classification system useful for collecting data, which are consistent and for identifying the opportunities for controlling quality costs that will have the greatest effect on efficiency.

**The typology has four categories:**

1. **Internal failure costs** (costs of scrap, rework, re-inspection and low production yields for non conforming items that are detected before they leave the company)
2. **External failure costs** (warranty-claims, repairs, and service costs that result when the failure is detected in the market place)
3. **Appraisal costs** (cost of inspecting upon arrival, during manufacture, in laboratory tests and by outside inspectors)
4. **Prevention costs** (design and development of new quality equipment, evaluation costs of a new product or service, training of quality personnel)

- An extremely important fact is that if a defect is neglected during process, the processed item will cost more defect-cost later. For example, in the design phase of a new product or service, the cost of correcting a defect may be minimal. If that defect goes undetected and the company releases the product or service to the public, it will incur a much greater cost to resolve the problems that result.
- Elimination of defects in standard product designs and manufacturing methods before production is just as important as eliminating defects during production. In fact, to achieve quality levels, manufacturers must focus on identifying and correcting defects in underlying product designs and production methods, not simply inspect incoming material or finished goods.
- The Quality Management Systems (QMS) in ERP packages support the benchmarking and use of optimal product design, process engineering, and quality assurance data by all functional departments within the manufacturing enterprise, thereby facilitating definition of repeatable processes, root cause analysis, and the continuous improvement of manufacturing methods.
- This documentation supports the job functions of the quality assurance and production managers in validating the manufacturer’s conformance to ISO: 9000, Good Manufacturing Practices (GMP) worldwide, and a variety of country specific standard of quality assurance.
- Specification Control Systems in ERP packages offer a state-of-the-art approach for documenting specifications and enable an organisation to standardise and simplify its quality assurance and control functions. Sample types, sample rules, and testing levels are completely user-defined for maximum flexibility and ease of use.
• Maintenance of standard specifications, detailed sampling instructions and testing procedures are performed online. Cyclic, subsequent, and repeat testing options are available to support the material acceptance function, with provision for the breakdown of test procedures into multiple dispositions, to improve inventory turnover and reduce inspection lead-times.

• The ERP system’s central database eliminates redundant specifications and ensures that a single change to standard procedures takes effect immediately throughout the organisation.

• The ERP systems also provide tools for implementing Total Quality Management programs within an organisation. Original manufacturers may be defined independently from vendors so that businesses can strictly adhere to quality assurance and control functions without preventing their buyers from seeking the best possible price and delivery terms.

• Each item supplied by an original manufacturer may be linked to a standard product specification. Actual test results and material disposition histories are retained by item, original manufacturer, and specification for in-depth quality performance review and analysis.

• Material Inspection Systems offer a wide range of capabilities for process supervision and control. These capabilities are fully integrated with other two modules like purchasing, inventory management, and shop floor control functions to ensure that the right quality control procedures are followed.

• Thus, by ensuring that the company has an efficient and effective quality assurance and management system, the ERP systems play a vital role in reducing the cost of quality.

6.9 Improved Information Accuracy and Decision Making Capability

• To survive, thrive, and beat the competition in today’s brutally competitive world, one has to manage the future. Managing the future means managing the information. In order to manage the information, in order to deliver high quality information to the decision makers at the right time, in order to automate the process of data collection, collation and refinement, organisations have to make Information Technology (IT) an ally, harness its full potential and use it in the best way possible.

• We have seen that in today’s competitive business environment, the key resource of every organisation is information. If the organisation does not have an efficient and effective mechanism that enables it to give the decision makers the right information at the right time, then the chances of the organisation succeeding in the next millennium are very remote. The three fundamental characteristics of information are:
  • accuracy
  • relevancy and
  • timeliness

Future guidelines for organisations:

• The information has to be accurate, it must be relevant for the decision-maker and it must be available to the decision-maker when she/he needs it.

• Any organisation that has the mechanism to collect, collate, analyse and present high quality information to its employees, thus enabling them to make better decisions, will always be one step ahead of the competition.

• Today, the time available for an organisation to react to the changing market trends is very short. To survive, the organisation must always be on its toes, gathering and analysing the data-both internal and external.

• Any mechanism that will automate this information gathering and analysis process will enhance the chances of the organisation to beat the competition.

• As the system work in isolation, collecting and analysing the data needed for the functioning departments as well as getting information about some aspects that is dependent on more than one department becomes a difficult task.

• Nevertheless, no business executive or decision maker can take good decisions with the isolated data that he will get from the various reports produced by each department. Even if the executive collects the data and produces the information that he requires, he would have lost valuable time that would have been better spent in decision-making for that process.
Therefore, what is needed is a system that treats the organisation as a single entity and caters to the information needs of the whole organisation. If this is possible and if the information that is generated is accurate, timely and relevant then these system will go a long ways in helping the organisation to realise its goals.

This is the strength of ERP system integration and automation and that is why implementation of ERP systems will help in improving the accuracy of information and thus help in better decision-making.

### 6.10 Disadvantages of ERP Systems

- **Expensive:** This entails software, hardware, implementation, consultants, training, etc. Or you can hire a programmer or two as an employee and only buy business consulting from an outside source, do all customisation and end-user training inside. That can be cost-effective.

- **Customisation of the ERP software is limited.**

- **Re-engineering of business processes to fit the “industry standard” prescribed by the ERP system may lead to a loss of competitive advantage.**

- **ERP’s are often seen as too rigid and too difficult to adapt to the specific workflow and business process of some companies this is cited as one of the main causes of their failure.**

- **Many of the integrated links need high accuracy in other applications to work effectively. A company can achieve minimum standards, and then over time “dirty data” will reduce the reliability of some applications.**

- **Once a system is established, switching costs are very high for any partner (reducing flexibility and strategic control at the corporate level).**

- **The blurring of company boundaries can cause problems in accountability, lines of responsibility, and employee morale.**

- **Resistence in sharing sensitive internal information between departments can reduce the effectiveness of the software.**

- **Some large organisations may have multiple departments with separate, independent resources, missions, chains-of-command, etc. and consolidation into a single enterprise may yield limited benefits.**
Summary

- This chapter deals with benefits and limitations of ERP implementation. Here a number of powerful advantages to Enterprise Resource Planning.
- It has been used to solve a number of problems that have plagued large organisations in the past. At the same time, it is not without a number of disadvantages. Being able to weigh the two will allow a company to decide if this solution will properly meet their needs.
- It should first be noted that companies that fail to utilize systems such as ERP may find themselves using various software packages that may not function well with each other. In the long run, this could make the company less efficient than it should be.
- The direct advantages include improved efficiency, information integration for better decision-making, faster response time to customer queries, etc.
- The indirect benefits include better corporate image, improved customer goodwill, customer satisfaction, and so on.
- ERP has a number of limitations. The success of the system is fully dependent on how the workers utilize it. This means they must be properly trained, and a number of companies have attempted to save money by reducing the cost of training.
- Even if a company has enough money to implement ERP, they may not be able to successfully use it if they do not have enough money to train their workers on the process of using it. One of the biggest problems with ERP is that it is hard to customise.
- Very few companies can effectively use ERP right out of the box. It must be modified to suit their needs, and this process can be both expensive and tedious. Even when a company does begin changing the system, they are limited in what they can do.

References


Recommended Reading

Self Assessment

1. The time elapsed time between placing an order and receiving it is known as ________.
   a. cycle time
   b. lead time
   c. placement time
   d. ordered time

2. ________ means meeting or exceeding customers’ requirements for a product or service.
   a. Customer satisfaction
   b. Customer retention
   c. Customer evaluation
   d. Customer facilitation

3. ________ has developed a typology of quality related costs that are based on the work of several quality masters.
   a. ERP
   b. EFI
   c. American Society for Quality Control
   d. ISO

4. ERP packages support the benchmarking and use of optimal product design, process engineering, and quality assurance data by all functional departments within the manufacturing enterprise is known as__________.
   a. information system
   b. functional system
   c. quality management system
   d. manufacturing system

5. ________ is a key issue in the formulation of strategic plans in companies.
   a. Designing
   b. Development
   c. Specialisation
   d. Flexibility

6. Which of the following is TRUE?
   a. ERP systems are expensive
   b. ERP systems are simple
   c. ERP systems are easy
   d. ERP systems are user friendly

7. Which of the following is FALSE?
   a. Customisation of the ERP software is limited.
   b. Information processing in ERP is accurate.
   c. ERP is rigid handling.
   d. ERP very user friendly and easy to use.
8. ________ is the ability of the operation to produce efficiently highly customised and unique products.
   a. Product flexibility
   b. Process flexibility
   c. Information flexibility
   d. Time flexibility

9. Match the following

<table>
<thead>
<tr>
<th>1. Internal Failure cost</th>
<th>A. Product evaluation costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. External failure cost</td>
<td>B. Cost of inspection</td>
</tr>
<tr>
<td>3. Appraisal cost</td>
<td>C. Warranty-claims</td>
</tr>
<tr>
<td>4. Prevention cost</td>
<td>D. Costs of scrap</td>
</tr>
</tbody>
</table>

   a. 1-A,2-B,3-C,4-D
   b. 1-C,2-B,3-A,4-D
   c. 1-C,2-A,3-D,4-B
   d. 1-D,2-C,3-B,4-A

10. Strategic opportunities or threats frequently motivate the launch of aggressive ______ management initiatives.
   a. process
   b. quality
   c. quantity
   d. operation
Chapter VII
ERP Market

Aim
The aim of this chapter is to:

- inform about existing ERP market
- introduce ERP software
- discuss about ERP tools used by the leading companies

Objectives
The objectives of this chapter are to:

- explore the leading ERP organisations
- explain use of ERP technology and its products
- explicate the basic ERP tools used by the leading companies
- emphasise on strengths of ERP system to help the business to grow

Learning outcome
At the end of this chapter, students will be able to:

- realise the existing ERP technologies used in market
- understand the innovation in the software solution of ERP
- analyse the ERP system which helps company in reaching their ultimate goal
- recognise the strengths and weaknesses of ERP
7.1 Introduction

The ERP market is a very competitive and fast growing market. According to AMR Research Inc., the leading industry and market analysis firm specializing in enterprise applications and enabling technologies, the Enterprise Peso Cite Planning (ERP) software market will grow at a compound annual growth of 37 percent over the next five years. According to the firms Enterprise Resource Planning Software Report, 1997-2002, total company revenue will top $52 billion by the year 2002.

This conclusion is in marked contrast to other forecasters, who believe that ERP demand has been artificially stimulated by year 2000. AMR Research attributes the continued growth to some primary factors.

- ERP vendors are continuing to expand market presence by offering new applications such as supply chain management, sales force automation, customer support and human resources.
- To sustain their rapid growth, ERP vendors will try to sell more licenses into their installed base. Currently, ERP vendors have a 10-20 percent penetration (i.e. percentage of total employees currently using the ERP system). This will grow to 40-60 per cent within the next five years.
- While ERP originated in the manufacturing market, ERP usage has spread to nearly every type of enterprise including retail, utilities, and the public sector and healthcare organisations. Most will purchase new ERP systems over the next five years, often for the first time.
- The vendors in the ERP market are segmenting into two tiers and are focusing on expanded product functionality, new target markets and higher penetration rates.
- The top tier consists of five vendors SAP AG, Baan, PeopleSoft, Oracle Applications, and J.D. Edwards. These companies, The Big 5 - account for 64 per cent of the ERP market revenue and have grown over the past year at a furious pace of 61 per cent.
- In addition, Baan, J.D. Edwards Oracle and People Soft are each expected to approach or exceed $ 1 billion in total revenue in 1998, while SAP will approach $5 billion.
- AMR Research predicts that the ERP market will reach $14.8 billion in total company revenue in 1998. In addition, when third party services, hardware, databases, and networking are considered, AMR Research estimates that the ERP infrastructure is worth over 342 billion. This market will continue to be one of the largest, fastest growing and most influential in the applications industry and is poised for steady growth into the new millennium.
- According to the Dataquest survey (Dataquest, April 15, 1999), in India also, SAP is the market leader with a 20% market share.
- According to the survey, ERP does not appear to be new to the Indian market. This is indicated by the proliferation of solutions, which have been implemented.
- While SAP R/3 and QAD’s MFG/PRO continue to dominate the Indian market scene, there is also an undeniable presence of lesser-known breeds Financials, Ramco Marshal, and Baan dominate the second and third rungs of the domestic ERP market.
- There is also an extensive list of ERP solutions being implemented in much smaller numbers. Reinforcing the baseline of ERP familiarity in Indian organisations is the fact that close to 35% of organisations have been using ERP for 24 months and longer, while the remaining organisations have used ERP for less than 24 months.
- Assuming an average implementation process of 18 months, 35% of organisations, therefore, have been grappling with ERP to 4 years and longer.
- Amongst the organisations planning to implement ERP in the future, SAP remains the number one preferred solution. This is followed by Oracle Financials, Baan, and MFG/PRO. Home-grown solutions like Marshal and MakESS have also been indicated as preferred options.
- In this chapter, we will see the profile of some of the top vendors of the ERP their profile, their product offerings, and product features.
The companies featured here are SAP AG, Baan Company, Oracle Corporation, People soft, J. D. Edwards, and SSA. The information provided here has been collected from the Internet and printed media. For further details, you are supposed to visit company websites directly.

7.2 SAP AG

7.2.1 Company Profile

- SAP AG founded in the year 1972, SAP (Systems, Applications and Products in Data Processing), located in Walldorf, Germany, and is the leading global provider of client/server business application solutions.
- Today, SAP has installations in more than 15 countries.
- SAP’s ERP package comes in two versions:
  - Mainframe version (SAP R/2) and
  - Client/server version (SAP R/3)
- Most prominent among SAP’s product range is enterprise application suite R/3 for open client/server systems.
- With SAP Systems, customers can opt to install the core system and one or more of the functional components, or purchase the software as a complete package.
- The System is accepted as the standard in key industries such as oil, chemicals, consumer products, and high technology and electronics.
- The SAP group employs a workforce of over 19,300 and has offices in more than 50 countries worldwide. SAP is the most successful vendor of standard business-application software and is the fourth-largest independent software supplier in the world.
- In its most recent fiscal year, ending December 31, 1998, SAP AG reported revenues of DM 847 billion, a 41% increase over 1997’s revenues. In the same period, sales of R/3 rose by 31%.
- Since 1988, SAP AG has been a publicly held corporation, with its shares being traded on the German and Swiss stock exchanges.
- In 1995, the company was added to the DAX, the index of German blue-chip companies. SAP listed its ADRs (American Depository Rights) on the NYSE (New York Stock Exchange) in August 1998.

7.2.2 Products and Technology

- SAP has developed an extensive library of more than 800 predefined business processes, spanning each functional software requirement.
- These processes may be selected from the SAP library and included within installed SAP applications, after tailoring the application solution to suit the user’s exact requirements.
- New business processes and technologies become available regularly, enabling SAP customers to add state-of-the-art solutions to meet ever-changing business demands.
- The power of SAP software lies in real-time integration, linking the company’s business processes and applications, and supporting immediate responses to change throughout the organisation on a departmental, divisional, or global national strength of the products.
- It extends to every aspect of the applications, such as the support of multiple currencies simultaneously and the automatic handling of country-specific import/export, tax, legal and language requirements.
- The complete suite of R/3 applications is available in 24 languages, including Japanese (Kanji) and other double-byte character.

7.3 R/3 – Overview

- R/3 employs a three-tier client/server architecture widely recognised by SAP customers, technology partners and industry analysts as a winning approach to solving some of today’s most demanding information-management challenges.
The architecture separates a system into three functional layers, each structured to support the demands of its function.

- The **database layer** resides on central servers or mainframe host computers.
- The **application layer** holds the processing logic of the system, preparing and formatting data for individual offices or departments.
- The **presentation layer**, typically on personal computers, handles all the tasks related to the presentation of data, including user interfaces that enable easy access to complex applications and data.

SAP has also incorporated and integrated the intranet and Internet technologies into business solutions for its customers.

Both internally and together with its partners, the company is defining and creating a number of internet standards based interfaces, applications and business processes that will extend the usefulness of SAP software in entirely new ways and to new classes of customers.

Through its **Industry Business Units (IBUs)** and its extensive development network closely with its customers to develop new information technology approaches to meet the unique demands of a wide spectrum of industries.

With this approach, customers become members of the SAP development sharing their best practices and solutions.

### 7.3.1 The R/3 System

- As a company, one needs dynamic strategies to meet the challenges of today’s fast-paced business world.
- The ability to respond nimbly to new customer needs and seize market opportunities as they arise is crucial.
- A powerful, open IT infrastructure that will optimally support the business activities and is flexible enough to adjust to change and progress has become a necessity.
- SAP’s R/3 System is the world’s most-used standard business software for client/server computing.
- R/3 enables us to respond quickly by making us more flexible, so we can leverage changes to our advantage. Our everyday business will surge, letting us concentrate on strategically expanding to address new products and markets. The R/3 System is ideal for companies of all sizes and industries.
- It gives them both a forward-looking information management system and the means to optimise their business processes.
- At R/3’s core are powerful programs for accounting and controlling, production and materials management, quality management and plant maintenance, sales and distribution, human resources management and project management. Already, over 2,000,000 users put R/3 business applications to the test every day. Information and early warning systems are also available.
- The Business Information Warehouse conveniently edits external and internal data to support decision-making at all corporate levels.
- The R/3 System is an unbeatable combination of functionality and technology. Although designed as an integrated system, R/3’s modules can also be used individually.
- We can expand it in stages to meet the specific requirements of our business. R/3 runs on the hardware platforms of leading international vendors, and can mesh smoothly with our in-house applications.
- It is open enough to allow interoperability with third-party solutions and services. It is quick and efficient to install. The R/3 System enjoys full 24-hour support from SAP’s global service network. R/3 overcomes the limitations of traditional hierarchical and function-oriented structures like no other software.
- Sales and materials planning, production planning, warehouse management, financial accounting and human resources management are all integrated into a workflow of business events and processes, across departments and functional areas.
- Employees receive the right information and documents at the right time at their desktops. R/3 knows no organisational or geographical boundaries.
Enterprise Resource Planning

- Corporate headquarters, manufacturing plants, sales offices, and subsidiaries all merge for the integrated handling of business processes.
- R/3 does more than just opening up completely new IT solutions within our company. Its applications also link your business processes with those of customers and suppliers to create complete logistical chains, covering the entire route from supply to delivery.
- R/3 lets you integrate banks and other business partners into inter-company communications, both nationally and internationally.

7.3.2 Best Business Practices and New Technologies

- R/3 software lets us integrate all our business operations in an overall system for planning, controlling and monitoring. We can choose from 800-plus ready-made business processes and their number continues to grow.
- They include best business practices that reflect the experiences, suggestions and requirements of leading companies in a host of industries. R/3 lets us profit directly from this wealth of business and organisational know-how.
- R/3 continues to evolve in close dialogue with the customers. Cutting-edge technologies, such as object-orientation, are incorporated into the development work and are translated into practical customer benefits.
- SAP is always on the lookout for ways to harness innovative applications to extend the ways in which one can use R/3.
- For example: More and more companies are using the Internet not just for marketing and communications, but for procurement customer service and order processing. R/3 is directly linked to the Internet and is ready for electronic commerce.

7.3.3 Dynamic Information Management

- R/3 is a major strategic tool for achieving these aims. R/3 gives enterprises of all sizes and from all types of industries, a flexible software base for their business infrastructure.
- Moreover, they profit from the quality and powerful functionality of R/3’s applications, which meet the information management needs of both medium-sized and large multinational companies.
- This flexibility, as regards enterprise size, is demonstrated by the fact that over 50% of R/3 installations are in small and medium-size companies.
- R/3 solutions are hard at work in some vertically structured industries. Automobile manufacturers use R/3 to build flow factories, in which just-in-time materials and assemblies flow from the supplier into production and then as finished products to the customer.
- Retail companies use R/3 to boost consumer response.
- The pharmaceutical and chemical industries use R/3 to integrate commercial and technical applications.
- Banking and insurance businesses use R/3 to coordinate revenue, risk management, and optimally manage their financial assets.
- Manufacturing companies use it because R/3 simultaneously supports several types of production.
- Special enhancements to the R/3 System enable government agencies to make their services more efficient and cost-effective.
- In wholesale businesses, R/3 speeds up all processes-from suppliers to final customers and permits the simultaneous optimisation of wholesale and consumer prices.
- Publishers and media take advantage of R/3’s flexibility to respond to short-term changes in the markets. Utilities use R/3 to reorganise their business processes and improve the quality of their services.
7.3.4 R/3 Application Modules

- The applications in R/3 are modules designed to tap the company’s performance potential. They link operational steps to forge automated workflow chains, control the flow of information from one department to another and connect the company with its customers and suppliers. Process-oriented operations increase productivity.
- Because R/3 connects processes that belong together, every employee has fast, convenient access to all required information on the spot. Information is up-to-the-minute and consistent. The integrated nature of the workflow management gives our staff a new understanding of the work environment.
- A team orientation replaces departmental thinking and strengthens individual initiative and motivation.
- R/3 helps all our employees work together. R/3 provides a flexible organisational structure.
- From a broad spectrum of functions and alternative business processes, we can select the modules that we want which will mould the company into an internally consistent organisational system, depending on our specific requirements. The system’s modularity also allows us to choose between incremental installation and “big bang” implementation, with simultaneous conversion of all systems.
- SAP matches its core processes to the company’s needs by customising additional applications, which are provided by SAP’s partners.
- The in-house staff can do the work simply and easily with the ABAP/4 ® Development Workbench, which is an integral part of the R/3 System.
- R/3 brings together people who work on shared tasks—within the same company, in a network of companies, or in their dealings with customers and business partners.
- R/3 unlocks ways to optimise organisational structures for a smoother flow of information at all levels and between all parts of the organisation.
- With integrated workflow management and access to up-to-the-minute information, R/3 lets employees assume greater responsibility and work more independently.

7.3.5 R/3 Modules

- R/3’s applications are modules. They can be used either alone or in combination with other solutions.
- From a process oriented perspective, greater integration of applications increases the benefits derived.
- The following are the R/3 modules:
  - **Financial accounting** collects all the data in our company relevant to accounting, provides complete documentation and comprehensive information, and is at the same time an up-to-the-minute basis for enterprise-wide control and planning.
  - **Treasury** a complete solution for efficient financial management that ensures the liquidity of our company worldwide, structures financial assets profitably and minimises risks.
  - **Controlling** a complete array of compatible planning and control instruments for company-wide controlling systems, with a uniform reporting system for coordinating the contents and procedures of our company’s internal processes.
  - **Enterprise controlling** continuously monitors our company’s success factors and performance indicators based on specially prepared management information.
  - **Investment management** offers integrated management and processing of investment measures and projects from planning to settlement, including pre-investment analysis and depreciation simulation.
  - **Production planning** provides comprehensive processes for all types of manufacturing: from repetitive, make-to-order and assemble-to-order production, through process, lot and make-to-stock manufacturing, to integrated supply chain management with functions for extended MRP-II and electronic Kanban, plus optional interfaces for PDC, process control systems, CAD and PDM.
• **Materials management** optimises all purchasing processes with workflow-driven processing functions, enables automated supplier evaluation, lowers procurement and warehousing costs with accurate inventory and warehouse management and integrates invoice verification.

• **Plant maintenance and service management** provides planning, control and processing of scheduled maintenance, inspection, damage-related maintenance and service management to ensure availability of operational systems, including plants and equipment delivered to customers.

• **Quality management** monitors, captures, and manages all processes relevant to our quality assurance along the entire supply chain, coordinates inspection processing and initiates corrective measures and integrates laboratory information systems.

• **Project system** coordinates and controls all phases of a project, in direct cooperation with Purchasing and Controlling, from quotation to design and approval, to resource management and cost settlement.

• **Sales and distribution** actively supports sales and distribution activities with outstanding functions for pricing, prompt order processing and on-time delivery, interactive multilevel variant configuration and a direct interface to Profitability Analysis and Production.

• **Human resources management** provides solutions for planning and managing our company’s human resources, using integrated applications that cover all personnel management tasks and help simplify and speed the processes.

### 7.3.6 R/3-Open for Customised Strategic Information Management

- With SAP’s Business Workflow®, the fetters of conventional methods of operation are changed. Integrated workflow technologies and applications link company-specific work processes to the business processes of the R/3 System. Workflow applications automate and control the flow of information, and transport documents such as orders or invoices from one work centre to another, and from one employee to another.

- Workflow management with R/3 speeds the flow of budget releases and purchase requisitions, increases the efficiency of change management in engineering/design and manufacturing and simplifies subsequent processing of documents transmitted by fax or EDI. R/3 also works well with third-party workflow solutions.

- The openness of R/3 strengthens our independence. When we use R/3, we are free to choose our technical infrastructure. We determine which hardware, operating systems, or databases we want to use.

- The entire range of offerings from the leading international vendors is open to us. We can even plan our IT strategy with various systems from different manufacturers.

- Most importantly, the openness of R/3 safeguards our investment in the long-term. As our company grows, R/3 grows with us and if we change our hardware environment, R/3 stays with us without jeopardising our software investment. R/3 works seamlessly with a variety of systems and applications. That gives us many different options for useful add-on applications and cooperative information processing. The Business Framework of SAP’s strategic product architecture enhances this openness.

- Object-oriented interfaces allow specific business functions to operate as standalone software products without any loss of integration. Alongside the benefits of greater cooperation and flexibility, the business framework speeds up the software maintenance and product rollout cycles.

### 7.3.7 Distributed Applications

- R/3’s innovative technologies do more than just ensure an optimal flow of information within your R/3 System.

- SAP Application Link Enabling (ALE) permits the seamless incorporation of autonomous application systems and components in a business communication is network.

- How does that help us? For example, we can install R/3 systems at corporate headquarters or in plants, branch offices, or subsidiaries so that they can perform their own tasks independently.

- When these business messages are exchanged between these systems, the ALE services ensure time-controlled and event-driven communication.
• For example, that master data can be updated, periodic results from sales offices can be transmitted to headquarters, or planning data and inventory information can be exchanged between local and central areas of the company.

• The same applies for the integration of business processes and information from R/2® applications, third-party solutions, and independent R/3 components.

• The openness of R/3 sets the pace in the market for client/server software. One can:
  • link together R/3 systems or loosely couple distributed R/3 applications
  • link both third-party software and popular desktop programs such as MSWord, MS Excel, and MS Project to R/3 applications
  • integrate specialised systems for computer-aided design (CAD), plant data capture (PDC), or mobile data entry
  • incorporate industry-specific solutions, such as laboratory systems or geographic information systems (GIS)
  • include enhancements to R/3 applications, such as systems for production optimisation and transportation planning
  • open up new business opportunities with e-commerce, thanks to direct cooperation between R/3 and the Internet
  • use Java technology to make R/3 available to our users with a familiar GUI on the Internet
  • include fax, e-mail, optical archiving systems and multimedia tools in the R/3 System’s business applications
  • electronically transmit via EDI, receive and process data from R/3 applications
  • build cooperating groups of solutions between R/3 applications and SAP’s R/2 system

7.3.8 R/3 and the Internet

• The gateway to the markets of the future is the Internet. It lets us reach new customers worldwide, shorten information paths between business partners, and involve all staff in online communications.

• The key to all of this is R/3 with its diverse Internet applications.

• No other technological development has had such a profound impact on the business world as the Internet. The intelligent use of Internet technology in business processes is turning into a critical success factor for many customers. Electronic commerce means making our current offerings available to prospective clients worldwide, around the clock, 365 days a year.

• For example, our customers can use the Internet to trigger certain business processes in your R/3 System such as purchase orders and then immediately receive information about availability, prices and delivery dates.

• The Internet lets us address potential customers and suppliers around the world at a relatively low cost. In addition, direct data entry by customers or data exchange with suppliers significantly accelerates your business processes whichever platform you may use.

• Ordering processes can even be fully automated by letting R/3 generate purchase requisitions, delivery notes, delivery data and invoices.

• When you use Internet technology for our in-house communications, our employees benefit in the same way as our customers and business partners.

• In addition, in local intranets, we can make selected R/3 functions available for use by all staff. For instance, we can move data entry and maintenance to where the data is actually generated.

• SAP’s multimedia-enabled, user-friendly interface of R/3 Internet applications, ensures that even untrained users have no difficulty in working with these selected functions.

• In addition to these specially designed Internet applications, R/3 offers us yet another attractive option. We can give your staff direct access to R/3 from the Internet, using a GUI that is already familiar to them. This is thanks to the state-of-the-art Java technology, which means that whatever hardware and software is in use, R/3 can be accessed at any Internet work centre, anywhere in the world.
7.4 SAP’s Business Engineer

- For efficient implementation and use of R/3, the Business Engineer installs and customises R/3 quickly and smoothly, at minimum cost and with maximum reliability.
- Fully integrated into the R/3 System, the Business Engineer supports in analysing, designing and configuring business processes. As a result, one not only saves considerable time in implementing R/3 and in subsequently customising the system as business needs change, but it also greatly reduces the cost.
- The Business Engineer delivers a complete toolkit that greatly facilitates the implementation of R/3 and the engineering of business processes.
- For example, the R/3 Procedure Model guides through the different project phases step-by-step from project generation to going live. Therefore, one can be sure that he/she is always on the right track.
- A wide range of tried-and-true, graphically portrayed business scenarios and processes are stored in the R/3 Reference Model. From this wealth of experience, the best possible processes can be chosen for the company.
- At the same time, one can use the model to test the complete suite of options ourselves in a real-world environment. The processes selects, then automatically determine the contents of individual Implementation Guide, which leads through all the activities, which are essential for optimum custom system configuration.
- The Business Engineer ensures quick and high-quality customisation of R/3 with the support of the Business Engineer, project teams and external consultants will get R/3 up and running in no time.
- Easy-to-understand documentation of all the system settings is automatically generated, so that one can access it whenever required.
- If a company needs to reorganise or enter new fields of business to seize new market opportunities, one can dynamically adapt R/3 System to respond to such changing needs.
- Without disrupting regular operations, the Business Engineer speedily extends R/3 for new functions and likewise, makes adjusting after an upgrade very simple.
- In short, as an integral component of R/3 software, the Business Engineer guarantees an easy and optimally customisation of R/3 system to accommodate current business requirements.

7.5 SAP Advantage

- R/3 unlocks the client/server world for us. In these open architectures, applications are distributed across a number of computers that communicate with each other through a network.
- R/3 offers integrated solutions for client server information processing that combine a variety of products and services, to create a smoothly functioning communications network.
- R/3 incorporates not only system management, but also network administration and backup solutions. SAP’s partnerships with hardware manufacturers, database providers and technology and service companies play a significant role here.
- In client/server architectures, database systems take care of managing enterprise data. They communicate with application servers that coordinate the actual applications and control communication with the database.
- At the client level, where the end users work, the cycle of tasks is appropriately distributed across various computers and it concludes with a presentation of the results on the desktop.

Benefits:

- Cooperative client/server processing distributes applications and computing capabilities almost at will across multiple levels, and systematically takes advantage of the strengths of different hardware and software components.
- Whether we use R/3 in two- or three-tier client/server architectures, locally or worldwide choose the best solution for our needs.
- The number of workstations we include with R/3 in our client/server solution is determined solely by our particular needs.
R/3 is infinitely expandable, and can be used in client/server architectures with anywhere between 30 and 1000 end users. This scalability ensures that R/3 can always grow with our requirements.

7.6 BAAN Company

7.6.1 Company Profile

- The company founded in the Netherlands in 1978 by Jan and Paul Baan brothers, Baan Company has dual headquarters in Barneveld, The Netherlands and Reston, Virginia, United States of America. Since 1995, the Company has significantly expanded its sales and service presence in North America, Latin America, Europe and Asia.
- Baan Company is a leading global provider of enterprise business software.
- Baan Company offers a comprehensive portfolio of best-in-class component-based applications for front office, corporate office, and back office automation. These applications are in use at over 7,000 customer sites worldwide. Baan Company products reduce complexity and cost, improve core business processes, are faster to implement and use, are more flexible in adapting to business changes and optimise the management of information throughout the entire value chain.
- Baan Company’s product family offers on-going delivery of open components for enterprise applications, including a comprehensive and flexible suite of year 2000-compliant software solutions and best-in-class business modelling tools.
- These tools are based on a flexible, multi-tier architecture, which can scale to meet the needs of small, medium and large enterprises.
- Baan Company makes this possible with its open architecture, which enables customers to migrate to new technologies and product releases at their own pace.
- Referred to within Baan Company as Dynamic Enterprise Modelling Strategy Execution (Baan DEMSE), this unique approach puts business requirements at the heart of the implementation process.

7.6.2 Technology and Products

- Over the past 14 years, Baan Company has evolved from pioneering the Enterprise Resource Planning (ERP) software market to now offering the most complete set of single-vendor enterprise business applications.
- The foundation for Baan’s products is differentiated through their open component architecture and with BaanDEM. BaanDEM provides a business view of the enterprise via graphical process/model-based views, tailored or templated to the specific needs of industry groups or individual customers.
- BaanDEM delivers the capability to rapidly configure and re-deploy Baan Company applications from a single view, helping to ensure that the Baan Company enterprise application accurately reflects a company’s most current organisational structure, business practices and operational procedures.
- Baan’s product line features multi-tiered architecture for maximum scalability and flexible configuration. Applications are isolated from the systems environment, enabling support of new hardware, operating systems, databases, networks and user interfaces without any modification to the application code.
- Baan Company supports popular UNIX platforms, as well as Microsoft NT and was the first solution provider in its class to earn the ‘Designed for Microsoft® BackOffice’ logo certification.
- Products also support major relational database systems (Oracle, Informix, DB2, Sybase and Microsoft SQL Server), and are Year 2000 compliant.
- Built on a commitment to reduce the complexity of IT solutions, the Baan product portfolio assembles best-of-class components, keeps them “evergreen” through on-going release cycles, and enables enterprises to update their information infrastructure in manageable, incremental initiatives.
- Three advantages distinguish each component element within the Baan Series-based family of products including, best-in-class components; evergreen delivery; and version independent integration.
• The Baan Series-based product family includes Baan Enterprise Resource Planning (BaanERP); Baan Front Office; Baan Corporate Office Solutions; and Baan Supply Chain Solutions.

7.6.3 Serving Vertical Industries

Aerospace and Defence (AandD)
• Baan offers specific vertical industry solutions for aerospace and defence companies engaging in multi-level projects and contracts.
• Baan’s AandD offering includes Baan Project to enable the effective management of key functional business process areas.
• This unique, industry specific approach solves the problems faced by organisations engaged in large, extensive projects. Today, Baan is recognised as the leader in the Aerospace and Defence industry segment for ERP.

Automotive
• Baan also offers specific vertical industry solutions for automotive companies. Many of the world’s leading automotive companies use Baan’s business applications to support worldwide manufacturing, distribution and financial operations.
• Baan’s product suite offers automotive companies next-generation information technology across manufacturing, supply chain and front office operations.
• With Baan, businesses choose best of breed components, add functionality without complex and costly upgrades and integrate Baan Company enterprise applications with existing and third party applications.
• The Baan Series-based family of products delivers real-time information across the entire value chain, from engineering design to manufacturing, distribution and financial reporting.

7.6.4 BaanERP Modules
• BaanERP, the successor to Baan IV, is a proven enterprise resource planning software application.
• It is fully integrated and provides exceptional functionality across the enterprise.
• BaanERP consists of a number of interdependent components that can be deployed to meet business needs.
• The flexibility within BaanERP allows customers to maximise the benefits of both best-in-class solutions and a fully integrated, high-performance system.
• BaanERP includes the following components: manufacturing, finance, project and distribution.
• **Manufacturing Module** (includes Bills of Material, Cost Price Calculation, Engineering ‘Change Control, Engineering Data Management, Hours Accounting, Product Classification, Product Configuration, Production Control, Production Planning, Project Budgeting, Project Control, Repetitive Manufacturing, Routings, Shop Floor Control, Tool Requirements, Planning and Control, Capacity Requirements Planning, Master Production Scheduling and Material Requirements Planning).
• **Project Module** (includes Project Budget, Project Definition, Project Estimating, Project Invoicing, Project Monitoring, Project Planning, Project Progress and Project Requirements Planning).
• **Distribution Module** (includes Sales Management, Purchase Management and Warehouse Management).

7.6.5 BaanERP Tools
• BaanERP Tools consists of a number of software components, which together form the technical foundation for all BaanERP components.
• The BaanERP Tools can be described as a computing platform that provides an independent, flexible, open and distributed computing and development environment.
• The open architecture of the BaanERP tools makes it possible to:
Quickly react to new trends in the marketplace that require software or software configuration changes.

Develop the Baan applications in such a way that they are kept independent of third party products such as hardware, operating systems and databases.

Easily integrate with third-party products.

Create customer-specific solutions.

**Run tools**

- The purpose of the run-time tools is to make BaanERP packages independent from computing-environment-specific issues, such as platform, operating system, middleware, databases and user interfaces.

- The run-time tools are developed in C/C++ and/or Java.

**Run-time tools**

- allows Baan application developers to focus on application-specific issues only
- removes the overhead of developing and generating a native application code for each combination of platform, operating system, database and so on
- greatly reduces the complexity of providing and maintaining application product updates
- reduces the overhead of ensuring cross-platform compatibility by bundling and maintaining computer-environment-specific code separately from the BaanERP applications

**7.6.6 Software Development and Administration Tools**

- In addition to the application functionality, the BaanERP suite contains ERP Tools.

- This particular Tools environment contains functionality for installation, configuration, administration, and modification of the ERP applications, or the creation of entirely new applications based on run-time tools.

A few of the key features are:

- Software configuration management offers the ability to create, modify, and test BaanERP software components in a run-time environment that does not affect the live environment. It includes functionality for detailed tracking and version control of modifications.

- Authorisation management system Allows for the detailed management of user privileges, either per individual or per role.

- Database management system enables a single environment to manage database related issues, regardless of the database(s) used.

- Exchange control, a utility to exchange static or dynamic data between BaanERP installations or between BaanERP and third party products.

- Dynamic Form Editor A Windows NT client used to create or modify BaanERP forms. The Dynamic Form Editor allows the dragging, and dropping, of form elements and automates the process of consistent positioning of form elements.

- 4GL Program Editor Developers can modify BaanERP or create add-ons using BaanERP 4GL development language, which is similar to C++ in syntax and structure.

- The 4GL environment automates many of the user interface and event handling issues, which allows the developer to focus on the required functionality.
  - software installation maintenance
  - application configuration
  - device management
  - job management
  - audit management

- management of domains and tables
management of labels, menus, reports and charts
• Ad-hoc SQL queries
• translation and documentation facilities
• desktop management
• control features for distributed data collection and OLE

The Software Development and Administration Tools environment also features:

Customers and partners
• Baan Company and its partners work closely with customers to insure the success of every installation, and to enable customers to achieve the highest level of self-reliance desired.
• Baan Company is committed to providing solutions that meet the unique needs of all major vertical markets. The company’s blue chip customer base includes industry leaders such as Boeing, Philips, Mercedes Benz, Nortel, Fujitsu Network Communications and Motorola.
• Baan Company aims to ensure that every interaction its customers have, is in line with its “Three 1” philosophy:
  • Integrity: In its interactions with its customers, colleagues, partners and shareholders
  • Innovation: In what it builds and how it delivers
  • Initiative: In the speed and focus, it brings to all aspects of its market opportunity.
• Baan Company has marketing and development partnerships with leading consulting, hardware and software companies including Microsoft, IBM Corporation, Intel, Compaq Computer Corporation, Hewlett-Packard and Silicon Graphics.
• Through its alliances, Baan Company offers packaged, pre-tested solutions, and ensures interoperability with optimisation for the most popular databases, middleware and hardware systems, while accelerating the development of next-generation capabilities.
• Baan Company’s software alliances bring added openness, robustness and flexibility to Baan Company’s software solutions and give Baan Company’s customers a high level of interoperability with complementary software applications.
• The Baan Certified Applications Provider Program provides its customers with alliance software solutions that are truly connected to the Baan Company’s enterprise application, are reusable, and are generally available for a wide variety of customers.

Global support, education and consulting

Support
• Baan Global Support is a company’s best source for fast, consistent problem resolution, as well as preventive technical advice.
• Baan Global Support offers a broad range of support services, including telephone support, Critical Incident Support, an Interactive Support Website and an on going Subscription to Innovation.
• Baan Company has closely linked Implementation Solution Centres around the world, which support internal, and third party implementation consultants as well as customers.
• Baan Company also assists customers in establishing on-site competence centres to manage all aspects of the implementation and ongoing systems use. Products are available in 59 countries through both direct and indirect channels, and are translated into more than 20 languages.

Baan Education:
• As a partner in lifetime learning, Baan Education helps maximise the return on investment in people and technology.
• Baan Education addresses the education needs of everyone in an organisation from newly hired employees to seasoned professionals who are maturing with technology.
• Baan Education offers new Internet-based learning called Virtual Campus. With Baan Education, a partner can realise the company’s goals of profitability, productivity and competitive advantage.
• Baan Education’s process-based curriculum, addresses not only specific Baan Company’s enterprise applications, but also provides an in-depth understanding of the business processes that its applications automate. Thus, Baan Company extends education beyond simple functionality, taking into account the context within which its applications are used in their manufacturing, sales, financial, and technical environments.
• This lifetime learning approach means that a company’s workforce is always abreast with the latest technology and business developments.

Baan Consulting
• Baan Consulting is dedicated to implementing Baan Company enterprise applications around the globe.
• In addition to the thousands of customers served by its consulting partners, Baan Consulting has a successful record of accomplishment with well over 1,000 customers worldwide, in almost every business environment. Baan Consulting provides a wide range of services, such as Project Management, Business Consulting, Application Consulting and Technical Consulting.
• Throughout the implementation and after a company goes live, Baan Consulting is by its side with its Internet-based Baan Cyber Consult offering.

7.7 Oracle Corporation

7.7.1 Company Profile
• Oracle Corp. (founded in 1977) is the world’s second largest software company and the leading supplier of software for enterprise information management.
• With annual revenues exceeding $ 8.0 billion, the company offers its database, tools and applications products, along with related consulting, education and support services.
• Oracle employs more than 41,000 people in more than 145 countries around the world.
• Headquartered in Redwood Shores, California, Oracle is the first software company to implement the Internet computing model for developing and deploying enterprise software across its entire product line: databases and relational servers, application development and decision support tools and enterprise business applications.

Technology
• Oracle software runs on network computers, personal digital assistants, set-top devices, PCs, workstations, minicomputers, mainframes and massively parallel computers.
• Oracle, the latest version of Oracle industry’s leading database, is the database for Internet Computing. Oracle’s family of database, networking, and gateway products enable corporations to access any data, on any server, over any network, from any client device.
• Oracle’s Warehouse Technology Initiative (WTI), one of the fastest growing and most comprehensive alliance programs in the data warehousing industry, provides customers with a complete data warehousing solution, based on the industry-leading Oracle database and more than 60 complimentary third-party software products and services. WTI is designed to increase the quantity and quality of Oracle-based data warehousing solutions, provide customers with greater choice, specialised tools, Oracle-optimised products and streamlined support as they build data warehouses.
• Oracle’s integrated Business Intelligence solutions deliver powerful capabilities to users anywhere in the enterprise, at any time. End users benefit from intuitive tools that provide easy access to business data and fast answers to any question.
• Oracle’s Business Intelligence family of products includes integrated releases of Oracle Reports, Oracle’s enterprise reporting tool; Oracle Discoverer, Oracle’s award-winning ad-hoc query and analysis tool; and Oracle Express, Oracle’s industry-leading enterprise online analytical processing (OLAP) engine. Oracle also
offers pre-built OLAP applications - Oracle Financial Analyser and Oracle Sales Analyser— to reduce further implementation time and costs.

• Oracle Applications is a leading provider of packaged and integrated front office and ERP solutions for the enterprise and a division of Oracle Corporation, the world’s second-largest software company and the largest supplier of software for information management.

• Oracle Applications’ strategy is to offer all the enterprise solution components—proven applications, advanced technologies, business expertise, and partnerships required—to enable customers to execute strategies quickly, manage the risk of change and lead their respective industries.

• Oracle Applications is the only suite of enterprise business applications from a major Enterprise Resource Planning (ERP) vendor that follows the Internet Computing model.

• Each of the over 45 modules for financials, human resources, manufacturing, supply chain and front office automation is web enabled, allowing it to be deployed on corporate intranets with no software, other than a browser, required on users’ desktops.

• This architecture allows companies to shift the complexity of application management, maintenance and upgrading from users’ desktops onto centralised, professionally managed servers, thereby dramatically reducing the cost of deploying and administering software.

• By minimising network traffic, this approach also makes it economical to deploy the applications over Wide Area Networks (WANs) to hundreds or thousands of users, making it possible to distribute critical business information much more broadly than is feasible in the client/server model.

• Oracle Applications further exploit the low-cost and universal access inherent in the Internet Computing model, by providing a set of applications specifically designed for secure, self-service business transactions across the Internet and corporate intranets. These applications are integrated with Oracle Workflow to automate completely business processes.

• Oracle Applications comprise of 45-plus software modules, which are divided into the following categories:
  • Oracle Financials
  • Oracle Human Resources
  • Oracle Projects
  • Oracle Manufacturing
  • Oracle Supply Chain
  • Oracle Front Office

• More than 6,000 customers in 76 countries use Oracle Applications.

• Available in 29 languages, Oracle Applications lets companies operate in multiple currencies and languages, support local business practices and legal requirements, and handle business-critical operations across borders.

A brief overview of the Oracle Application categories is given below:

**Financials Oracle**

• Financial Applications can transform a finance organisation into a strategic force. In today’s fast-moving corporate arena, organisations require access to critical financial management functions.

• With Oracle Financial Applications, companies will be able to work globally, lower their administrative costs, close their books faster and improve cash management while providing the strategic information required for making timely and accurate decisions.

**Projects Oracle**

• Projects Applications improve operational efficiency by providing an integrated project management environment that supports the full lifecycle of every project in your enterprise, increasing top-line revenue growth and bottom-line profitability.
As the bridge between operations systems and corporate finance, Oracle Projects Applications provide a central repository of validated cost, revenue, and billing and performance data associated with your business activities or projects.

**Human Resource Oracle**

- Human Resources Well-managed human resources directly improve the bottom-line and contribute to competitive advantage.
- The ability to hire, motivate and retain the most capable workforce; engage employees and line managers directly in managing their skills and careers; and provide comprehensive and up-to-date workforce information for management on a global basis are a few of the characteristics important for success.
- The Oracle Human Resource Management System (HRMS) provides comprehensive facilities for organisations to achieve such goals.

**Manufacturing Oracle**

- Manufacturing Applications are the industry-leading mixed-mode manufacturing solution that enables companies to achieve market leadership by becoming more customer-responsive and efficient.
- This product family supports companies from small, single-facility environments to multi-plant, global manufacturers with complex requirements.
- Oracle Manufacturing Applications help companies increase revenue, profitability and customer loyalty by universally capturing demand, planning the extended enterprise in one rapid step and by ensuring that the most efficient manufacturing process is used to produce each product.

**Supply Chain Oracle**

- Supply Chain Management Applications simplify supply-chain processes by providing a single, integrated environment for managing the extended enterprise.
- From our suppliers’ suppliers to our customers’ customers, Oracle enables effective trading partner collaboration and supply-chain optimisation capabilities that are vital to gaining and sustaining competitive advantage.
- Oracle Supply Chain Management Applications help in increasing market share while improving customer service and minimising costs across the networked supply chain.

**Front Office Oracle**

- Front Office Applications provide a true customer centric approach, allowing us to better understand our customer relationships, their value and profitability.
- Oracle Front Office Applications increase top-line revenues, decrease sales and service costs, and maintain customer retention and satisfaction.
- The sales, marketing and service solutions provide deep integration with the entire enterprise suite of applications, and enable us to attract and retain profitable customers through a unified set of deployment channels, including Web mobile and call centre.

**7.7.2 Vertical Solutions**

Oracle also provides vertical solutions with a full line of modular product components aimed at the unique requirements of many major industries, including automotive, aviation, aerospace and defence, communications, consumer packaged goods, energy downstream, energy upstream, financial services, high-tech, public sector and utilities.
7.8 PeopleSoft Incorporation

7.8.1 Company Profile

- PeopleSoft Inc. was established in 1987 to provide innovative software solutions that meet the changing business demands of enterprises worldwide. It employs more than 7,000 people worldwide.

- The annual revenue for the year 1998 was $1.3 billion. PeopleSoft’s mission is to provide innovative software solutions that meet the changing business demands of organisations worldwide.

- PeopleSoft develops markets and supports enterprise-wide software solutions to handle core business functions including human resources management, accounting and control, project management, treasury management, performance measurement and supply chain management.

- PeopleSoft provides industry-specific enterprise solutions to customers in select markets, including communications, financial services, healthcare, manufacturing, higher education, public sector, services, retail, transportation, US federal government and utilities.

- The company also offers PeopleSoft Select, a complete packaged solution including software, hardware and services to address the needs of medium-sized organisations.

- PeopleSoft’s innovative use of technology empowers individuals to make informed decisions and delivers the flexibility that allows dynamic organisations to manage constant change.

- Based on multi-tier client/server architecture and using advanced workflow technology, PeopleSoft products support clients running Microsoft Windows and popular Web browsers, as well as a range of mainframe, midrange and LAN relational database server platforms.

- PeopleSoft solutions run on a variety of leading hardware and database platforms, including Compaq, Hewlett-Packard, IBM, Sun Microsystems, Informix, Microsoft SQL Server, Sybase, DB2 and others.

- PeopleSoft delivers Web-enabled applications, workflow, online analytical processing (OLAP), etc. PeopleSoft has over 2,900 customers in nearly every industry and geographic region in the world, including a large cross-section of the Fortune 1000.

- The company’s products are sold through direct sales offices and distributors in the United States, Canada, Europe, Asia/Pacific, Latin America and Africa.

- With award-winning customer service, PeopleSoft dedicates approximately 47 per cent of its staff to customer service in the areas of account management, product support, professional services, education services and communication services.

7.8.2 Business Management Solutions

- PeopleSoft solutions extend across the globe. The applications help in managing a broad set of business processes, from human resources and finance to supply chain management.

- One can implement a single application, or a complete enterprise-wide solution. The flexible design lets us tailor the applications to our specific needs.

- The PeopleSoft’s business management solutions are in the areas given below:
  - human resources management
  - accounting and control
  - treasury management
  - performance measurement
  - project management
  - sales and logistics
  - materials management
  - supply chain planning
  - service revenue management
  - procurement
7.8.3 Commercial Solutions

Supply Chain Management

- PeopleSoft has the industry’s only complete enterprise resource planning solution that is built around supply chain optimisation.
- A Demand Planning module enables sophisticated forecasting, using both real-time and historical information. PeopleSoft’s complete suite of Supply Chain Management products provides comprehensive support for any organisation that produces or markets a physical product.

Service Industry Solutions

- PeopleSoft also provides a complete commercial support solution for service industries. The Service Revenue Management suite features modules supporting the tracking of time and labour, payroll processing, project management and billing, as well as expense and receivables processing.
- A suite of Procurement modules is also available supporting purchasing, inventory management, payables and expense processing, and asset management.

7.8.4 Industry Solutions

- PeopleSoft supports industry-specific market initiatives in many business sectors. The initiatives include industry-specific products, customisation of existing applications, and sales and marketing support through direct channels and business alliances.
- PeopleSoft has 11 distinct business units, which provide software solutions specific to a broad range of public and private sector industries.
- Industry-partners help make the solutions comprehensive, spanning the enterprise from the back office to the front lines.
- From service and manufacturing to education and government, PeopleSoft solutions are global, enterprise-wide, and tailored to unique industry requirements.

The different business units are:

- communications
- federal government
- financial services
- healthcare
- higher education
- manufacturing
- public sector
- retail
- service industries
- transportation
- utilities
7.8.5 People Tools

- People Tools is an integrated set of client/server business application development and customisation tools from PeopleSoft.
- These tools enable customers to implement, tailor and maintain PeopleSoft applications as well as to extract, analyse and manipulate data. People Tools includes several tools for reporting, customisation, and workflow.

7.8.6 Technology

- PeopleSoft continually adds and refines technology to optimise their customers’ information systems. They help customers take advantage of new and emerging technologies, giving them more choices and freedom to develop their own innovative business processes.

Some of them are given below:

- Self-Service Applications to improve productivity throughout the organisation, PeopleSoft focuses on providing the occasional user with easy access to information and functionality specific to their role.
- They have developed a set of self-service applications to help companies quickly and cost-effectively distribute functionality throughout the enterprise over the Internet, intranets and extranets.
- Built with an intuitive interface based on a standard Web browser such as Netscape Navigator or Microsoft Explorer these Java-based, cross-platform applications enable employees, customers, suppliers and other occasional users to perform self-service administrative tasks easily.
- Self-service applications are linked to PeopleSoft core product lines, including PeopleSoft Accounting and Control, Human Resources Management and Materials Management.
- Web Client Self-service applications use the PeopleSoft Web Client. The Web Client is downloadable on demand and runs on a Web browser across multiple platforms. Its affordability, open architecture, and simplicity provide an ideal framework for delivering enterprise solutions to a large number of people.
- Applications do not need to be installed at every desktop; they are accessed easily through a browser. In addition to supporting self-service applications, the PeopleSoft Web Client has a Work list and Query interface to help incorporate occasional users in the flow of a company’s business processes and improve access to information. Furthermore, all data transmitted between the Web Client and the application server is encrypted for added security. Because the Web Client takes advantage of People Tools, self-service applications can be deployed across the Internet or existing corporate intranets with common business rules workflow logic and security features.
- Multi-tier Transaction Processing the ability to support large numbers of concurrent users, while maintaining reliable and superior performance, is critical to enterprise-wide data processing.
- Recognising that PeopleSoft works in a variety of settings over local area networks (LANs) and wide area networks (WANs), throughout organisations of varying sizes there is an option of two-tier or three-tier processing.
- In the latter, the application logic runs on an application server instead of the client. The application server is designed to relieve the client from processing intense SQL transactions, thereby reducing LAN traffic and improving performance across WANs.
- Three-tier architecture also provides increased scalability to accommodate high volumes of concurrent users while maintaining a consistent and reliable performance level. PeopleSoft continues to support its traditional two-tier architecture as well.
- Online Analytical Processing companies must be able to quickly extract and analyse the information they require for effective decision-making. OLAP or online analytical processing is a powerful method for interactively analysing data online.
- PeopleSoft integrates popular OLAP tools - including Cognos Power Play and Arbor Essbase that enable users to easily ‘slice and dice’ multidimensional data stored in various locations.
- With the Cube Manager, users can define the data they want to extract into an OLAP cube, enabling them to view quickly information from all different angles to test conclusions, conduct what-if scenarios and compare alternative strategies.
With multidimensional information presented in quick-read formats, managers can make better decisions, react faster to competitive threats and identify inefficiencies.

Workflow, an essential part of our solution, PeopleSoft workflow capabilities help communications companies achieve enterprise-wide integration of information, applications and people.

Workflow enables a company to automate many time-consuming clerical tasks, while putting useful data into the hands of users. With workflow, the company’s PeopleSoft applications do more of the work.

For example, if managerial approval is needed for a work order, the system automatically forwards the request. Workflow can also help the company track projects, by initiating a workflow message to the appropriate person when a project exceeds a predetermined cost.

The company can even bring non-PeopleSoft users into the workflow process, using e-mail systems and the Internet for collecting and distributing data.

7.8.7 Partnerships

PeopleSoft has established global consulting agreements with Andersen Consulting, Deloitte and Touché Consulting Group, KPMG Consulting (a part of KPMG Peat Marwick LLP) and Price Waterhouse LLP, four of the world’s leading consulting and systems integration firms.

PeopleSoft also maintains relationships with more than 150 industry-leading third-party vendors through its six Partnership Programs Application, Database, Hardware, Implementation, System Integration and Workflow.

7.8.8 PeopleSoft Implementation Toolkit

PeopleSoft has a modular application structure, which lends itself to the use of phasing an incremental process by which we ‘bite off only what we can chew’ during implementation.

Yet it allows the riskier ‘big bang’ approach when time-critical business needs must be addressed quickly. A phased implementation helps to minimise risk and allows better resource and overall project cost management.

The PeopleSoft Implementation tool kit incorporates four phasing strategies:

- **Geographical** - applicable when business practices and processes in various locations are independent enough from one another to justify separate implementations.
- **Departmental** - our initial phase is focused on full implementation for a given department; additional departments are made operational during subsequent phases.
- **Core and support processes** - our first phase encompasses critical, core business processes; subsequent phases focus on support processes.
- **No phasing** - some situations do not lend themselves to phasing. Examples include date driven implementations (regulation effective dates drive action) and formation of new business enterprises.

We can combine our phasing choice with one of these implementation approaches:

- **As delivered** - this is the simplest approach, because we implement the applications as delivered and adjust our business processes to match the system.
- **By using this approach, we are in essence reengineering our business operations, with PeopleSoft functionality driving our requirements.
- **Data modification** - used when data analysis, modification and clean-up are a primary focus of the implementation. For example, if implementation is driven by legacy data held in date storage formats that do not support the Year 2000.
- **Legacy integration** - useful when interfaces between legacy systems and PeopleSoft applications are a significant factor in the implementation. This approach includes business event analysis and early resolution of interface issues.
- **Application sequencing** - applicable when our implementation involves multiple PeopleSoft applications. Using this approach, we will focus initially on business processes supported by the first application we implement. Then, as we implement other applications, we will concentrate on additional business processes.
Business Objectives and Events Pertinent: When in order to meet a set of business objectives and their respective business events, our implementation also involves non-PeopleSoft applications. For example, to broadcast timely sales and collections information to the field, we would use this approach to implement a sales-force automation application along with PeopleSoft Financials.

The PeopleSoft Implementation Toolkit is engineered to support various combinations of phasing strategies and implementation approaches, which we call routes.

The PeopleSoft Implementation Toolkit helps in identifying the route that best suits our implementation. Once a route is determined, it is then used to present guidance specific to our type of implementation project.

By providing route-specific project plans and guidance, the Implementation Toolkit gives us the focus necessary to achieve a more rapid implementation.

7.9 System Software Associates, Inc. (SSA)

7.9.1 Company Profile

SSA was founded in December 1981 and has its headquarters in Chicago, USA. SSA has its presence in 91 countries and employees more than 2000 employees.

The 1998 revenues of the company was $ 420.8 Million. The Company’s product line, BPCS Client/Server V6, is currently live or being implemented in more than 1,000 major industrial sector firms in over 4,000 sites worldwide.

SSA's vision is to be the best global partner to the world’s industrial sector companies.

SSA’s mission statement, which has been the same since SSA was founded in December 1981, is to provide competitive advantage for Clients through the implementation of their business enterprise information system.

This mission statement is underwritten by six key goals:

1. **Best client satisfaction** - This means that the company wants their clients to achieve the greatest possible business benefit from their relationship with SSA.

2. **Single image worldwide** - Means that the clients get the same high level of support and expertise all around the world.

3. **Enterprise solutions leadership** - It means that the company is focused on building and delivering solutions, which bring together the entire enterprise.

4. **Proven leading technology** - This means that every piece of technology applied by SSA will already be proven for high transaction volume enterprise-wide applications.

5. **Highly skilled and motivated professionals** - It means that SSA is committed to having the best professionals and resources in the application software business.

6. **Strong financial results** - This means that SSA can continue to invest in the improvement of its software and professionals, and will be a stable partner in the long run.

7.9.2 BPCS Client/Server

BPCS Client/Server is a comprehensive set of integrated client/server applications that addresses the core system needs of industrial sector enterprises on a global scale.

BPCS Client/Server covers Configurable Enterprise Financials applications, Supply Chain Management applications, Multi-Mode Manufacturing and CIM applications, as well as Electronic Commerce applications such as EDI.

BPCS Client/Server is based on SSA’s proven object technology foundation that ensures that it operates identically from an end-user’s perspective across any supported server, be it HP 9000, AS/400, or Windows NT.

BPCS Client/Server products offer numerous full function applications with capabilities to support solutions needed by the industrial sector.

Major objectives of industrial managers have been to improve customer satisfaction, improve product quality, remain cost competitive, and reduce the time in launching a product in the market.
SSA’s BPCS Client/Server products provide a wealth of features and functions enabling industrial managers to achieve these objectives.

- The Microsoft Desktop is the BPCS Client/Server Desktop: The BPCS Client/Server user interface is graphically and fully compliant with Microsoft Windows 95.
- The look and feel is the same as other Microsoft desktop applications, resulting in a system that is easy to learn and use.
- Examples of Microsoft desktop functions include full use of hypertext and other point of demand education, such as field sensitive help text, bookmarks, annotations and other Windows help text functions. BPCS Client/Server also includes hypertext linking related topics.
- The BPCS Client/Server graphical user interface includes icons, messages, scroll bars, tool bars, pull-down menus, radio buttons, check boxes and other Microsoft desktop features.
- In addition, the BPCS Client/Server applications are interoperable with other Windows compliant applications through the Windows cut-and-paste feature.
- BPCS Client/Server is used worldwide by more than 8500 companies, at 25,000 sites, and by 3,000,000 end users, representing various vertical markets automotive, chemical, consumer goods, electronics, fabrication and assembly, food and beverage, forest products and pharmaceuticals.
- SSA and its strategic partners provide full implementation support for BPCS Client/Server in over 90 countries worldwide.
- The BPCS Client/Server solution delivers unparalleled agility and reconfigurability to meet changing market demands, through a quantum leap forward in ERP technology that delivers significant business benefits, including century dating.
- With BPCS Client/Server version 6.0, SSA has successfully addressed the most crucial issues facing the ERP marketplace, the implementation and integration of package applications.
- SSA has reduced time-to-benefit implementation cycles to 6-12 months, down from an industry average of 1224 months.
- At the core of BPCS Client/Server is its object-based architecture, called DOCA (Distributed Object Computing Architecture), which is specifically designed for enterprise-wide application in industrial sector companies.
- DOCA is optimised to support high transaction volumes in a functionally rich, distributed data processing, client/server environment.
- DOCA’s object-based architecture provides inherent flexibility, enabling the rapid reconfiguration of BPCS Client/Server applications. This allows organisations to alter the solutions quickly and easily in response to new business and market challenges.

7.10 QAD

7.10.1 Company Profile

- QAD was founded in 1979, and now has a presence in 21 countries and employs more than 1100 people. The company’s products include MFG/PRO, on/Q, Service/Support Management, Decision Support, and Qwizard.
- The company’s flagship product is its ERP solution MFG/PRO. It is available in 26 languages and has more than 4,000 installed sites in over 80 countries. The company got the ISO certification in 1995.

7.10.2 Products

- QAD offers a variety of supply chain and Enterprise Resource Planning (ERP) software products to manufacturing industries within the automotive, consumer products, electronics, food and beverage, industrial products and medical sectors.
- QAD software optimises our enterprise by increasing the speed of internal processes and by synchronising distributed operations.
- QAD’s flagship product, MFG/PRO software, provides multinational organisations with an integrated Global Supply Chain Management solution
Summary

- This chapter discussed about various ERP vendors and their existing products.
- AMR Research estimates that, ERP market will continue to be one of the largest, fastest growing and most influential in the applications industry and is poised for steady growth into the new millennium.
- According to the survey, ERP does not appear to be new to the Indian market. This is indicated by the proliferation of solutions, which have been implemented.
- In this chapter, we discussed about the profile of some of the top vendors of the ERP their profile, their product offerings, and product features.
- The companies featured in this chapter are SAP AG, Baan Company, Oracle Corporation, People soft and SSA.
- The information provided here has been collected from the Internet and printed media. For further details, you are directed the companies directly.

R/3 system

- SAP R/3 is SAP’s integrated software solution for client/server and distributed open systems. SAP’s R/3 is the world’s most-used standard business software for client/server computing.
- R/3 meets the needs of a customer from the small grocer with 3 users to the multi-billion dollar companies. The software is highly customisable using SAP’s proprietary programming language, ABAP/4. R/3 is scalable and highly suited for many types and sizes of organisations.
- The R/3 architecture is comprised of application and database servers. The application servers house the software and the data-base servers handle document updates and master file databases.
- The system can support an unlimited number of servers and a variety of hardware configurations.

References


Recommended Reading

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<td>1. 4GL</td>
<td>a. Provides complete package for ERP like software, hardware and service</td>
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<td>3. Oracle's WTI</td>
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<td>3. Baan ERP</td>
<td>c. Database System</td>
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<td>4. Open architecture of Baan ERP</td>
<td>d. Graphical process/model based view</td>
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5. Mainframe version of SAP AG is also called as ____________.
   a. SAP R/3
   b. SAP R/2
   c. SAP R/4
   d. ABAP/4

6. In R/3 system, the _________ resides on central servers or mainframe host computers.
   a. upper layer
   b. database layer
   c. presentation layer
   d. application layer

7. ____________ layer undergoes preparing and formatting data for individual offices or departments.
   a. Database
   b. Presentation
   c. Application
   d. Console

8. Which of the following is the strategic tool for achieving aims of company in R/3 systems?
   a. Processing management
   b. Quality management
   c. Dynamic information management
   d. Workflow management

9. What is a complete solution for efficient financial management that ensures the liquidity of our company worldwide, structures financial assets profitably and minimises risks?
   a. Financial accounting
   b. Treasury
   c. Investment management
   d. Controlling

10. Which of the following optimises all purchasing processes with workflow-driven processing functions, enables automated supplier evaluation, lowers procurement and warehousing costs with accurate inventory and warehouse management and integrates invoice verification?
    a. Plant maintenance
    b. Project System
    c. Materials Management
    d. Production Planning
Chapter VIII
ERP Implementation Cycle

Aim

The aim of this chapter is to:

- introduce the ERP implementation process
- bring an idea about ERP implementation requirements
- elucidate various phases of ERP implementation

Objectives

The objectives of this chapter are to:

- understand various phases in ERP implementation
- explain the necessary phases of ERP implementation according to essentialities of the system
- describe the typical requirements of ERP in an organisation

Learning outcome

At the end of this chapter, students will be able to:

- understand the importance of each and every phase of ERP implementation
- recognise the requirements of business according to various processes of departments in company
- specify the planning procedures to design ERP package for a particular business
**8.1 Introduction**

Like any other project, the ERP implementation project also has to go through different phases. There are no clear separating lines between these phases and in many cases, one phase will start before the previous one is completed, but the logical order is followed; and all the phases, which we are discussing in this session, may not be applicable in all cases.

For example, in some cases, the organisation might have already identified a particular package; then the pre-selection screening and package evaluation phases are not done.

The different phases of the ERP implementation are given below:

- pre-evaluation screening
- package evaluation
- project planning phase
- gap analysis
- reengineering
- configuration
- implementation team training
- testing
- going live
- end-user training
- post-implementation

Fig. 8.1 ERP implementation process
Although these phases, as shown in figure, may seem linear and distinct from each other, in reality, throughout an actual implementation, the phases are in fact quite fluid. In many cases, companies go through many implementations - in different business units, different modules, or ERP Implementation Lifecycle manufacturing locations. Therefore, at any given time, more than one of the phases may be operational.

Some companies opt for the one and only ‘Big Bang’, while other companies favour sequential rollouts- each company has different needs. However, whether it is the ‘Big Bang’ method or sequential rollout, the lifecycle phases are the same.

### 8.2 Pre-evaluation Screening

- Once the company decides to go in for the ERP system— the search for the perfect package starts. However, there are hundreds of ERP vendors of all sizes and shapes, all claiming to have the solution that is ideal for us. Analysing all the packages before reaching a decision is not a viable solution. It is also a very time consuming process. Therefore, it is better to limit the number of packages that are evaluated to less than five.
- It is always better to do a thorough and detailed evaluation of a small number of packages, than doing a superficial analysis of dozens of packages. Hence, the company should do a pre-evaluation screening to limit the number of packages that are to be evaluated by the committee.
- Not all packages are equal-each has its own strengths and weakness. The pre-evaluation process should eliminate those packages that are not at all suitable for the company’s business processes. One can zero in on the few best packages by looking at the product literature of the vendors, getting help from external consultants; and most importantly, by finding out what package is used by companies, which are similar.
- It is always better to find out how the different packages are performing in environments similar to ours. If one studies the history of the ERP packages and finds out how each package evolved, it soon becomes evident that every ERP package grew out of the experience or opportunity of a group of people, working in a specific business, who created systems that could deal with certain business segments.
- It is generally accepted that most ERP packages are stronger in certain areas than in others, and each one is madly trying to add functionality in areas where they have been lacking.
- For example, PeopleSoft is strong in HR and less so, in manufacturing, Baan, on the other hand, is historically stronger in manufacturing than in finance and so on. As the companies grew overtime, the ERP packages evolved.
- The experience gained from implementation, the feedback by the users, the need to enter into new markets and the pressure from competitors forced most ERP vendors to redefine and expand the scope of the activities and functionality of their products.
- The concepts were expanded upon, new functions were introduced, and good ideas were copied from others, and so on. But, each package has a history (or origin) that determines in which type of business it is best suited for.
- While making the analysis it would be a good idea to investigate the origins of the different packages. Now, most packages cater to almost all business and service sectors. It would be wrong to say that a system that was developed initially for manufacturing, is now not capable of catering to the needs of another business sector, say, software development. The system would have been thoroughly revamped and re-designed to cater to the needs of the diverse business sectors that it is catering.
- However, it should be remembered that many ERP packages are still very good in some areas, even though they are capable of catering to the needs of other sectors. Once we select a few packages after the screening, we can start the detailed evaluation process.

### 8.3 Package Evaluation

- The evaluation/selection process is one of the most important phases of the ERP implementation, because the package that we select will decide the success or failure of the project.
- Since ERP systems involve huge investments, once a package is purchased, it is not an easy task to switch to another one. Therefore, it is a ‘do it right the first time’ proposition. There is little room for error.
The most important factor that should be kept in mind when analysing the different packages is that none of them are perfect.

The idea that there is no perfect package needs to be understood by everyone in the decision-making team. The objective of the selection process is not to identify a package that covers each requirement (a perfect fit).

The objective is to find a package that is flexible enough to meet the company’s needs, or in other words - software, which could be customised 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 company should identify the system that meets the business needs, that matches the business profile and that which identifies with the business practices of the company.

It is impossible to get a system that will perform, exactly as the company does business, but the aim should be to get the system that has the least number of differences.

According to S. Shankar Narayanan, Senior Consultant with Baan Info Systems India Pvt Ltd. (ERP Systems-Using IT to gain a competitive advantage), some important points to be kept in mind while evaluating ERP software include:

- functional fit with the company’s business processes
- degree of integration between the various components of the ERP system
- flexibility and scalability
- complexity
- user friendliness
- quick implementation
- ability to support multi-site planning and control
- technology-client/server capabilities, database independence, security
- availability of regular upgrades
- amount of customisation required
- local support infrastructure
- availability of reference sites
- total costs, including cost of license, training, implementation, maintenance, customisation and hardware requirements

It is always better to form a selection or evaluation committee, which will do the evaluation process.

This committee should comprise of people from the various departments (the functional experts), the top management (preferably the CIO or COO) and consultants (package experts).

The selection committee should be entrusted with the task of choosing a package for the company. Since all business functions are represented and the management is involved, the package that is selected will have company-wide acceptance.

The package experts or the consultants can act as mediators, or play the role of explaining the pros and cons of each package.

8.4 Project Planning Phase

This is the phase, which designs the implementation process. It is in this phase that the details of how to go about the implementation are decided.

Time schedules, deadlines, etc. for the project are arrived at. The project plan is developed. Roles are identified and responsibilities are assigned.

The organisational resources, which will be used for the implementation effort, are decided and the people who are supposed to head the implementation are identified.

The implementation team members are selected and task allocation is done. This phase will decide when to begin the project, how to do it and when the project is supposed to be completed.
This is the phase which will plan the ‘what to do’ in case of contingencies; how to monitor the progress of the implementation; what control measures should be installed and what corrective actions should be taken when things get out of control.

The project planning is usually done by a committee constituted by the team leaders of each implementation group. The committee will be headed by the ERP in-charge (usually the CIO or COO).

The committee will meet periodically (during the entire implementation lifecycle) to review the progress and chart the future course of actions.

8.5 Gap Analysis

This is the most crucial phase for the success of the ERP implementation. Put very simply, this 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. It has been estimated that even the best ERP package, custom tailored to a company’s needs, meets only 80% of the company’s functional requirements.

The remaining 20% of these requirements present a problematic issue for the company’s BPR (business process re-engineering).

One of the most affordable, albeit painful, solutions entails altering the business to ‘fit’ the ERP package. Of course, a company can simply agree to live without a particular function (the cheap but annoying solution).

Other solutions include:

- pinning our hopes on an upgrade (low cost but risky)
- identifying a third-party product that might fill the gap (hopefully it also partners with the ERP packages, keeping interfacing to a minimum)
- designing a custom program
- altering the ERP source code, (the most expensive alternative; usually reserved for mission-critical installations)

8.6 Re-engineering

It is in this phase that the human factors are taken into account. In ERP implementation settings, re-engineering has two different connotations.

The first connotation is the controversial one, involving the use of ERP to aid in downsizing efforts and there have been occasions where high-level executives have invoked the re-engineering slogan, and purchased an ERP package with the aim of reducing significant numbers of employees.

While every implementation is going to involve some change in job responsibilities, as processes become more automated and efficient, it is best to treat ERP as an investment as well as a cost-cutting measure, rather than as a downsizing tool.

‘Downsizing’ is a business practice that may have its place, but it should not be cloaked within the glossier slogan of ‘reengineering’, or justified by the purchase of an ERP package.

ERP should engender business change, but should not endanger the jobs of thousands of employees.

The second use of the word re-engineering in the ERP field (or business process reengineering (BPR) as it is usually called), refers to an ERP implementation model initially designed and used with much success by the ‘Big Six’ consulting firms.

The BPR approach to an ERP implementation implies that there are really two separate, but closely linked implementations involved on an ERP site: a technical implementation and a business process implementation.

The BPR approach emphasises the human element of necessary change within organisations. This approach is generally more time consuming, and has received its share of criticism for creating bloated budgets and extended projects.
However, adherents of the BPR approach to ERP would argue that there is no way that we can ignore the human element in an implementation that involves significant changes in responsibilities.

As the ERP market shifts to a mid-market focus, and as all implementations are becoming more cost-sensitive, the BPR approach has come under some real scrutiny.

8.7 Configuration

This is the main functional area of the ERP implementation. There is a bit of mystique around the configuration process and for good reason: the Holy Grail or unwritten rule of ERP implementation is, synchronising existing company practices with the ERP package rather than changing the source code and customising it to suit the company.

In order to do so, business processes have to be understood and mapped in such a way that the arrived at solutions match up with the overall goals of the company.

However, companies cannot just shut down their operations while the mapping processes take place.

Hence the prototype a simulation of the actual ‘business processes of the company will be used. The prototype allows for thorough testing of the “to be” model in a controlled environment.

As the ERP consultants configure and test the prototype, they attempt to solve any logistical problems inherent in the BPR before the actual go-live implementation.

Configuring a company’s system reveals not only the strengths of a company’s business process but also and perhaps more importantly its weaknesses.

It is vital to the health of the company and to the success of the ERP implementation that those configuring the system are able to explain what will not fit into the package, and where the gaps in functionality occur. For example, a company might have an accounting practice that cannot be configured into the system or some shipping process that will not conform to the package.

The company obviously needs to know which processes have to change in the process of implementation. Finding out what will work and what will not requires knowledge of the business process itself, and an ability to work with people throughout the company. So, people with such skills should be assigned to these tasks.

As a rule, in most large implementations, the functional configurations are split between the different areas within the company, so some will attend to HR; some will be involved in financials and so forth.

ERP vendors are constantly striving to lower configuration costs. Strategies currently being pursued include automation and pre-configuration.

Baan for instance, has developed Orgware, an automated configuration tool, while SAP has pre-configured industry-specific templates that can be tweaked for each individual company (Accelerated SAP Solutions).

The current ERP industry push towards developing the mid-range market in turn creates an added incentive to reduce costs, encouraging the sought-after mid-range companies to feel they can afford to implement a top-of-the-line ERP package.

By creating a custom pre-configured ERP module for a particular industry-say a shoe software manufacturing prototype created for a shoe manufacturer, the need for hands-on custom configuration is reduced, thereby keeping the costs down.

It is hoped that a kind of “question and answer” format can be used to find out the kinds of business process information hitherto addressed through the hands on configuration process.

In theory, these pre-configured tools should save time and money, but every business is unique and at least some configuration is unique to each project.

8.8 Implementation Team Training

Around the same time that the configuration is taking place, the implementation team is being trained, not so much how to use the system, but how to implement it.

This is the phase where the company trains its employees to implement and later, run the system. The ERP vendors and the hired consultants will leave after the implementation is over.
• However, 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 situations.
• Thus, it is very vital that the company recognises the importance of this phase and selects those employees who have the right attitude—people who are willing to change, learn new things and are not afraid of technology—and good functional knowledge.

8.9 Testing
• This is the phase where we try to break the system.
• We have reached a point where we are testing real case scenarios. The system is configured and now we must come up with extreme-case scenarios system overloads, multiple users logging on at the same time with the same query, users entering invalid data, hackers trying to access restricted areas and so on.
• The test cases must be designed specifically to find the weak links in the system and these bugs should be fixed before going live.

8.10 Going Live
• From technical point of view, the work is almost complete data conversion is done, databases are up and running; and on the functional side, the prototype is fully configured and tested, and ready to go operational.
• The system is officially proclaimed operational, even though the implementation team must have been testing it and running it successfully for some time, but once the system is ‘live’, the old system is removed, and the new system is used for the business.

8.11 End-user Training
• This is the phase where the actual users of the system will be given training on how to use the system. This phase starts much before the system goes live.
• The employees who are going to use the new system are identified. Their current skills are noted and based on the current skill levels; they are divided into groups.
• Then each group is given training on the new system. This training is very important as the success of the ERP system is in the hands of the end-users.
• Therefore, these training sessions should give the participants an overall view of the system and how individual actions would affect the entire system.
• In addition to these general topics, each employee is trained on the job or task that he/she is supposed to perform once the system goes live.
• It is human nature to resist change and also many people are afraid of computers and other new technologies. So there will be resistance to change. Another factor is that not all people will be successful in making the changeover.
• The company management should address these concerns and take necessary actions to avoid failure. The end-user training is much more important and much more difficult (since most end-users are not thrilled at having to change) than the implementation team training.
• Companies are beginning to take this phase seriously, as there is statistical evidence now, which shows that most implementations fail because of a lack of end-user training.

8.12 Post-implementation (Maintenance Mode)
• One important factor that should be kept in mind is that the post-implementation phase is very critical. Once the implementation is over, the vendors and the hired consultants will go.
• To reap the full benefits of the ERP system, it is very important that the system should get enterprise-wide acceptance.
• There should be good strength of employees who should be trained to handle the problems, which might crop-up. There should be people, within the company, who have the technical prowess to make the necessary enhancements to the system as and when required.

• The system must be upgraded as and when new versions or new technologies are introduced. Here the organisation should think in terms of the incremental benefits of the new enhancements. Because with any up-gradation or enhancements, there will be many other aspects like user training that have to be considered. Therefore, instead of going in for up-gradation as and when a new version is announced by the vendor, the organisation should first analyse the costs and benefits.

• The post-ERP organisation will need a different set of roles and skills than those with less integrated kinds of systems.

• At a minimum, everyone who uses these systems needs to be trained on how they work, how they relate to the business process and how a transaction ripples through the entire company whenever they press a key.

• The training will never end; it is an ongoing process; new people will always be coming in, and new functionality will always be entering the organisation. Just as courtships and honeymoons are different from marriages, 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.
Summary

• In this chapter, the various phases are discussed about how the ERP system will be installed; there are various phases which design implementation platform for the ERP system.

• According to business requirement of the company, it desires of well built and efficient system under ERP, so there are phases which describe typical implementation process of ERP. The implementation process include following phases as follows;

• Pre-evaluation screening phase includes, analysing all packages that are to be evaluated by the committee. Not all packages are equal-each has its own strengths and weakness. The pre-evaluation process should eliminate those packages that are not at all suitable for the company’s business processes. The system would have been thoroughly revamped and re-designed to cater to the needs of the diverse business sectors that it is catering

• The evaluation/selection process is one of the most important phases of the ERP implementation, because the package that we select will decide the success or failure of the project.

• The objective is to find a package that is flexible enough to meet the company’s needs, or in other words - software, which could be customised 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.

• Project planning phase designs the implementation process. It is in this phase that the details of how to go about the implementation are decided. Time schedules, deadlines, etc. for the project are arrived at. The project plan is developed. Roles are identified and responsibilities are assigned.

• This is the phase which will plan the ‘what to do’ in case of contingencies; how to monitor the progress of the implementation; what control measures should be installed and what corrective actions should be taken when things get out of control.

• Gap analysis is the most crucial phase for the success of the ERP implementation. This 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.

• Reengineering phase the human factors are taken into account. In ERP implementation settings, reengineering has two different connotations.

• Those are use of ERP to aid in downsizing efforts purchased an ERP package with the aim of reducing significant numbers of employees.

• Configuration is the main functional area of the ERP implementation. There is a bit of mystique around the configuration process and for good reason: the Holy Grail or unwritten rule of ERP implementation is, synchronising existing company practices with the ERP package rather than changing the source code and customising it to suit the company.

• Implementation team training is the phase where the company trains its employees to implement and later, run the system. The ERP vendors and the hired consultants will leave after the implementation is over.

• In testing phase, the system is configured and come up with extreme-case scenarios system overloads, multiple users logging on at the same time with the same query, users entering invalid data, hackers trying to access restricted areas and so on. After testing, the prototype is fully configured and tested, and ready to go operational.

• In end-user training phase where the actual users of the system will be given training on how to use the system. This phase starts much before the system goes live.

• The employees who are going to use the new system are identified. Their current skills are noted and based on the current skill levels; they are divided into groups, which are already explained in the chapter.

• Post-implementation is the last phase of ERP implementation where final system is established, on this system the various parameters are checked for each and every operation of an organisation.

• 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.
References


Recommended Reading


### Self Assessment

1. **Match the following:**

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<td>Pre-evaluation</td>
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<td>2</td>
<td>Package Evaluation</td>
<td>b. Designs implementation process</td>
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<td>3</td>
<td>Project Planning</td>
<td>c. Decides success/failure of the project</td>
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<td>4</td>
<td>Reengineering</td>
<td>d. Elimination of unsuited package</td>
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2. **Match the following:**

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<td>1</td>
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<td>a. Makes system operational</td>
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<td>2</td>
<td>System breaking</td>
<td>b. Configuration</td>
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<td>3</td>
<td>Process mapping</td>
<td>c. Testing phase</td>
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<td>4</td>
<td>Going Live</td>
<td>d. Gap analysis</td>
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<td>d</td>
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3. The _______ process should eliminate those packages that are not at all suitable for the company’s business processes.
   - a. post implementation
   - b. evaluation
   - c. pre-evaluation
   - d. gap analysis

4. Flexibility and scalability are the part of _____________.
   - a. evaluation phase
   - b. pre-evaluation
   - c. testing
   - d. gap analysis

5. ___________ phase designs the implementation process.
   - a. Testing
   - b. Gap analysis
   - c. Project planning
   - d. Configuration
6. ________ system reveals not only the strengths of a company’s business process but also and perhaps more importantly its weaknesses.
   a. Information
   b. Configuration
   c. ERP
   d. Management information

7. Which of the following is TRUE?
   a. Project planning is the phase where company tries to break the system
   b. Evaluation is the phase where company tries to break the system
   c. Testing is the phase where company tries to break the system
   d. Post implementation is the phase where company tries to break the system

8. After this phase system is become operational is known as _____________.
   a. configuration
   b. evaluation
   c. testing
   d. going live

9. ________ is very important as the success of the ERP system is in the hands of the end-users.
   a. Testing
   b. Evaluation
   c. Training
   d. Maintenance

10. Which of these following phase after which the vendors and consultants are go to next level?
    a. Pre-evaluation
    b. Testing
    c. Configuration
    d. Post Implementation
Chapter IX
Vendors, Consultants and Users

Aim
The aim of this chapter is to:

• introduce the ERP vendors, consultants and users

• explain the basic standpoint of ERP vendors, consultants and users

• describe the importance of vendors in marketing channel

Objectives
The objectives of this chapter are to:

• explain the role of ERP vendors, consultants and users

• elucidate the pros and cons of in-house implementation

• understand the importance of need of vendors and consultants in ERP implementation

Learning outcome
At the end of this chapter, students will be able to:

• understand the responsibilities of vendors and consultants

• analyse the importance of vendors in marketing channel

• understand the methodologies of consultants in dealing with various problems occurred in ERP implementation
9.1 Introduction

Developing an ERP package is a very complex and time-consuming process, which needs a lot of skilled manpower and other resources. Many companies have personnel in their IT departments who can absorb the necessary knowledge and who have experience in developing sophisticated systems. The problem is that such specialised computer work is not the main business of these companies. They should be directing all their available resources into improving their own products or services so that they can remain competitive, serve their customers better and continue to grow. Since designing and implementing integrated software packages is not the business of most companies, or a focus of their executives, the systems that their in-house team come up with will never equal in quality, scope, functionality or technology those systems created by software firms whose business this is. These software firms (ERP vendors) can produce sophisticated packages and provide their clients with products that allow them to maintain a focus on their own chief activities, thus improving revenues, profits and shareholder returns.

9.2 In-house Implementation – Pros and Cons

- The probable question that many people ask is: why cannot the company carry out the ERP implementation by itself?
- To successfully set up and implement as ERP package, which functions perfectly, is not an easy task.
- One cannot go in for a trial-and-error method of implementation strategy due to the huge amount of investments involved. The consequences of a failed ERP implementation can be quite catastrophic. It might put the organisation out of business.
- The ERP implementation process cannot go on for a long time. It has to be completed within a reasonable time.
- To carry out the implementation within a reasonable timeframe successfully, the in-house people who are designated to do the job should possess a certain amount of knowledge and skill.
- To start with, the company should have people who are familiar with the ERP package and with the technical issues.
- Implementing the ERP software means, assigning the optimum values to the various parameters and the variable elements of the system. Experience has proven that a good professional needs at least one year to become reasonably good in an ERP system and that this one year should be hands-on practical experience.
- It is not possible to become an expert by reading product brochures and on-line help files.
- We have to have practical implementation experience. Many software vendors have their own team of consultants, whose responsibility is to ensure that their software package, follow a standard approach or methodology.
- Definitely, these people know the product and can be of great value during implementation. However, developing a good software package and successfully implementing it are two entirely different propositions.
- A good package vendor need not be good at implementing its own product. Also each group of people in an implementation project (vendors, consultants, in-house team, users and so on) have definite roles to play in the implementation. If the same party is performing multiple roles, it can create problems when a conflict arises.
- For example, if the vendor is doing the implementation, the vendor’s consultants may not be as open to the ideas of the in-house team as third-party consultants, because the vendor’s consultants will have a mindset, which will prevent them from seeing the other side’s perspective.
- Besides having a very good knowledge of the product, the people who are to implement the ERP system should possess the following skills:
- Knowledge of how to organise and run a project of this magnitude.
- This calls for good organisational skills, project management skills, team management skills and knowledge of scientific methods of software project management.
Experience: Enough experience in handling problems and issues that arise during the implementation. No implementation will be a smooth process; there will be problems, cost overruns, time overruns and so on. Knowing what to do in these situations is vital for the success of the project.

Diplomacy skills: Any ERP implementation will face resistance from the employees. The resistance could be due to ignorance about the product, fear of unemployment, fear of training, fear of technology and so on. So it is very important that the people in the implementation team are very good diplomats, adept at diffusing crisis situations.

Good leadership skills: ERP implementation will involve dealing with a lot of people and good leadership and communication skills are very effective.

Excellent training skills: Every ERP project involves considerable amount of training at various levels and in various details. There will be familiarisation programs for all the employees, be executive programs for the top management, functional training for the implementation team members and end-user training.

- In today’s business environment, where the trend is to reduce manpower and focus more on the company’s core competencies, it becomes ever more difficult to take the total responsibility of the ERP implementation and get it done using in-house resources.
- If the company is planning to do the ERP implementation in-house, it might have to hire experts and have them on the company’s rolls.
- This is an expensive proposition because once the implementation is over, we will not need that many experts to keep the system running the post-implementation phase.
- We will need only a handful of people may be a few of them in each functional area, to handle the post-implementation scenario effectively.
- If the company is planning to do the ERP implementation, all by itself, then it will be wasting many of its resources and spending a lot of money on training most of which are not needed after the package implementation.
- Hence, it is always a better idea to leave the implementation most part of it to the people who are specialising it and focus the company’s efforts on preparing its personnel to administer the package after it is implemented.
- Once these employees have been trained during the course of the implementation they can help the company in its implementation efforts in other units of the company, or provide training to the employees in using the system and so on.
- The company can save a lot of money that otherwise would have been spent on hiring trainers by getting the employees trained during the implementation.
- In summary, it is better for companies to concentrate on their business and leave the job of ERP implementation to people who are in that business.
- But to get maximum benefit out of a packaged solution, the company personnel should participate fully during the implementation of the package.
- The company should plan the participation so that its people play an appropriate role in the implementation project so that it has enough experts in-house, once the implementation is over.
- The company should bring in the know-how and experience that will guarantee the best possible use of the acquired package.

9.3 Vendors

- Vendors are the people who have developed the ERP packages.
- They are the people who have invested huge amounts of time and effort in research and development to create the packaged solutions.
- Now with the ERP market place becoming crowded with more and more players entering the market and the competition becoming hot, today’s ERP packages have features and functionality to cater to the needs of businesses in almost all sectors.
The ERP vendors spent billions of rupees in research to come up with innovations that make the packages more efficient, flexible, and easy to implement and use.

Also with the evolution of new technologies, the vendors have to upgrade their product to be able to use the best constantly and latest advancements in technology.

9.3.1 Role of the Vendor
Vendors will perform following role:

Supply of product
Primarily the vendor should **supply the product** and its documentation as soon as the contract is signed. Only after the software is delivered, can the company develop the training and testing environment for the implementation team.

Solve problems
The vendor is responsible for **fixing any problems** in the software that the implementation team encounters. Therefore, the vendor should have a liaison officer who should constantly **interact** with the implementation team.

Training
- Another role the vendor has to play is that of the trainer to **provide the initial training** for the company’s key users, people who will play lead roles in the implementation of the system.
- These key users are the ones who will define, together with the consultants, how the software is to serve the company.
- In other words, these in-house functional experts will decide how the functionalities are to be implemented as well as how to use or adapt the product to suit the company’s unique requirements.
- Therefore, it is very critical that these key users are given a thorough training on the features of the package. Vendor’s training should achieve the goal of showing the key users how the package works, what are the major components, how the data and information flows across the system, what is flexible, and what is not, what can be configured and what cannot, what can be customised, and what should not, what are the limitations, and what are the strengths and weaknesses, etc.
- The objective of the vendor training is to show how the system works, not to show how it should be implemented.
- This means that the vendor demonstrates the product as it exists and highlights what are the possible options available.
- The company’s employees who are participating in the vendor training should try to understand the characteristics of the package and the impact of the system on their business processes.
- The trainees should use these training sessions to question the vendor on all aspects of the system.
- The consultants also have a role to play during this vendor training. They should participate in the training sessions to evaluate how the users react to the reality that is starting to take shape from the detailed presentations and demos.
- Consultants should also ask questions that the vendors are trying to avoid and the users are unaware about. This is the best way to present the real picture to the users and it will prevent the vendors from making false claims.

Quality control
- The role of the package vendor does not end with the training. The vendor also plays an important project support function and must exercise the quality control with respect to how the product is implemented.
- It is the vendor who understands the finer details and subtleties of the product and can make valuable suggestions and improvements that could improve the performance of the system.
• It is also in the best interests of the vendor that this participation continues, because if the implementation fails, most of the blame will fall on the vendor.
• Furthermore, a successful implementation means another satisfied client, improved goodwill and good referrals and so on.

### 9.4 Consultants

• Business consultants are professionals who specialise in developing techniques and methodologies for dealing with the implementation and with the various problems that will crop up during the implementation. They are experts in the administration, management and control of these types of projects. Each of them will have many person-years of implementation experience with various industries and would have time-tested methodologies and business practices that will ensure successful implementation.
• They will be good at all phases of the implementation lifecycle, right from package evaluation to end-user training.
• The only problem with them is that they are very expensive.
• Many of the big consulting firms, having forecasted the ERP boom, invested a great deal of money in developing a range of consulting services in this field and assigned many of their professionals to become specialists in the various aspects of ERP packages and their implementation.
• These firms researched the various products and developed an in-depth understanding of each product’s strengths and weaknesses, worked by the side of the ERP vendors, confirmed that the vendor’s package worked and learned the tricks and techniques of the trade, found out the pitfalls and mistakes that should be avoided and thus created a pool of experts who could handle the ERP implementation without failure.
• Thus, consultants are people who have made the business of ERP implementation their business and have invested huge amount, of money and manpower for that purpose.
• So when we want to get the services of these consultants, the first question that will be asked is” Are they going to be expensive?” The answer is a definite YES.
• The consultants will be expensive, so the company will have to formulate a plan regarding best optimum utilisation of the money spent on consultants.
• If we study the statistics, we can see that a well-selected, integrated system that was successfully implemented and which is successfully working usually pays for itself in a relatively short period between 10 and 30 months.
• If we analyse the cost break-up, we will find that the most expensive part of the implementation was the consultation charges.
• For a typical ERP implementation, the cost of consultants is 1.5 to 3 times for every rupee invested in the software product.
• But the catch is that the product has to be the right one and the implementation has to be successful. That is why the expertise of the consultants becomes invaluable and the money spent on good consultation is never wasted. So finding the right consultants people who have the necessary know-how, who will work well with the company personnel, people who will transfer their knowledge to the company’s employees and people who are available in case their services are required again-is very important.

#### 9.4.1 Role of Consultants

• The consultants should **guarantee the success** of the project and should be able to show the results quantifiable results like reduction in cycle time, increased response time, improved productivity and so on) to the satisfaction of the company management.
• Consultants are responsible for **administering** each of the phases of the implementation, so that the required activities occur at the scheduled time and at the desired level of quality and with effective participation of all those who must participate.
For keeping the promises that the consultants have made during the negotiations, they have to transform their approaches and methodologies into detailed work plans. The methodology will have to be converted into tasks and should be allocated to the right people.

Consultants should also know how to remain impartial while questioning current company processes in an effort to promote better business practices and better implementation results. They should strive to improve the company’s business processes so that the software package can be used as it was originally intended by its developers.

**Refining the company’s processes** can only optimise the performance of the system and maximise future user satisfaction.

The consultants are also responsible for analysing and clearly addressing the customisation issues. They must be able to distinguish between the ‘must have’ and ‘nice to have’ items and decide on the level of customisation.

It is the duty of the consultants to **present the advantages and drawbacks** of each area and reach a consensus decision, which should also be the right one.

Consultants need to position themselves in such a way as to balance their loyalty to the client and the project, with that of defending the package vendor, when such defence is technically correct.

It is the duty of the consultant to **understand** the total context and scope of the envisioned work and to know when to alert the company management about actions and decisions that must be undertaken so that the job will not be compromised and the implementation will not be jeopardised.

Maintaining technical documentation on the project also falls within the duty of the consultant. The consultants will leave once the project is complete, but the knowledge of the project must stay within the organisation.

Therefore, the consultants should create a knowledge base and should train enough people so that the work they have started is continued.

### 9.5 End-Users

- These are the people, who will be using the ERP system once it is in place. These are the people, who were doing the functions that are being automated or computerised by the ERP system.

- With the implementation of the ERP system, the old job descriptions will change, the nature of the job will undergo drastic transformation.

- It is human nature to resist change. When we are talking about implementing an ERP system, we are talking about change in a very massive scale.

- Employees will fear that system will replace existing jobs, as many functions will be automated and people will be afraid of the amount of training they have to undergo and learning they have to do to use the new system.

- Job profiles will change, job responsibilities will undergo drastic alterations, and people will be forced to develop new skill sets. If these fears are not addressed and alleviated well in advance, it will cause trouble for the organisation.

- It should be worth noting the fact, that while the ERP systems eliminate many existing jobs, it creates many new ones with more responsibilities and value addition.

- It is easy to see that the automation of the business processes, through technology, can eliminate the jobs of many employees whose function it is to record, control, calculate, analyse, file or prepare reports. But it must be pointed out to the employees that the same automation creates many more opportunities for them, because they can get away from the monotonous clerical work and transform themselves into highly valued individuals, in a new and challenging working environment using modern technology.

- If the company can succeed in making its employees accept this fact and assist in making the transformation (by giving them training), then the major (and most critical) obstacle in the path of an ERP implementation is solved.
Summary

- Developing an ERP package is a very complex and time-consuming process, which needs a lot of skilled manpower and other resources.
- Designing and implementing integrated software packages is not the business of most companies, or a focus of their executives, the systems that their in-house team come up with will never equal in quality, scope, functionality or technology those systems created by software firms whose business this is.
- These software firms (ERP vendors) can produce sophisticated packages and provide their clients with products that allow them to maintain a focus on their own chief activities, thus improving revenues, profits and shareholder returns.
- Vendors are undertaking activities like, supply the product, fixing any problems in the software, provide the initial training for the company’s key users, Quality control etc..
- Consultants are look after to show the results, administering Refining the company’s processes for analysing and clearly addressing the customisation issues, present the advantages and drawbacks of each area and reach a consensus decision etc..
- Users are the people, who will be using the ERP system once it is in place. These are the people, who were doing the functions that are being automated or computerised by the ERP system.

References


Recommended Reading

Self Assessment

1. Match the following:

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<tr>
<th>1. Vendors</th>
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<td>b. Employees</td>
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<td>3. User</td>
<td>c. Develop methodologies</td>
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<td>4. Implementation Team</td>
<td>d. Develop ERP packages</td>
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b. 1-d,2-c,3-b,4-a  
c. 1-c,2-b,3-a,4-d  
d. 1-c,2-a,3-d,4-b

2. Match the following:

<table>
<thead>
<tr>
<th>1. Quality Control</th>
<th>a. Implementation of ERP system</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Refining company’s process</td>
<td>b. End-Users</td>
</tr>
<tr>
<td>3. Recording, Calculating and Analysing</td>
<td>c. Consultants</td>
</tr>
<tr>
<td>4. In-house team</td>
<td>d. Vendors</td>
</tr>
</tbody>
</table>

a. 1-d,2-c,3-b,4-a  
b. 1-a,2-b,3-c,4-d  
c. 1-c,2-b,3-a,4-d  
d. 1-c,2-a,3-d,4-b

3. Which of the following is TRUE?

a. To implement the ERP system, a person should possess good knowledge.  
b. To implement the ERP system, a person should possess communication skills.  
c. To implement the ERP system, a person should possess writing skills.  
d. To implement the ERP system, a person should possess software skills.

4. In today’s business environment, the trend of ERP implementation is to reduce usage of _____________.

a. machinery  
b. manpower  
c. material  
d. money

5. __________ are the people who have developed the ERP packages.

a. Users  
b. Consultants  
c. Vendors  
d. Manufacturers

6. The ERP _______ spent billions of rupees in research to come up with innovations that make the packages more efficient, flexible, and easy to implement and use.

a. producers  
b. vendors  
c. advisors  
d. consultants
7. Which of the following is FALSE?
   a. Vendor is responsible for training.
   b. Vendor is responsible for fixing problems.
   c. Vendor is responsible for Information processing.
   d. Vendor is responsible for supply of product.

8. __________ function is not undertaken by consultant.
   a. Quality control
   b. Administering
   c. Success guarantee
   d. Analysis of issues

9. Refining the company’s processes can only optimise the performance of the system and maximise future __________ satisfaction.
   a. consumer
   b. vendor
   c. company’s
   d. users

10. Who of the following undergo ERP system once in a place?
    a. Consumer
    b. End-users
    c. Employees
    d. Vendors
Chapter X

Future Directions in ERP

Aim

The aim of this chapter is to:

• introduce future directions in ERP
• provide an overview of opportunities for ERP systems in the future
• explore areas of scope for ERP development

Objectives

The objectives of this chapter are to:

• explain the new markets and channels for ERP
• describe the faster implementation methodologies for ERP systems
• explore new features available in the ERP system

Learning outcome

At the end of this chapter, students will be able to:

• think out of the box and try to imagine different framework for ERP
• understand the areas where ERP has scope for development
• evaluate the things to be modified in the future with current pace of technology development
10.1 Introduction

Nothing is permanent in the constantly evolving, high-speed world of technical innovation. Therefore, the question is: how will these inevitable changes affect the ERP market?

In this chapter, we will survey the industry landscape and find out what is on the horizon keeping in mind that often what appears to loom large in the distance turns out to be a mirage.

ERP industry watchers are agreed on at least one point: ‘one-size-fits-all’, across the board integration is no longer seen as the convention.

As revolutionary as the ERP concept was and to a certain extent still is given the number of companies yet to implement it, it is doubtful whether it can hold onto its overall position as the ‘hottest’ dominating technology in the face of competition from new cutting-edge technologies such as Internet commerce and EDI (Electronic Data Interchange), and competitive new business practices involving supply chain and customer self-service.

As the market stands now, no one doubts ERP’s ability to continue dominating Back-Office practices in areas of traditional strength such as Financial Management, Human Resources, and basic manufacturing. Top-tier ERP vendors can expect to continue to make healthy inroads into these markets, particularly into the mid-market sector.

But as industry experts have pointed out for some time, the enormous surge in ERP implementations over the last several years has, to a certain extent, been fuelled by its ability to provide solutions to Y2K problems. Therein lies part of the dilemma for ERP vendors.

The Y2K problem has dominated the market because of its pressing nature, forcing cutting-edge projects to take a back seat to Y2K solutions. That mindset is changing rapidly, and now there is increasing demand for investment in innovative applications such as electronic commerce and supply chain and HR/customer self-service (sometimes referred to as Front-Office applications).

The question then becomes:

Can ERP afford the kind of investment needed to maintain both their Back-Office supremacy and develop the technology and the market it needs in the Front Office? Or will smaller companies with a faster response time and less investment resources, commanded by existing applications, take over the Front Office and leave ERP in Back-Office maintenance-upgrade mode-still lucrative and stable to be sure, but not quite as attractive.

Forrester Research group look at the market five years from now and suggest that the current top-tier ERP vendors will continue their supremacy in the global core applications market, while the dynamic, emerging, industry specific Front Office market will be captured by best-of-breed niche applications.

Just how likely is it that the ERP behemoths will roll over and play dead? Given the inevitable slowing of the growth rate in the basic core applications market (expected to drop from its current rate of 50% to about 33%, five years from now), won’t the Big 5-SAP, Baan, Oracle, People Soft and JD Edwards refocus their energies into Front-Office areas such as customer management and supply chain? That is what the Hurwitz Group anticipates. They predict that the top-tier ERP vendors will move into new technologies while preserving their current market share, albeit with slower growth rates.

There is lots of evidence for the view that the Big 5 ERP vendors are finding it hard to resist the siren song of the Web and let us not forget the supply chain buzz. The future of the supply chain market seems all set. The problems are logistical, reflecting the fluid state of the market as developers strive for market share, rather than any inherent problems in supply chain itself. The Hurwitz Group expects supply chain to shake out and fuel significant business growth.

Enterprise resource planning (ERP) applications are the complex, multi-module suites of business management software that handle accounting, distribution, manufacturing, human resources, and payroll. Typically targeted at Fortune 1000-level enterprises, these are the applications that, before client/server, would have been run on IBM mainframe, AS/400, DEC, or HP minicomputer platforms. Today, ERP vendors are focused primarily on the UNIX platform, and five major players, as shown in Table 10.1, dominate the market.
Table 10.1 Major ERP vendors and their products

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP AG</td>
<td>R/3</td>
</tr>
<tr>
<td>Oracle Corporation</td>
<td>Oracle Application</td>
</tr>
<tr>
<td>JD Edwards world solution Co.</td>
<td>One World</td>
</tr>
<tr>
<td>PeopleSoft Inc.</td>
<td>People Soft</td>
</tr>
<tr>
<td>Baan Co.</td>
<td>Baan IV</td>
</tr>
</tbody>
</table>

10.2 New Markets

- As larger enterprises become saturated with new-generation client/server ERP systems, vendors are being forced to find new markets for their product suites in order to grow.
- This pressure is causing ERP vendors to increase their appeal to small business clients through a number of initiatives.

These initiatives include the following:

- lowering the entry price point of their software to make it financially viable
- stratifying their software offerings to appeal based on reduced functionality
- improving the implementation methodologies for faster deployment
- porting the products to platforms such as microsoft windows NT
- supplying

10.3 New Channels

- Vendors such as SAP AG Inc., Oracle Corporation, and Baan Co. have been building reseller channels-both in the US and worldwide-to reach the smaller businesses that are looking for the complete-one-stop shopping for their ERP solutions.
- The ERP software is made more financially attractive by lowering the entry price point for each module and by ramping up the total costs by basing price on user licenses.
- Oracle is being particularly aggressive in this respect with software pricing comparing favourably with middle-market client/server offerings from companies such as Platinum Software and Great Plains Software. Although J D Edwards ventured in these waters by complementing its One World suite with a lower-cost line called Genesis, most of the vendors have avoided producing less-expensive ‘Lite’ versions of their software. SAP abandoned its SAP Lite project some time ago and it looks as if the Lite versions will have to wait for some more time.

10.4 Faster Implementation Methodologies

- All ERP vendors have suffered from the perception that their software is difficult and costly to implement. This perception has provided huge profits to the ‘Big 6’ accounting firms (now Big 5 with the merger of Price Waterhouse and Coppers and Laybrand) that have generated billions in fees from their ERP software implementation ‘practices.’
- Even though only 10-15% of the implementations have taken years to complete and have eaten up millions of dollars of consulting costs, the fact remains that implementing ERP packages is difficult.
- An ERP system may consist of dozens of modules that are deployed on a multinational basis to service hundreds of users from many different business departments.
- There may also be a complete change of its infrastructure-say from a mainframe to a UNIX platform-while a number of core business processes are being simultaneously reengineered.
ERP vendors have thus begun to focus their effort on making the implementation process easier by providing tools that are more effective and methodologies to speed up the process, creating elite consulting teams to intensify resources when required and using model based approaches and opening up their systems for easier integration.

For example, SAP has introduced a program called Accelerated SAP (ASAP) that takes the knowledge gained from thousands of R/3 implementations to date and consolidates this expertise in a product called the Business Engineer.

This product helps implementation teams configure the SAP modules to conform to the processing style of some 100 business operating scenarios. Methodologies such as ASAP help reduce SAP implementation times to less than six months in many cases. Oracle recently introduced a similar program called Fast Forward, to help speed up implementations of Oracle Applications suites and nail down the costs up-front.

Despite the availability of new channel partners and implementation methodologies of the major consulting firms, ERP systems have often been difficult to implement because of a dearth of skilled consultants.

As a result, initiatives such as Oracle’s Oracle One or SAP’s Platinum consulting services are leading the way in creating highly skilled consulting teams and are charged with delivering fully trained and experienced consultants on a worldwide basis to push implementations through faster.

10.4 Business Model and Business Application Programming Interfaces (BAPI’s)

- Using products such as Intellicorp Inc.’s Live Model, implementation teams can review and simulate changes to the SAP R/3 application Reference Model that provides views of R/3 processes, data models and functions.
- The Reference Model and any changes made to it are stored in the Live Model repository and can thus be audited and changed on demand.
- Furthermore, because Live Model is OLE compliant, the R/3 models can be manipulated and documented through desktop OLE applications such as Microsoft Word. SAP has attacked the notion that the R/3 system is not open by releasing the specifications for some 170-business application programming interfaces (BAPIs), which help third party applications interact with R/3 directly.
- BAPIs are simply, sets of methods that allow external applications to collaborate with specific R/3 business objects, such as customers, accounts, or employees.
- The fact that the R/3 data is addressable through these callable methods, (BAPIs) gives the third party application vendors a lot of flexibility to build supporting applications for the R/3 system.
- In a similar manner, Baan provides an offering called Org Ware that is based on the use of a tightly integrated business-modelling tool, combined with business-specific templates that help to configure the software automatically to suit specific operational needs.
- Baan is currently in the process of enhancing this tool with new setup wizards to accelerate software implementation on the Windows NT platform.

10.5 Convergence on Windows NT

- The growing popularity of Windows NT has forced almost all ERP vendors to offer products that cater to this segment.
- SAP R/3 has been available since April 1994 on NT and since October 1995 on SQL Server-while Baan, Oracle, and People Soft have announced the general availability of their applications on the Back Office platform in 1997.
- SAP claims to have over 2,000 R/3 installations on NT and holds Microsoft itself as the company’s best customer. Baan sports the ‘Designed for Microsoft Back Office’ certification.
- Oracle touts its support for its own NT-based clustering technology, and PeopleSoft shows of its recent switch to Back Office as its primary development and initial rollout platform.
As Microsoft scales up its enterprise versions of NT and SQL Server to support more processors as well as failover clustering and row-level locking, BackOffice is simply becoming a more viable platform for running demanding ERP applications.

The BackOffice platform is already the platform of choice among the middle market vendors of accounting and distribution software, with the NT/SQL Server combination grabbing market share from the popular Novell/Btrieve platform.

10.6 Application Platforms

ERP vendors already deliver comprehensive suites of application modules that support multinational deployment, Year 2000 compliance, and the Euro (European single currency).

But each vendor is trying to extend the reach of its software and make it more like an application platform than a suite of modules.

SAP is already ahead in this race; its R/3 product is one of the few that can be managed, centrally using popular platform management tools from vendors such as Computer Associates (Uni-center TNG) and Tivoli (TME).

10.7 New Business Segments

All the ERP vendors are now capable of delivering specialised variants of their applications to service vertical markets such as government, healthcare, financial service, or retail environments.

Some vendors are also moving into more specialised areas, such as supply chain management and demand forecasting or sales automation and marketing.

PeopleSoft bought Red Pepper Software to enhance its supply chain offering, while Baan recently acquired Aurum Software for its Aurum Customer Enterprise suite of customer relationship management tools.

To strengthen its financial modules, Baan also teamed up with Hyperion Software to link Hyperion’s financial accounting, budgeting and reporting solutions to Baan’s distribution and manufacturing modules.

10.8 More Features

Improving decision support has been another focus of almost all the ERP vendors.

Baan is linking its applications to the Gentian product (from Gentian Software Inc.) to provide OLAP capabilities, and for the setup and monitoring of key performance indicators.

J D Edwards teamed up with Information Builders to deliver a data mart, based on Information Builders Inc.’s Smart Mart suite of database access middleware, data transformation, reporting, and OLAP tools. Oracle provides a data mart designer and builder tool for creating data marts and Oracle also offers Oracle Discoverer, an end-user tool for querying, charting and reporting data from Oracle’s Applications suite.

The next version of PeopleSoft will include closer integration between PeopleSoft applications and both, the client-based Congas Corp.

Power Play multidimensional OLAP tool and Arbor Software Corp.’s multidimensional Essbase server. SAP has also previewed its own Business Information Warehouse product for synchronising the R/3 transaction system with a data warehouse that can manage both R/3 and non-R/3 data, through use of a metadata repository and a front-end OLAP engine.

10.9 Web Enabling

As with every other software market, ERP vendors are being forced to move from a client/server to browser/server architecture to web-enable their software and thus, deliver self-service and electronic commerce capabilities.

Baan is working to deliver a Java-based web interface to all its products. The company is also focusing on the automation of supply-chain relationships via the Internet, one-commerce via the Microsoft Merchant Server (now known as Site Server), and on using Hyperion Software Corp.’s Spider-Man technology for report and alert distribution across the Web.
• PeopleSoft is set to deliver its Universal Applications-Java-based self-service applets-with its PeopleSoft.

• J D Edwards is also using Java to allow its One World functionality to be available either through a Windows client or through a Web browser, while Oracle has used Java to deliver its Oracle Web Employees, Oracle Web Customers, and Oracle Web Suppliers modules.

• In 1997, SAP released 25 Web applications for version 3.1 of the R/3 and recently previewed links to online catalogues for web-based procurement.

• Unlike the Microsoft-centric middle market applications, the ERP vendors are all using Java, rather than Microsoft’s ActiveX, for their first generation of Web-enabled applications.

• The move by the ERP vendors to embrace Java as a means to deliver and deploy their web functionality is the first move away from proprietary technologies to more open tools.

• One reason why implementing solutions from SAP and PeopleSoft can be expensive is because the tools for customising their products ABAP4 and PeopleTools are proprietary, whereas many lower-tier software vendors have built their application front ends using popular commercial tools such as PowerBuilder, Visual Basic, or Microsoft Access the ERP vendors have not taken this route.

• As a result, the customer will have to pay a premium for ABAP4 and PeopleTools programmers, instead of leveraging the PowerScript or Visual Basic expertise that they may already have in-house. Because Oracle is already a tool vendor, the company uses Oracle Forms, Developer 2000, and Designer 2000 to develop its Oracle Applications.

10.10 Market Snapshot

• Even with zero growth at SAP, it would still take any competitor a couple of years of triple-digit growth to overtake the German giant.

• PeopleSoft has not made a wrong move so far, and Baan is showing that it has the mentality and results to become a top-three player. Oracle has lately, focused more attention on its applications business as a growth engine and seems to be reaching, most aggressively, into the territory targeted by the middle-market client/server accounting players.

• J D Edwards seem to be in the most vulnerable position, with their continued reliance on the momentum of IBM’s AS/400 line, coupled with their need for transition to new product lines and platforms, where their previous market-leading positioning was less than clear-cut.

• ERP vendors are definitely extending their reach as they fight to maintain their growth momentum, during the transition from client/server through browser/server to the Promised Land of distributed components.

• We can expect to see many more acquisitions along the lines of the Baan/Aurum deal, an increasing focus on the Microsoft BackOffice platform, and ERP packages turning up more and more in businesses that previously, could just envy functionality available to those with deeper pockets.

• One thing is clear; no one wants just ERP’ anymore. The emerging trends in the enterprise packaged application industry are its integration with new, cutting-edge technologies, such as sales force automation (SFA) and customer management.

• Driven in part by the huge impact of Internet-based commerce, these new applications are leading to a seeming divergence between so-called Back Office and Front Office functionalities.
Summary

• The chapter deals with New Channels, new markets, faster implementation methodologies, new business segments, More Features, Web Enabling, and Market Snapshot.

• New markets are the companies which are available in short span with same scope and objective for the growth in the relevant sector of ERP.

• Other than vendors and consultants there are more persons who are there in the market to reach to the customers and become as new channels for ERP software’s and systems.

• Faster implementation methodologies are the development in the existing ERP system which improves lead time and cover more features to work system more efficiently.

• Business Application Programming Interfaces are simply, sets of methods that allow external applications to collaborate with specific R/3 business objects, such as customers, accounts, or employees.

• Convergence of Windows NT talks about the growing popularity of Windows NT and it has forced almost all ERP vendors to offer products that cater to this segment.

• SAP R/3 has been available since April 1994 on NT and since October 1995 on SQL Server-while Baan, Oracle, and People Soft have announced the general availability of their applications on the Back Office platform in 1997.

• All the ERP vendors are now capable of delivering specialised variants of their applications to service vertical markets such as government, healthcare, financial service, or retail environments.

• As with every other software market, ERP vendors are being forced to move from a client/server to browser/server architecture to web-enable their software and thus, deliver self-service and electronic commerce capabilities.

References


Recommended Reading


• Leon, A., Future Directions in ERP. Available at: <http://www.slideshare.net/sonalichauhan/erp-alex-leon-chapter-10-presentation> [Accessed 6 December 2010].

• Future Directions in ERP. Available at: <http://siestyit.0fes.net/FUTURE%20DIRECTIONS%20IN%20ERP.ppt> [Accessed 6 December 2010].


Self Assessment

1. Match the following:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. BAPI</td>
<td>a. Baan Linking application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. MS Merchant</td>
<td>b. Computer Associate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Uni-centre TMG</td>
<td>c. Site Server</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Gentian Software</td>
<td>d. Set of methods</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   a. 1-a,2-b,3-c,4-d
   b. 1-c,2-b,3-a,4-d
   c. 1-c,2-a,3-d,4-b
   d. 1-d,2-c,3-b,4-a

2. Match the following:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. Big 6</td>
<td>a. Platform for SAP implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ASAP</td>
<td>b. OLE applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. R/3 Manipulation</td>
<td>c. SAP program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. SQL server</td>
<td>d. Merger product with PWC and Laybrand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   a. 1-a,2-b,3-c,4-d
   b. 1-c,2-b,3-a,4-d
   c. 1-d,2-c,3-b,4-a
   d. 1-c,2-a,3-d,4-b

3. Research group look at the market five years from now and suggest that the current top-tier ERP vendors will continue their supremacy in the global core applications market, while the dynamic, emerging, industry specific Front Office market will be captured by best-of-breed niche applications.

   a. Forrester
   b. AMR
   c. Gemloft
   d. Forbes

4. Today, ERP vendors are focused primarily on the platform.

   a. Oracle
   b. SQL
   c. Linux
   d. UNIX

5. As larger enterprises become saturated with new-generation client/server ERP systems, ______ are being forced to find new markets for their product suites in order to grow.

   a. users
   b. consultants
   c. vendors
   d. company
6. Which of the following vendor is not building reseller channels-both in the US and worldwide?
   a. SAP AG Inc
   b. Oracle
   c. Baan Corp
   d. J.D.Edwards

7. Big-6 is produced by uniting Big-5 with _______________.
   a. SAP AG
   b. Price Waterhouse and Coppers and Laybrand
   c. Laybrand
   d. Oracle

8. The Client/Server version is also known as ____________.
   a. SAP R/3
   b. SAP R/2
   c. SAP R/1
   d. SAP R/5

9. Using products such as ______ Live Model, implementation teams can review and simulate changes to the
   SAP R/3 application Reference Model.
   a. Oracle
   b. SAP AG
   c. Intellicorp Inc
   d. J.D. Edwards

10. ______ are simply, sets of methods that allow external applications to collaborate with specific R/3 business
    objects, such as customers, accounts, or employees.
    a. Windows NT
    b. BAPI’s
    c. OLE
    d. UNIX
Case Study I

Pantaloon Retail- Implementing ERP

Introduction:
Pantaloon Retail is the flagship enterprise of the Future Group, with a presence across multiple lines of business. The company owns and manages multiple retail formats that cater to a wide cross-section of Indian society. Headquartered in Mumbai (Bombay), the company operates through four million square feet of retail space, has over 140 stores across 32 cities in India and employs over 14,000 people. The company registered a turnover of Rs 2,019 crore for FY 2005-06.
Pantaloon Retail forayed into retail in 1997 with the launching of its fashion retail chain, Pantaloons in Kolkata. In 2001, it launched Big Bazaar, a hypermarket chain. This was followed by Food Bazaar, a food and grocery chain. Next up was Central, a first of its kind located in the heart of major Indian cities. Some of its other formats include, Collection i (home improvement products), E-Zone (consumer electronics), Depot (books, music, gifts and stationary), aLL (a Little Larger, fashion apparel for plus-size individuals), Shoe Factory (footwear) and Blue Sky (fashion accessories). It has recently launched its e-business venture, futurebazaar.com. The group’s subsidiary companies include, Home Solutions Retail India Ltd, Pantaloon Industries Ltd, Galaxy Entertainment and Indus League Clothing. The group also has joint venture companies with a number of partners including French retailer Etam group, Lee Cooper, Manipal Healthcare, Talwalkar’s, Gini and Jony and Liberty Shoes. Planet Retail, a group company owns the franchisee of international brands like Marks and Spencer, Debenhams, Next and Guess in India.

Impression
More than eight years after, it assaulted into the retail business, Pantaloon Retail decided to implement SAP to keep itself competitive in the rapidly growing Indian retail market.
Store operations have never been as important to retailers as they are now. Successful retailers are those who know that the battle for customers is only won at the frontline, which in the case of a retail chain is at its stores. Pantaloons was regularly opening stores in the metros and there was an urgent need for a reliable enterprise wide application to help run its business effectively. “The basic need was to have a robust transaction management system and an enterprise wide platform to run the operations,” says Rakesh Biyani, Director, Pantaloon. The company was looking for a solution that would bring all of its businesses and processes together. After a comprehensive evaluation of different options and software companies, the management at Pantaloon decided to go in for SAP.

Resolution
Some of the qualities of SAP retail solutions are that it supports product development, which includes ideation, trend analysis, and collaboration with partners in the supply chain; sourcing and procurement, which involves working with manufacturers to fulfil orders according to strategic merchandising plans and optimise cost, quality, and speed–variables that must be weighted differently as business needs, buying plans, and market demand patterns change; managing the supply chain, which involves handling the logistics of moving finished goods from the source into stores and overseeing global trade and procurement requirements; selling goods across a variety of channels to customers, which requires marketing and brand management; managing mark-downs and capturing customer reactions, analysing data, and using it to optimise the next phase of the design process.

Implementation
“The implementation was outsourced to a third party. The implementation was done by the SAP team with help of Novasoft which is based out of Singapore,” says Biyani. Some people from Pantaloon also assisted in the project. About 24 qualified people worked on this SAP implementation. SAP was chosen as the outsourcing party on a turnkey basis. This project was headed by Pantaloon’s Chief Information Technology Officer, Chinar Deshpande.
Three phases
SAP implementation is not a single phase process. The project was divided into three phases. The first phase involved blueprinting existing processes and mapping them to the desired state. In this phase, the entire project team worked on current processes within the structure of the organisation, analysed and drafted them. This blueprint was later used in the formation of new states of the solution. Since the SAP would combine all the processes, each and every one of these had to be evaluated.

In the second phase, the SAP platform was developed with the help of Novasoft’s template which was predefined by SAP after evaluation of Pantaloon’s needs and expertise in retail solutions.

The last phase in this project was for stores to switch over to the new system and for current data to be ported. Before the SAP implementation, all the data was unorganised. This data had to be migrated to the new SAP application.

The project was flagged off on 15th June 2005 and took about six months to finish. It went live at the head office on 1st January 2006. The stores went live on SAP from 1st January 2006 to 30th June 2006. With the aim, to deploy a robust transaction management system and an enterprise-wide platform to run its operations and with the help of SAP team of Novasoft (Singapore), will implement SAP system for around 1200 users costing around $10 million within time period of Six months.

Payback and confronts
The key challenges in this project were not in the implementation. Rather, the difficulties were faced during the data migration and in managing the interim period when the project was underway for about six months. Migrating unorganised data to an organised format is a challenging task.

Pantaloon has not been able to see immediate benefits from this implementation. This application certainly has long term benefits which will be seen when the performance of various aspects will be analysed. “It is too early to calculate ROI (Return on Investment). We have already started working on MAP (Merchandise Assortment Planning), Auto-Replenishment and Purchase Orders. We hope to use these systems to optimise our inventory and cut it by about two to four weeks (depending on the line of business),” says Biyani.

This application is currently being used by around 1,200 employees across the organisation. For maintaining this implementation and its related applications, Pantaloon has an in-house team and it has outsourced ABAP resources. They are also in the process of setting up a SAP Competency Centre. The system runs on a HP Superdome server on HP UNIX 11i and the database is from Oracle. The cost of this project was about $10 million.

After the successful implementation of SAP for its retail chain, Pantaloon plans to go ahead with IT projects such as implementation of WMS with RFID, Customer Intelligence and CRM. Inventory and Promotions Optimisation will be pursued later this year.

Questions and Answers
1. According to above case, which module you would suggest for company to set up a business more efficiently?
   
   **Answer:**
   Keeping in view the company's problem area, I will suggest a module which will resolve the problems of Inventory control, merchandise planning, customer service drafting, trend analysis, demand and supply control as the periodically the demand and supply fluctuates. So to control the challenges as mentioned above are the most common problems and will become stringent, if not controlled.

   So the company has to focus on the modules which provide functions of inventory control planning, customers resource planning and management and capacity management.
2. Explain in brief the problematic area and suggestion from you for the above case?

   **Answer:**

   In the above case Pantaloons faces control and estimation over following:
   
   - transaction management
   - sourcing and procurement
   - merchandising plans and optimise cost, quality,
   - managing the supply chain,
   - managing mark-downs and capturing customer reactions etc.

   For keeping record of the above company should use an ERP system which integrates the functions that control and keep a track on above particulars, which may be complex procedure but helps to maintain watch over every activity of business.

3. What do you think, is “SAP implementation” sustainable for Pantaloons Retail for longer period of time?

   **Answer:**

   According to me, SAP implementation in Pantaloons Retail is correct solution for visualising a business and analysing each and every activity.

   In the long run, it will reflect on profitability and efficiency of business and definitely their will be great scope to modify and eliminate the discarded processes in retail activity.

   So, SAP implantation is effective and sustainable over longer period.

   Some of the qualities of SAP retail solutions are that it supports product development, which includes:
   
   - ideation, trend analysis, and collaboration with partners in the supply chain
   - sourcing and procurement, which involves working with manufacturers to fulfil orders according to strategic merchandising plans and optimise cost, quality, speed variables that must be weighted differently as business needs, buying plans, and market demand patterns change
   - managing the supply chain, which involves handling the logistics of moving finished goods from the source into stores and overseeing global trade and procurement requirements
   - selling goods across a variety of channels to customers, which requires marketing and brand management; managing mark-downs and capturing customer reactions, analysing data, and using it to optimise the next phase of the design process
Case Study II

STC ThirdEye Technology (India) Pvt Ltd

STC ThirdEye Technology (India) Pvt. Ltd, is India’s largest independent software testing organisation providing end-to-end testing services. We build and operate dedicated India-based testing centres for our customers with the latest computing and data communication technologies, and deliver our services, with high standards of security and confidentiality. Consistent qualities of deliverables under compressed time schedules enable us to get repeat business. We help Fortune 500 ERP, BFSI, Healthcare, Gaming and Telecom solution providers. It is ISO 9001:2000 certified organisation.

Customer:
OpenPro was the first complete Enterprise Resource Planning (ERP) manufacturing software solution provider, integrating back office manufacturing with Customer Relationship Management (CRM), Supply Chain Management (SCM), E-Commerce, Finance and Accounting, Human Resources and e-business capabilities to support today’s extended enterprise.

Domain challenges:
• using ERP across a large geographical area and satisfying different business units.
• pressure to increase customer satisfaction and revenue creation
• staying competitive with other companies
• continuing corporate need to cut back the over all expenses
• fragmented business applications
• executive pressure to create a more productive workforce
• dealing with end-user requests and deferment of improvements

Situation:
The client has a flagship product, an ERP package that aids in easy control of business models but creates headaches for other systems, especially when it comes to managing deferred revenue, revenue forecasting, billing, sales orders, contract renewals, and issuing complex invoices. The client was looking for a partner to test their ERP package with various modules. The company wanted a robust quality assurance process in ensuring that the various business scenarios are identified, scripted, and tested. This required a combination of understanding of the company’s business processes, configuration knowledge, and in-depth manufacturing and Supply Chain domain knowledge to generate all possible scenarios.

Solution from STC
STC used its Delivery model Onsite – Offshore (Hybrid) to deliver the value added testing services. Since this project started from scratch at a time where even the business requirements were still under definition, it required different levels of functional testing. STC used its domain expertise to understand the business requirements and system configurations and generate possible logical, system and business scenarios for the configured application.

Benefits:
• outsourced application testing can reduce costs while freeing the team to focus on core competencies
• increase the quality and roi of your erp solution
• increase end-user confidence
• testing helps ensure full functionality, high performance, and security of applications.
• the domain expertise and varied industry experience of stc combine to bring you leading-edge, best practices-based services and shorter, more rapid testing cycles
• result in re-usable regression tests for future upgrades and maintenance
Questions:
1. Identify the problem areas in the case and suggest possible solutions.
2. Which topic is covered in following case? Write theoretical background for the topic discussed.
3. Suggest more possible solution for relative challenges discussed in the case.
EMIL Pharmaceuticals (India) Pvt. Ltd. Mumbai
The company is founded in 1989-90, Emil’s principal business is developing, manufacturing and marketing of allopathic formulations in various dosage forms viz., Tablets, capsules, oral liquids, dry powders, creams, ointments and gels. EMIL also manufactures ayurvedic / herbal and veterinary formulations. Headquartered in Mumbai, the financial capital and hub of pharmaceutical industry, Emil markets products in India as well as in African.

In the last 15 years, Emil has also established itself as a reliable and cost-efficient contract manufacturer of integrity for leading multinational and Indian companies to produce quality products for their Indian and international markets.

Mission
To improve quality of life by offering best quality medicines.

Vision
To develop, produce and market medicines of internationally acceptable quality.

Values
Respect for life of living beings, environment and law of the land. Innovation and excellence in all our business processes. Satisfaction of employees, customers and suppliers. Commitment to ethical business practices.

Asset – People
Our people will lead us on the path of success. Talent identification and retention has been the secret of our success. Enhancing of individual knowledge and skill is done through classroom training as well as on the job training which is an ongoing process at Emil

Core competency
Development and Manufacture of pharmaceutical formulations at competitive costs. Have develop and manufactured over 300 formulations over 20 MNC’s and large Indian companies in the last 15 years

The challenge
The Client being a leading manufacturer and exporter of pharmaceutical products, has a wide span of departments and different processes, which though functioned under the best management and supervision may suffer from poor correlation, due to improper integration of resources causing disruption in work, thus creating difficulties in maintaining the statutory requirements. Lack of co-ordination also leads to unusual problems in smooth functioning between manufacturing process and amongst various departments. There were separate channels of separate processes that caused increased input of work with reduced efficiency in functioning and prolonged functioning of normal processes that prevented the optimum utilisation of resources. They were faced with the challenge of surviving and succeeding in an environment that has become more complicated and uncertain, and one that is characterised by rapid developments in science and technology, and organisational change. From the standpoint of the pharmaceutical industry, the impetus for change is the result of a combination of political, economic, technological and social factors; all of which have helped redefine the dynamics of this particular industry. Over the past number of years, the growth of the worldwide pharmaceutical industry has been slower than the increases in Research (R) and Development (D) costs, and this has led to a cost-earnings differential that cannot be sustained indefinitely. Firms have found it increasingly difficult to sustain historical levels of growth principally because of two converging factors. First, the earnings of the pharmaceutical industry are being increasingly squeezed between pricing constraints due to government policies and generic competition; and second, through the rising costs of R and D due to increasing legislative requirements and growing technological sophistication. As a consequence of these pressures on pharmaceutical earnings, combined with that of rising R and D costs, pharmaceutical firms have been forced to adopt a number of cost containment measures in addition to those pertaining to the safety and efficacy of drugs. The need to demonstrate ‘value’ to the consumer has now become imperative.
Traditionally, the pricing methods adopted in the former producer driven environment for pharmaceuticals was essentially based on what was considered to be ‘fair returns’ for the high costs and risks associated with innovation. Today however, much of that has changed. The deregulation of generic products has helped to bring about a much greater acceptance of product substitution, which in turn has led to changes in consumer choice -- an event that has acted as a catalyst for change within the marketplace. Therefore rather than being producer-driven, the market for pharmaceuticals today is essentially customer-led. Price has become the key indicator of how the marketplace truly values the products that are discovered, marketed and sold. Consequently the price that a company charges for a product is the culmination of every decision made along the chain of discovery from discovery through to marketing. Therefore in order to be able to survive this challenging environment, pharmaceutical companies can no longer permit their internal processes to determine price levels, as this has now become the privilege of the customer.

The demand for innovation in an increasingly complex, global business environment has necessitated new approaches to organisation because the requirements for success in the marketplace have changed in a number of profound ways. In addition to demands for efficiency, quality and flexibility, pharmaceutical companies are also required to simultaneously cut costs, improve standards of quality, shorten product development times, and introduce innovative products that customer’s value. As a result, companies have been forced to re-examine every aspect of how their businesses are implemented and conducted, and this has given rise to a number of important issues that question the long held and accepted ways of managing pharmaceuticals. It also raises a number of critical questions that are pertinent to five key areas of business. The discovery, development and marketing of new pharmaceutical products are the essence of the research-based pharmaceutical industry. As a result of the transformation toward a customer-led marketplace, important issues have been raised which present a number of challenges for many pharmaceutical companies. Of greater significance is the issue of cost. The total cost of bringing a new product to market from discovery through to launch, including the cost of capital with a risk premium and the cost associated with failures, is estimated to be approximately $500 million, over a 10-12 year period. Of this total, around 30 per cent of the costs are concentrated in exploratory research while the remaining 70 per cent are invested in subsequent development phases. At the same time, the percentage of money spent on innovation has been increasing steadily from around 6 per cent in the 1960s to approximately 20 per cent by the late 1990s. Both the increased cost together with the growing quantity of resources being invested in pharmaceutical innovation is due to a combination of factors other than inflation. Traditionally, the rate of growth of the firm has been linked to new product introductions, as it was believed that increased investment in innovation generally guaranteed more novel products. Furthermore, the shift from acute to chronic therapy has increased the complexity of research as well as the regulatory approval process. Demands for regulatory data have almost doubled since the mid-1980s thus increasing the time it takes to get a product to market. In addition, companies with low levels of new product innovation have spent vast amounts of capital in an effort to secure future sources of revenue.

The solution--“E-resource”

E-resource, proved to be the best possible ERP solution to overcome the challenges faced by this client. The client was provided with an application, through which under a single point, there was integration of all its resource to improve and optimize their utility. E-resource ERP provided a platform where at a single juncture all the processes and essential functional activities were taken care of. A clear advantage to the web-based E-resource ERP is that remote users like executives and sales reps can access the company system with any browser, which is much more convenient than going through stand alone computer configured for Terminal Services. It also eliminates the need of upgrading of your network and other computer peripherals. E-resource ERP’s fast and quick on-time implementation method helps the client commence their business operation through the system as per planned time schedule which ultimately helps all their business operations. E-resource, ERP is a next-generation enterprise resource planning solution that powers your core business functions, including analytics, human capital management, financials, operations, and corporate services. It delivers industry-specific capabilities that let you seamlessly integrate key business processes from end to end. And because it’s highly scalable and adaptable, it gives you the option to incrementally add the right mix of customer relationship management, supply chain management, or product life-cycle management solutions as your business evolves over time.
Questions:
1. Brief the case and write its problem areas and suggest solution for it.
2. If you are part of the company’s top management, what solutions would you recommend over existing problem?
3. What do you think, is the current strategy suitable to reach company’s long term goals? Justify your answer.
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**Recommended Reading**


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# Self Assessment Answers

## Chapter I
1. c  
2. b  
3. a  
4. d  
5. b  
6. d  
7. c  
8. c  
9. c  
10. a  

## Chapter II
1. b  
2. c  
3. d  
4. b  
5. b  
6. b  
7. b  
8. d  
9. b  
10. a  

## Chapter III
1. a  
2. b  
3. d  
4. a  
5. d  
6. c  
7. a  
8. c  
9. d  
10. b  

## Chapter IV
1. a  
2. c  
3. d  
4. b  
5. b  
6. a  
7. b  
8. d  
9. a  
10. b
Chapter V
1. c
2. d
3. c
4. a
5. c
6. b
7. a
8. d
9. b
10. c

Chapter VI
1. b
2. a
3. c
4. c
5. d
6. a
7. d
8. a
9. d
10. b

Chapter VII
1. a
2. d
3. c
4. b
5. b
6. b
7. c
8. c
9. b
10. c

Chapter VIII
1. c
2. d
3. c
4. a
5. c
6. b
7. c
8. d
9. c
10. d
Chapter IX
1. b
2. a
3. a
4. b
5. c
6. b
7. c
8. a
9. d
10. b

Chapter X
1. d
2. c
3. a
4. d
5. c
6. d
7. b
8. a
9. c
10. b