A Course Material on

Information Technology and ERP

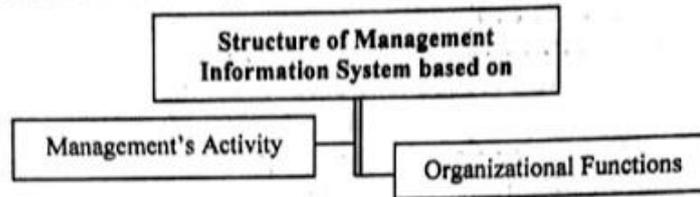# MBA, 2nd Semester

By

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Structure of MIS

MIS is structured around two basic factors viz., based on:

Structure of Management Information System based on

| Management's Activity | Organizational Functions |

1.2.7.1. MIS Structure based on Management Activity

Management information systems support management activity. This means that the structure of an information system can be classified in terms of a hierarchy of management planning and control activities. MIS structure has to be designed to satisfy various hierarchical information requirements.

There are four levels of management hierarchy:
1) **Strategic Planning (Top Management):** Strategic planning deals with long-range considerations. The decisions to be made are concerned with the choice of business direction, market strategy, product mix, etc.

2) **Management Control and Tactical Planning (Senior Management):** Management control and tactical planning has a medium-term planning horizon. It includes acquisition and organization of resources, structuring of work, and acquisition and training of personnel. It is reflected in the capital expenditure budget, the three-year staffing plan, etc.

3) **Operations Planning and Control (Middle and Junior Management):** Operational planning and control is related to short-term decisions for current operations. Pricing, production levels, inventory levels, etc., are a result of operational planning and control activities.

4) **Transaction Processing (Clerical Staff and Workers):** A Transaction Processing is a computerized system that performs and records the daily routine transaction necessary to the conduct of the business. **For example,** sales order entry. MIS helps the clerical personnel in the transaction processing and answers their queries on the data pertaining to the transaction, the status of a particular record and reference on a variety of documents.

At each level of management, the nature of information in terms of details, conciseness, frequency, interpretations, decision supporting/decision giving capabilities etc is different and MIS structure should support it.

1.2.7.2. MIS Structure based on Organizational Function

The structure of an information system can also be described in terms of the organizational functions which use information. There is no standard classification of functions, but a typical set of functions in a manufacturing organization includes production, sales and marketing, finance and accounting, logistics, personnel, and , information systems. Top management can also be considered as a separate function.

A management information system (MIS) is essentially a federation of information systems that are designed to support the functional subsystems of the organization. Within each functional subsystem, there will be applications for transaction processing, operational control, managerial control, and strategic planning (**figure 1.9**).

Organizational functions

Figure 1.9: Matrix of Functional Subsystems and Management Activities

Some of the organisational functions are as below:

1) **Sales and Marketing Subsystems:** The sales and marketing function generally includes all activities related to the promotion and sales of products or services.

2) **Production Subsystem:** The responsibilities of the production or manufacturing function include product engineering, planning of production facilities, scheduling and operation of production facilities, employment and training of production personnel, and quality control and inspection.

3) **Logistics Subsystem:** The logistics function encompasses such activities as purchasing, receiving, inventory control, and distribution.

4) **Personnel Subsystem:** The personnel subsystem includes hiring, training, record keeping, payment, and termination of personnel.

5) **Finance and Accounting Subsystem:** Finance and accounting are somewhat separate functions but are sufficiently related to be described together

   Finance is responsible for ensuring adequate organizational financing at as low a cost as possible (in a manner consistent with other objectives).

   Accounting covers the classification of financial transactions and summarization into the standard financial reports (income statement and balance sheet), the preparation of budgets, and classification and analysis of cost data.

6) **Information Processing Subsystem:** The information processing function is responsible for ensuring that the other functions are provided the necessary information processing services and resources.

7) **Top Management Subsystem:** The top management function (chief executive officer plus staff) operates separately from the functional areas, but also includes the functional vice presidents acting in a top management capacity such as in management committees.

1.3.3. . Types of Functional Information Systems

ISs serve various purposes throughout an organization in what are known as functional business areas-in-house services that support an organization's main business. Each function has an information system composed of multiple subsystems, all of which provide information for the tasks within the function. The major functional systems of many organizations are:

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              Types of Functional Information Systems

Marketing Information System(MkIS)     Manufacturing Management
                                       Information System(MMIS)

Human Resource Information             Accounting Information System(AIS)
system(HRIS)

Financial Management Information       Inventory Management(Control)
System(FMIS)                           Information System(IMIS)

              Production Management Information
                     System (PMIS)
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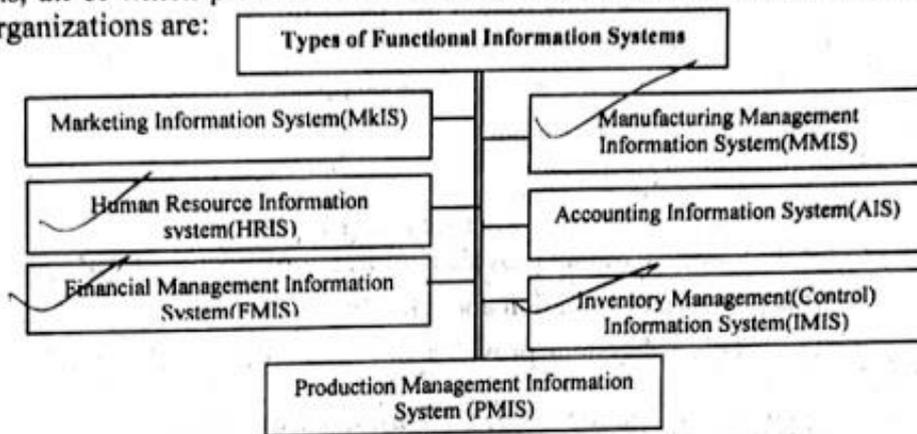
1.3.3.1. Marketing Information System(MkIS)

Marketing information system (MkIS) is a computer - based system that works in conjunction with other functional information systems to support the firm's management in solving problems that relate to marketing of the firm's products. A Marketing Information System (MkIS) consists of people, equipment and procedures to gather, sort, analyse, evaluate and distribute needed, timely and accurate information to marketing decision makers. The role of the MkIS is to assess the marketing manager's Information needs, then develop the framework for collecting information and distribute the information gathered to the end users in time.

Model of MkIS
A conceptual model of MkIS is shown in figure 1.12.

```
Data        Information

         Internal                              Product
         Sources        Transaction            Subsystem
                        Processing
                        System
                                               Place
                                    Data       Subsystem
         Marketing       Base
         Research
         Subsystem                             Promotion        USER
                                               Subsystem

         Environmental
         Sources                               Price
                        Marketing              Subsystem
                        Intelligence
                        Subsystem
                                               Integrated Mix
                                               Subsystem
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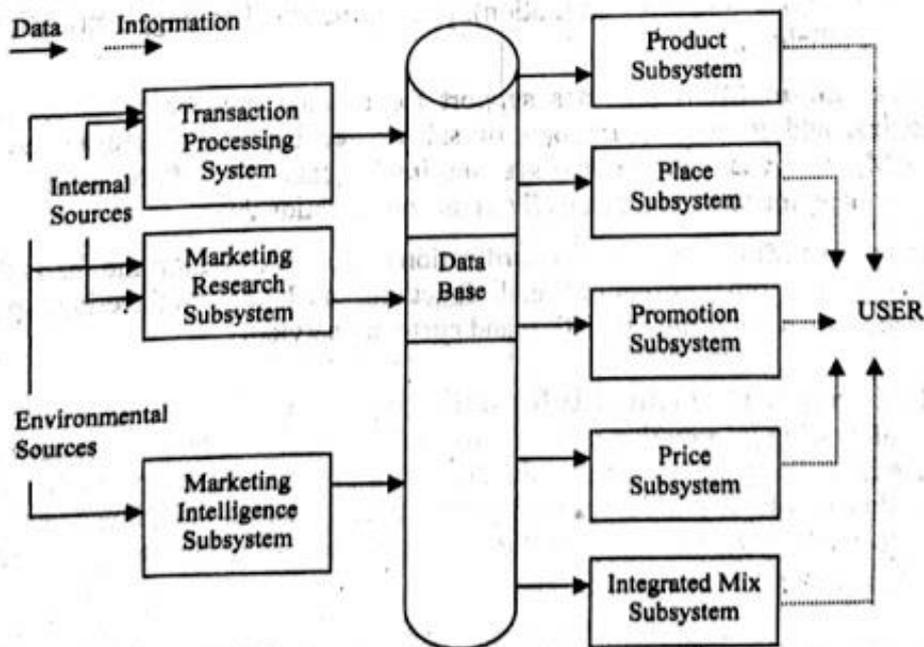
Figure 1.12: Marketing Information System

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The various parts of the MkIS are:
1) **Input Subsystems**: These include the following subsystems:
    i) **Transaction Processing System (TPS)**: Transaction processing system gathers data from both internal and environmental sources and enters data into the database.
    ii) **Marketing Research Subsystem**: The marketing research subsystem also gathers internal and environmental data by conducting special studies. Marketing research is the systematic collection, analysis and interpretation of information about specific marketing matters. Marketing Research subsystem is used only when specific information is needed and each research project has an explicit purpose and time span.
    iii) **Marketing Intelligence Subsystem**: Marketing intelligence is general information about developments in the marketing environment of the organisation that helps managers to develop and change marketing plans. The marketing intelligence subsystem is the set of procedures and sources used to acquire the information. Collection of this data is usually unplanned.

2) **Database**: The data that are used by the output subsystems comes from the database. The database is populated with data from three input subsystems.

3) **Outputs Subsystems**: These include the following subsystems:
    i) **Product Subsystem**: Product subsystem provides information about the firm's products.
    ii) **Place Subsystem**: This provides information about the firm's distribution network.
    iii) **Promotion Subsystem**: This subsystem provides information about firm's advertising and personal selling activities.
    iv) **Price Subsystem**: This helps the manager make pricing decisions.
    v) **Integrated Mix Subsystem**: This is the fifth subsystem, that enables manager to develop strategies that consider the combined effects of the ingredients.

Advantages of MkIS
1) **Market Monitoring**: During the use of market research and marketing intelligence activities, MkIS can enable the identification of emerging market segments, and the monitoring of the market environment for changes in consumer behavior, competitor activities, new technologies, economic conditions and governmental policies.

2) **Strategy Development**: MkIS provides the information necessary to develop marketing strategy. It supports strategy development for new products, product positioning, marketing communications (advertising, public relations, and sales promotion), pricing, personal selling, distribution, customer service and partnerships and alliances.

3) **Strategy Implementation**: MkIS provides support for product launches, enables the coordination of marketing strategies, and is an integral part of sales force automation (SFA), customer relationship management (CRM), and customer service systems implementations. MkIS enables decision makers to more effectively manage the sales force as well as customer relationships.

4) **Functional Integration**: MkIS enables the coordination of activities within the marketing department and between marketing and other organizational functions such as engineering, production, product management, finance, manufacturing, logistics, and customer service.

1.3.3.2. Manufacturing Management Information System(MMIS)
The mission of a manufacturing information system is to apply computer technology to improve the process and the efficiency of a manufacturing system so that the quality of products is better and the costs to manufacture them are lower. In other words, a manufacturing system takes material, equipment, data, management, and information systems technology as the input, and uses manufacturing and information processes to generate better final products as output.

The manufacturing systems are designed around the transformation process of raw materials into usable components or materials. These systems are value added processes, such as materials processing, or support systems such as scheduling.

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"**Manufacturing Information System is a complete set of tools for managing the flow of manufacturing production data throughout the enterprise. This IS was designed to provide tools for both IT and Operations personnel who would deliver services to anyone in the plant**".
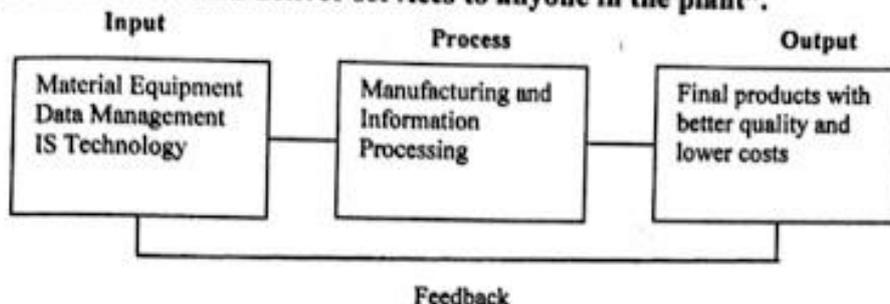

Figure 1.13: Manufacturing Information System Model

Manufacturing plant control encompasses many tactical and operational functions that address several types of manufacturing–related operations. Manufacturing consists of many different disciplinary areas, including product engineering, facility design and scheduling, fabrication, and quality control management. Each of them can be dramatically improved by using information systems. Manufacturing Information Systems track, schedule, and control manufacturing processes, collect data such as, hours the machine operates every day of the month and hours the machine is idle.

Model of MMIS

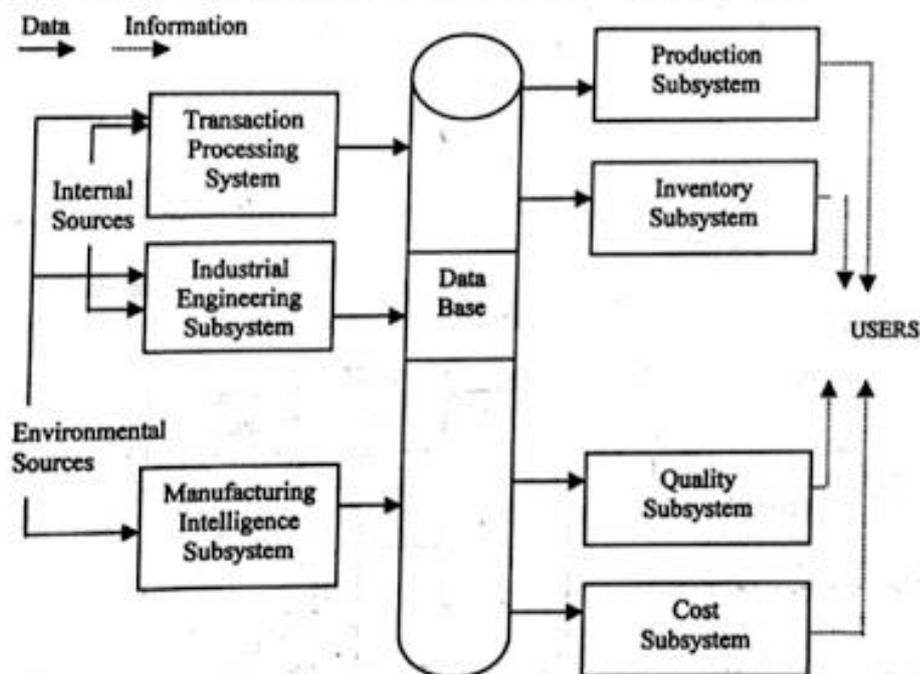A conceptual model of manufacturing information system is shown in **figure 1.14**.

Figure 1.14: Manufacturing Information System

The various parts of the manufacturing information system are:
1) **Input Subsystems**: These include the following subsystems:
    i) **Transaction Processing System (TPS)**: Transaction processing system gathers data from both internal and environmental sources and enters data into the database.

    ii) **Industrial Engineering Subsystem**: This consists of activity by industrial engineers(IEs) who conduct studies of the manufacturing operation to ensure its efficiency. IE's works involves the setting up of production standard and are compared to actual performance.

    iii) **Marketing Intelligence Subsystem**: Marketing intelligence is general information about developments in the marketing environment of the organisation that helps managers to develop and change marketing plans. The marketing intelligence subsystem is the set of procedures and sources used to acquire the information. Collection of this data is usually unplanned.

2) **Database:** The data that are used by the output subsystems comes from the database. The database is populated with data from three input subsystems.

3) **Outputs Subsystems:** These include the following subsystems:
   i) **Production Subsystem:** By using terminals around the production floor, data on production processes can be quickly gathered and processed. These data are used for billing and in almost every aspect of production control.
   ii) **Inventory Subsystem:** This subsystem includes the inventories for raw materials. Often, vendor data is maintained by the purchasing department, although sometimes the manufacturing area will personally buy certain items. In any case, manufacturing personnel must be constantly aware of the origination of their raw materials, what new types of products are offered by vendors and current prices.
   iii) **Quality Subsystem:** This checks the quality of the product after manufacturing.
   iv) **Cost Subsystem:** This subsystem find the cost and compare it with others.

Advantages of MMIS
1) Improve efficiency, quality,
2) Deliver goods and services more efficiently,
3) Speed up the process,
4) Allow more customization.

1.3.3.3. Human Resource Information System(HRIS)

Human Resource Management System (HRMS), Human Resource Information System (HRIS), HR Technology or also called HR modules, refers to the systems and processes at the intersection between human resource management (HRM) and information technology.

Human Resource Information System (HRIS) provides a method, by which an organisation collects, maintains analyses and reports information on people and jobs.

The information contained in the HRIS serves as a guide to recruiters, trainers, career planners and other human resource specialists. It applies to information needs at macro level as well as to the micro level. HRIS offers HR, payroll, benefits, training, recruiting and compliance solutions.

Models of HRIS
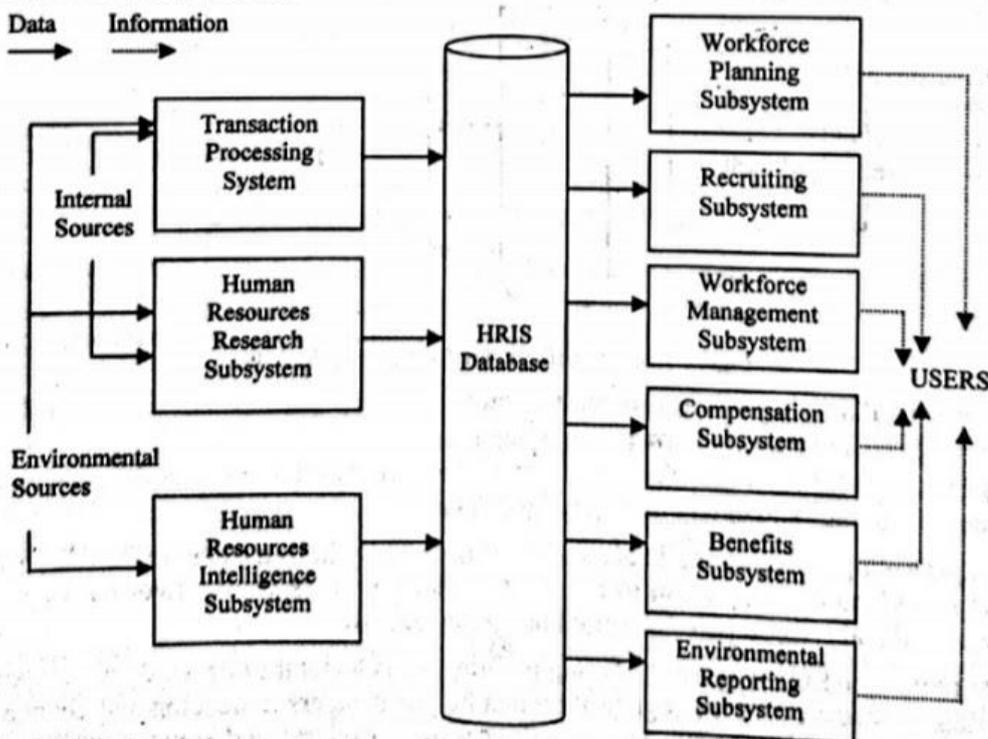The model of HRIS is shown below:

Figure 1.15: Human Resources Information System

The various parts of the HRIS are:

1) **Input Subsystems**: These include the following subsystems:
   i) **Transaction Processing System (TPS)**: This provides input data, as using the same format as the MkIS.
   ii) **Human Resources Research Subsystem**: Conducts special studies and human resources.
   iii) **Human Resources Intelligence Subsystem**: Gathers environmental data that bear on HR issues.

2) **Database**: The data that are used by the output subsystems comes from the database. The database is populated with data from three input subsystems.

3) **Outputs Subsystems**: The output subsystems of the HRIS each address a particular aspect of HR management:
   i) Planning
   ii) Recruiting
   iii) Managing the workforce
   iv) Compensating the employees
   v) Providing employee benefits and
   vi) Preparing the many HR reports that are required by the environment

This is the way that output subsystems are determined-they represent the major areas of interest to the users.

Advantages of HRIS

1) **Automated Procedures**: Human resources specialists are responsible for providing management with consultation in areas such as employee turnover, disciplinary action and performance issues. Real-time access to employee information including demographics, compensation, performance reviews and leave balances is vital to providing the best service possible. HR also holds responsibility for the accurate and timely entry of a variety of personnel actions ranging from new hires and promotions to resignations and retirements.

   An automated method allows these actions to proceed as expeditiously as possible from the initial request to the transmission to payroll. Since there are approval requirements at various levels, an automated process facilitates electronic signatures. An HRIS also assists an agency in creating and maintaining employee position and compensation records to build historical data and move towards a paperless environment.

2) **Report Functionality**: Reports are often requested from management as well as external customers like State and/or federal government. Report inquiries include those regarding hiring practices, staffing allocations, pay levels and retirement eligibility dates. The ability to create and distribute *ad hoc* reports as needed is vital to an agency's strategic planning process and government compliance. Time and attendance reports are also available to assist management with leave administration. In some instances, the ability to generate reports is delegated directly to management. Those reports can be in a pre-defined or customizable format.

3) **Data Integrity**: A human resources information system (HRIS) is regulated to engage in compliance and oversight activities to protect critical information and control access to data at all levels. The system also incorporates system edits to reduce the risk of inaccurate input and eliminate duplication. A centrally-managed HRIS allows an agency to define rules to ensure the quality of data entered into the system.

1.3.3.4. Accounting Information Systems(AIS)

Accounting Information System (AIS) performs the firm's accounting applications. A high volume of data processing characterizes these applications. Data processing consists of four major tasks- data gathering, data manipulation, data storage, and document preparation.

An Accounting Information System (AIS) is the system of records a business keeps to maintain its accounting system. This includes the purchase, sales, and other financial processes of the business. The purpose of an AIS is to accumulate data and provide decision makers (investors, creditors, and managers) with information to make decisions.

AIS study the structuring and operation of planning and control processes which are aimed at:
1) Providing information for decision-making and accountability to internal and external a stakeholder that complies with specified quality criteria.
2) Providing the right conditions for sound decision-making.
3) Ensuring that no assets illegitimately exit the organization.

Model of AIS

Figure 1.16 gives a model of AIS. The input, transformation, and output elements of the physical system of the firm are at the bottom.
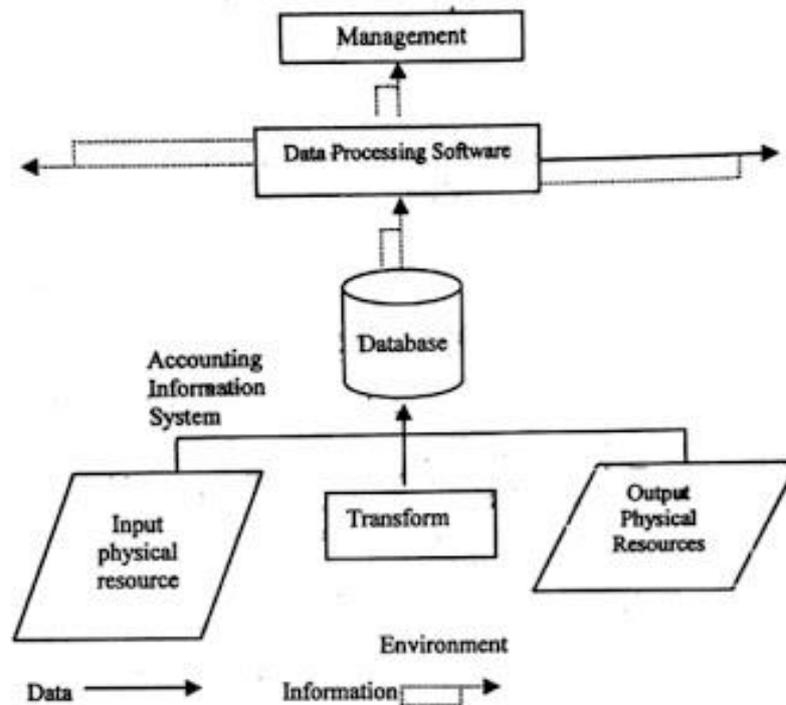

Figure 1.16: Model of Accounting Information System

Data is gathered from throughout the physical system and the environment, and it is entered into the database. Data processing software transforms the data into information for the firm's management and for individuals and organizations in the firm's environment.

Advantages of AIS

1) **High Speed:** The main benefit of information systems in accounting is the speed of processing tasks. Data is entered once and can then be used and reused in compiling reports by literally pressing a button. If a transaction needs correction, it is easily done, with reports generated afterward at speeds never possible with manual accounting systems.

2) **Safety:** Once data is entered into a computer, it is safe. The chances of losing data are remote, especially when one performs regular system backups. In manual systems, paper pads can be lost or damaged more easily. One can save data on the Internet, where it will not only be accessible anytime need it but will also still be secure even if computer is lost or damaged.

3) **Classification:** When data is entered in an accounting system, manual or computerized, an accountant needs to classify it in a detailed fashion. For example, a transaction could be sales revenue or an interest revenue. Using information systems, this classification process is easily accomplished with a drop-down menu from which one choose the proper category. One can also quickly generate reports involving classifications. With a manual system, this process takes much more time.

1.3.3.5. Financial Management Information System(FMIS)

The term Financial Information System is used to describe the CBIS(computer based information system) subsystem that provides information to persons and groups both inside and outside the firm concerning the firm's financial matters. Information is provided in the form of periodic reports, special reports, and results of mathematical simulation, electronic communications, and the advice of expert systems.

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A financial MIS provides financial information not only for executives but also for a broader set of people who need to make better decisions on a daily basis. Financial MISs is used to streamline reports of transactions.

Model of FMIS
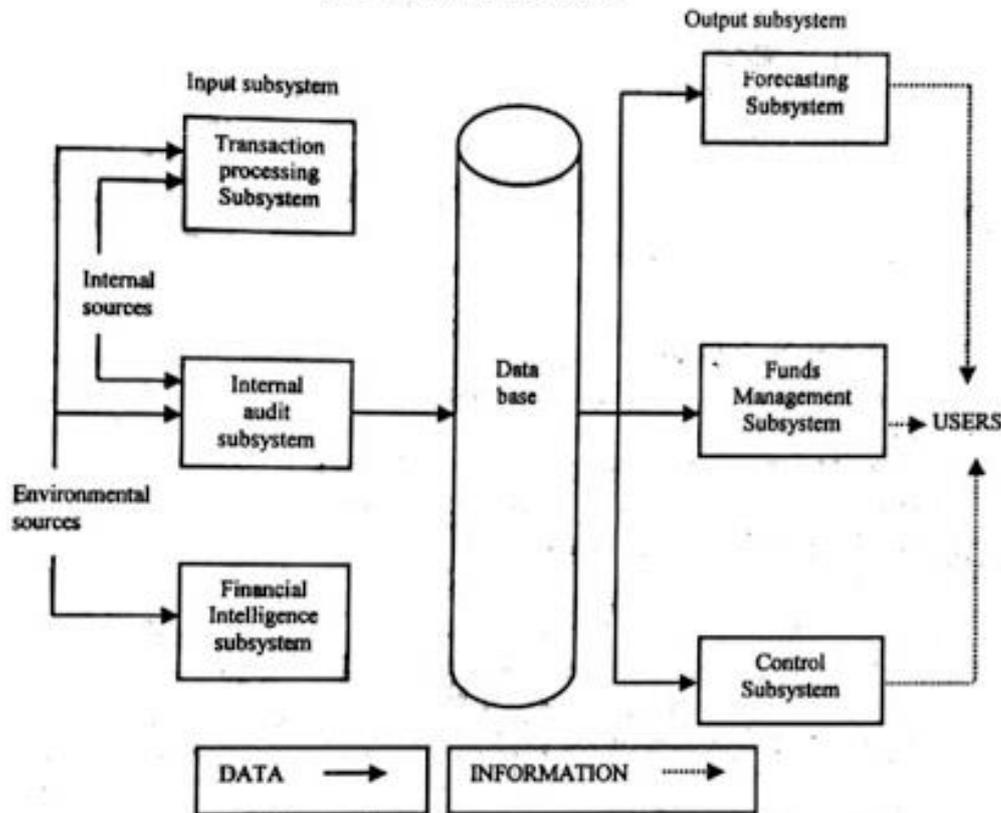The model of Financial Information System is shown below:

Figure 1.17: Model of Financial Information System

The various parts of the Financial information system are:
1) **Input Subsystems**: These include the following subsystems:
   i) **Transaction Processing System (TPS)**: This provides input data, as using the same format as the MkIS.
   ii) **Internal Audit Subsystem**: Internal audit consists of the firm's internal auditors who analyse the firm's conceptual systems to ensure that they process financial data the proper way.
   iii) **Financial Intelligence Subsystem**: Gathers environmental data that bear on HR issues.

2) **Database**: The data that are used by the output subsystems comes from the database. The database is populated with data from three input subsystems.

3) **Outputs Subsystems**: The output subsystems of the financial information system are as below:
   i) **Forecasting Subsystem**: This subsystem projects the firm's long-range activity in an economic environment.
   ii) **Fund Management Subsystem**: The funds management subsystem manages the money flow as it occurs, seeking to keep it balanced and positive.
   iii) **Control Subsystem**: With the control subsystem, managers can get effective use from resources of all types that are made available to them.

Advantages of FMIS
1) **Integration**: Integrate financial and operational information from multiple sources, including the Internet, into a single system.
2) **Easy access of Data**: Provide easy access to data for both financial and non-financial users, often through the use of a corporate intranet to access corporate Web pages of financial data and information.

3) **Time Reduced:** Make financial data immediately available to shorten analysis turnaround time.

4) **Provide Multiple Dimensions:** Enable analysis of financial data along multiple dimensions – time, geography, product, plant and customer.

5) **Provides Current and Historical Data:** Analyse historical and current financial activity.

6) **Monitoring:** Monitor and control the use of funds over time.

1.3.3.6. Inventory Management(Control) Information System

Inventory refers to the stock of raw materials and finished goods available in the organisation for production and sale. All organisations need an efficient system to maintain and control the optimum level of investment in all types of inventories.

An inventory control system ensures the proper stock levels of each item are maintained. The improper stock levels (low or high) cause the following problems:

1) Low inventory of raw materials leads to idle time in a production process and hence, causes wastages of resources like labor, power, and equipment's, etc., needed for production. It may also lead to decrease in sales due to out-of-stock especially during periods of peak demands.

2) Low inventory of finished goods leads to backorder, lost sale and loss in goodwill of the company due to out-of-stock positions.

3) High inventory of raw materials and finished goods leads to unnecessary investments and hence, causes a financial burden on the organisation.

Inventory control is the means by which materials of the correct quality and in correct quantity are made available as and when required with due regard to economy in storage and ordering costs, purchase prices and working capitals. In other words it is the technique of maintaining the size of the inventory at some desired level keeping in mind the best economic interests of the production system. The desired level can neither be much high nor much low because high level of inventory will lead to increase in carrying cost while low level of inventory will lead to increase in ordering cost.

Inventory control is the technique of maintaining stock keeping items at the desired level, whether they are raw materials, goods in process or finished products. Inventory control keeps track of inventory. The balance between high level and low level can be done by means of effective inventory control.

Thus the inventory control management includes the following aspects:

1) Size of inventory- Determining maximum and minimum levels, establishing time schedules, procedures and lot of sizes for new orders, ascertaining minimum safety levels, coordinating sales, production and inventory policies.

2) Providing proper storage facilities arranging the receipts, disbursements and procurement of materials, developing the forms of recording these transactions.

3) Assigning responsibilities for carrying out inventory control functions.

4) Providing for the reports necessary for supervising the overall activity.

Functions of Inventory Control

1) **Ensure Timely Availability of Material:** Inventory control helps in preventing delays due to lack of materials by ensuring regular supply of proper qualities of material at the right time. So it ensures timely availability of material and avoid built up of stock levels.

2) **Better use of Financial Resources:** It minimizes the capital investment in the stock of materials. The decision regarding appropriate size of inventory is significant. An unreasonably big or small inventory is uneconomical to any organization. The decision regarding size of inventory should be based on sound principles and techniques. This leads to healthy practice of wise spending in inventories.

3) **Protecting the Inventory from Losses:** A good inventory system develops a set of policies regarding loss due to improper handling or store of goods and unauthorized removal from stores. It reduces the risk of loss from fraud and theft. Stock analysis is done to be sure that obsolescence and deprecation are kept at minimum possible level.

4) **Provides Protection against the Uncertainties of Demand and Supply:** Maintenance of specified raw materials general supplies, work in process and component parts in sufficient quantities to meet the demand of production. Inventory control system ensures the regular supply of proper quantities of materials at the right time.

5) **Preparation of Accurate Material Reports:** Inventory control helps in keeping perpetual inventory system and other records to facilitate the preparation of accurate material reports. Perpetual inventory is a system of records maintained by the controlling department, which reflects the physical movements of stock and their current balance. It furnishes quickly and accurately the value of materials used in various departments. This facilitates quick decisions and prompts action.

6) **Determination of Results:** The proper determination of Profit depends upon the proper valuation. A major objective of accounting for inventories is the proper determination of income through the process of matching appropriate costs against revenues. It provides the data on running basis and thus facilitates the preparation of financial statements at shorter intervals.

7) **Minimize Wastages and Rate of Deterioration:** Inventory Control system also aims at controlling all types of wastages and losses of materials, which may arise due to carelessness in the storing, issuing, and handling of materials. It helps in eliminating wastage in the use of materials by controlling obsolete items and slow moving items-costs and losses.

Inventory Control Model

1) **Fixed Order Quantity System (Q-System):** According to this system, inventory is continuously checked and a new order is placed when the level of inventory reaches a certain point, called the reorder point. In this system, the order quantity (Q) is always constant and the order is placed when the level of inventory reaches the reorder point. This system is also referred to as reorder point system. The quantity to be ordered is determined by demand and cost considerations.

The fixed order quantity system assumes that the demand for inventories over a period of time (i.e., the usage rate of materials) is constant and the lead-time for replenishment of inventories is zero (i.e., materials are received immediately after they are ordered). With the passage of time, the level of stock gets steadily depleted until it reaches the point R (reorder point) and then the order is placed for Q units and the stock reaches the initial level.

The assumptions like no lead time, constant product demand, constant price per unit of product, constant ordering or set-up costs may not be applicable in real life situations. Thus, to improve the applicability of this system, firms adopt a more practical approach wherein the time between two successive orders is varied to accommodate the changes in demand.
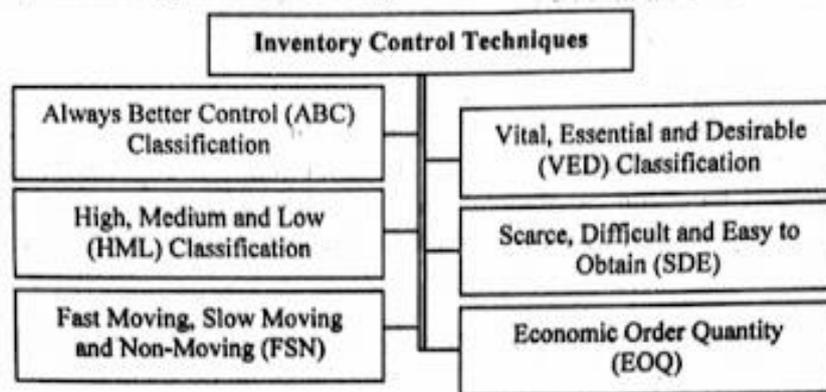
2) **Fixed Order Period System (P-System):** In the fixed order period system, the order period is fixed, but the order quantity varies with the requirement. The quantity ordered each time depends on the current inventory level or inventory in hand and future inventory requirements. Here, orders are placed at equal intervals of time ($T_1 = T_2 = T_3$) and the quantity ordered during T_1 is different from the quantity ordered at T_2. The level of inventory in this system is counted during the review period. The order size is determined on the basis of available and required inventory level. As this system is based on periodic review of inventory level, the cost involved in constant review can be saved. But the system requires higher levels of safety stocks to tide over any unexpected demand variations.

Inventory Control Techniques

Inventory control techniques are employed by the inventory control organization within the framework of one of the basic inventory models, viz., fixed order quantity system or fixed order period system. Inventory control techniques represent the operational aspect of inventory management and help realize the objectives of inventory management and control.

Several techniques of inventory control are in use and it depends on the convenience of the firm to adopt any of the techniques. What should be stressed, however, is the need to cover all items of inventory and all stages, i.e.,

from the stage of receipt from suppliers to the stage of their use. The techniques most commonly used are the following:

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                    ┌─────────────────────────────────┐
                    │   Inventory Control Techniques   │
                    └─────────────────────────────────┘
┌──────────────────────────────┐     ┌──────────────────────────────┐
│ Always Better Control (ABC)  │     │ Vital, Essential and Desirable│
│       Classification         │─────│     (VED) Classification       │
└──────────────────────────────┘     └──────────────────────────────┘
┌──────────────────────────────┐     ┌──────────────────────────────┐
│   High, Medium and Low       │     │   Scarce, Difficult and Easy to│
│    (HML) Classification       │─────│       Obtain (SDE)             │
└──────────────────────────────┘     └──────────────────────────────┘
┌──────────────────────────────┐     ┌──────────────────────────────┐
│  Fast Moving, Slow Moving     │     │   Economic Order Quantity     │
│   and Non-Moving (FSN)        │─────│         (EOQ)                  │
└──────────────────────────────┘     └──────────────────────────────┘
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1) **A-B-C (Always Better Control) Analysis:** The materials are divided into a number of categories for adopting a selective approach for material control. It is generally seen that in manufacturing concern, a small percentage of items contribute a large percentage of value of consumption and a large percentage of items of materials contribute a small percentage of value. In between these two limits there are some items, which have almost equal percentage of value of materials.

Under A-B-C analysis, the materials are divided into three categories viz., A, B and C. Past experience has shown that almost 10 percent of the items contributes to 70 per cent of value consumption and this category is called 'A' category. About 20 per cent of the items contribute about 20 per cent of value of consumption and this is known as category 'B' materials. Category 'C' covers about 70 per cent of items of materials, which contribute only 10 per cent of value of consumption. There may be some variation in different organization and an adjustment can be made in these percentages.

The information is shown in the **following diagram:**

Class	Number of items %	Value if items %
A	10	70
B	20	20
C	70	10
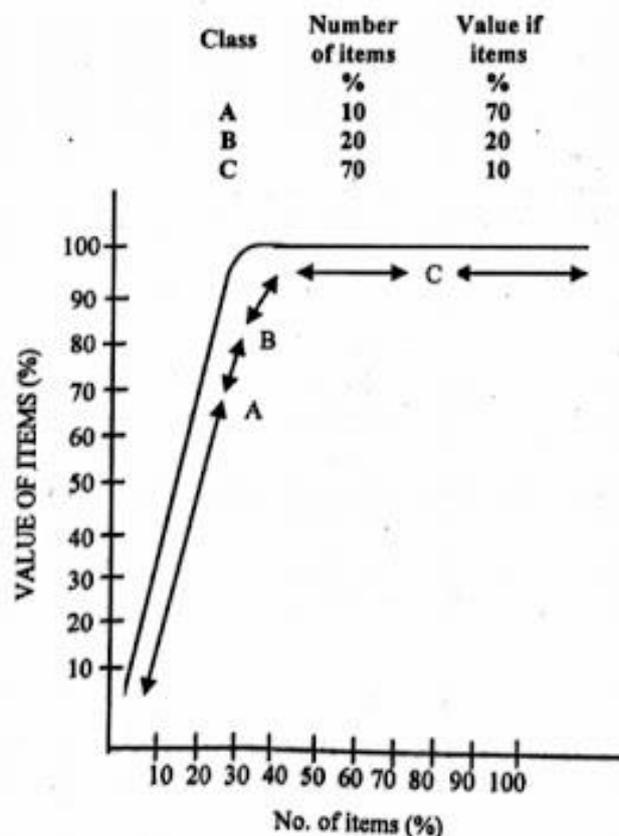
A-B-C analysis helps to concentrate more efforts on category A since greatest monetary advantage will come by controlling these items. An attention should be paid in estimating requirements, purchasing, maintaining safety stocks and properly storing of 'A' category materials. These items are kept under a constant review so that a substantial material cost may be controlled. The control of 'C' items may be

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relaxed and these stocks may be purchased for the year. A little more attention should be given towards 'B' category items and their purchase should be undertaken at quarterly or half-yearly intervals.

2) **VED Analysis:** In VED analysis, the items are classified on the basis of their criticality to the production process or other services. In the VED classification of materials, V stands **for Vital** items without which the production process would come to a standstill. E in the system denotes **Essential** items whose stock out would adversely affect the efficiency of the production system. Although the system would not altogether stop for want of these items, yet their non-availability might cause temporary losses in, or dislocation of, production. The D items are the **Desirable** items which are required but do not immediately cause a loss of production.

The VED analysis is done mainly in respect of spare parts.

3) **HML Analysis:** This is similar to the ABC analysis except that, in this analysis, the items are classified on the basis of unit cost rather than their usage value. The items are classified accordingly, as their cost per unit is H-high, M-medium, or L-low. This type of analysis is useful for keeping control over materials consumption at the departmental level.

4) **SDE Analysis:** This uses the criterion of the availability of item. In this analysis:
   i) S stands for **scarce** items which are in short supply,
   ii) D refers to the **difficult** items -- meaning the items that might be available in the indigenous market but cannot be procured easily;
   iii) E represents **easily** available items, from the local markets may be.

5) **FSN Analysis:** Based on the consumption pattern of the items, the FSN classification calls for classification of items, as **Fast-moving, Slow-moving, and Non-moving.** Some analysts classify the items as FNSD; Fast moving, Normal-moving, Slow-moving, and Dead (or non-moving). This 'speed' classification helps in the arrangement of stocks in the stores and in determining the distribution and handling patterns.

6) **Economic Order Quantity (EOQ):** EOQ is an important factor in controlling the inventory. It is a quantity of inventory which can reasonably be ordered economically at a time. It is also known as 'Standard Order Quantity', 'Economic Lot Size,' or 'Economical Ordering Quantity'. In determining this point **ordering costs** and **carrying costs** are taken into consideration. Ordering costs are basically the cost of getting an item of inventory and it includes cost of placing an order. Carrying cost includes costs of storage facilities, property insurance, and loss of value through physical deterioration, cost of obsolescence. Either of these two costs affects the profits of the firm adversely and management tries to balance these two costs. The balancing or reconciliation point is known as **economic order quantity.**

Advantages of Inventory Control
Proper management and control of inventories will result in the following benefits to an organization:
1) Inventory control ensures an adequate supply of materials and stores minimizes stock-outs and shortages and avoids costly interruptions in operations.
2) It keeps down investment in inventories, inventory carrying costs and obsolescence losses to the minimum.
3) It facilitates purchasing economies through the measurement of requirements on the basis of recorded experience.
4) It eliminates duplication in ordering or in replenishing stocks by centralizing the source from which purchase requisitions emanate.
5) It permits a better utilization of available stocks by facilitating inter-department transfers within a company.
6) It provides a check against the loss of materials through carelessness or pilferage.
7) It facilitates cost accounting activities by providing a means for allocating material costs to products, departments or other operating accounts.
8) It enables the management to make cost and consumption comparisons between operations and periods.
9) It serves as a means for the location and disposition of inactive and obsolete items of stores.
10) Perpetual inventory values provide a consistent and reliable basis for preparing financial statements.

1.3.3.7. Production Management Information System

Production is the process of making finished products from raw materials. It consists of many interrelated activities. This can be summarized as under:

1) Production scheduling (deciding which goods should be produced in a given span of time and in what lot sizes),
2) The physical act of producing, and
3) Determination of inventory level.

Firms to model the production process into an integrated system like MRP I or MRP II use computerized approaches. Materials requirement planning is category of software, which automates the process of production planning. MRP II (Manufacturing Resource Planning) integrates all the resources required to make a product like personnel, machine, pricing, distribution and cost accounting against each conformed order.

Steps Involved in an MRP II System

1) First Sales forecast is made with the help of which the number of products available for shipment is identified.
2) From the sales forecast production schedule is prepared to achieve production goals to meet the projected demand.
3) Then, bill of materials is prepared on each product. It is exploded further to arrive at the total raw material requirement.
4) These requirements are checked against stock on hand to determine order requirements.
5) Keeps track of production process dynamically.
6) Used to produce various management reports on the status of the production process.

Today over 200 MRP II package is available targeted to specialize manufacturing environments. Important packages are:

1) Avalon CIIM, (Avalon Software Corporation),
2) Oracle (Oracle Manufacturing Corporation),
3) ERP-R/3 System (SAP America).

Product Design

Product design is the starting point of any manufacturing process. It is through this process the design and technical specifications for the product are finalized. Increasingly, product design and Engineering specification are becoming more computerized through approaches such as Computer Aided Design (CAD) and Computer Aided Engineering (CAE).

With CAD and CAE, product designers use technology to design a product and, before it goes into production, to thoroughly test it for such concerns as safety, durability, and ease of productivity. The initial design can be input to the CAD system in various ways, including drawing sketches on a digitizing tablet, or using solid-modeling software to build a series of equations.

After the product is digitally represented, it can also be tested by referencing various specification databases or by simulating its performance under real-world conditions, to make sure that it meets a set of standards. Increasingly, artificial intelligence techniques are applied to CAD systems to analyze and appraise functional characteristics of a design thus reducing the expenses associated with making of physical prototypes.

CAD and CAE are helpful when designing such products as automobiles, aircraft, ships, buildings and even sports shoes. Besides playing an important decision support role in the designing and Engineering of durable goods, CAD is also very useful in such fields as arts, advertising and movie production.

Figure 1.18 shows the concept of CIM and its role in the organizational setup.

Manufacturing Information Systems help companies simplify, automate and integrate many activities which are required to produce products. **For example**, computers help engineers design better products using Computer Aided Engineering and Computer Aided Design (CAD).

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Materials requirement planning system helps in planning the material required for production process. This is integrated with production scheduling and shop floor operations. This is popularly known as **Manufacturing Resource Planning (MRP).**

Computer Aided Manufacturing (CAM): These systems automate the production process. The automation of the production process can be accomplished by monitoring and controlling the production processes through Manufacturing Execution Systems. This can also be done by directly controlling a physical process (Process Control) or a machine tool (Machine Control) or machines with some human-like work capabilities (robots).
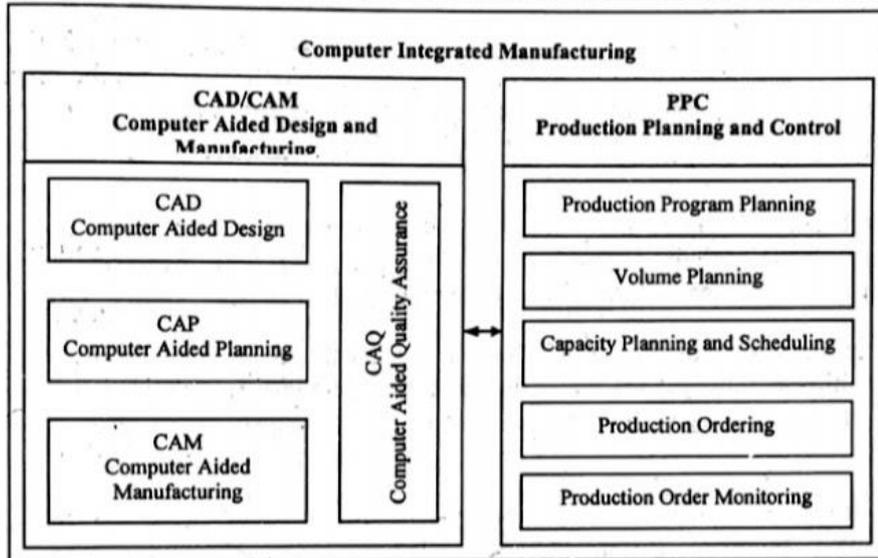
Figure 1.18: Components of Product Design

Process Control System
Process control systems use computer hardware and software to control physical production processes. Typically analog devices monitor heat, the pressure in processing chambers, and the chemical composition of the products, and then input the information to a computer. The process control software evaluates the input data and makes decision at part with pre-set control limits.

2) **Decision Support Systems (DSS):** DSS are a natural progression from management reporting systems and transaction processing systems. Decision support systems are interactive, computer-based information systems that use decision models and specialized databases to assist the decision-making processes of managerial end users.

According to Scott Morton, "Decision Support System (DSS) as Interactive computer based systems, which help decision-makers utilize data and model to solve unstructured problems".

Decision support systems are computer-based information systems that provide interactive information support to managers and business professionals during the decision-making process.

Types of Decisions in Organisation at different Levels

i) **Structured Decisions:** It is also called **programmed decisions**, involves situations where the procedures to follow when a decision is needed can be specified in advance. Therefore, such decisions are structured or programmed by the decision procedures or decision rules developed for them.

Programmed decisions have short-run impact and are taken by lower level managers, such as, granting leave to an employee, purchase of materials in normal routine, etc.

For example, a television mechanic may immediately decide to perform, a certain operation in response to a specified set of symptoms. Similarly, a purchase manager may decide to request a certain amount of supplies as soon as the existing stock drops below a specified level. He makes decisions automatically on the basis of well-established-information.

ii) **Unstructured Decisions:** Unstructured Decisions also called **non-programmed decisions**, involve decision situations where it is not possible or desirable to specify in advance most of the decision procedures to follow. Many decision situations in the real world are unstructured, because they are subjected to too many random or changeable events or involve too many unknown factors or relationships.

For example, a biochemical researcher making a decision about the appropriate dosage of a radically, new drug is making in non-programmed decision. His decision is not made automatically by recourse to pre-established alternatives.

iii) **Semi-Structured Decisions:** In the middle of the field are semi-structured decisions, and this is where most of what are considered to be true decision support systems are focused. Decisions of this type are characterized as having some agreement on the data, process, and/or evaluation to be used, but are also typified by efforts to retain some level of human judgment in the decision making process.

Semi-structured decisions can be made at all levels of an organization. They strike the balance between everyday routine decisions that require quite a limiting thought process and more unstructured decisions that are more thought provoking and less frequent.

Comparison between Different Types of Decisions in Organisation at Different Levels

Table 1.4: Decision at Various Levels of Organisation

Decision Structure	Operational Management	Tactical Management	Strategic Management
Unstructured	Cash Management	Business Process reengineering Work Group performance Analysis	New Business Planning Company Reorganization
Semi-Structured	Credit Management Production Scheduling Daily Work Assignment	Employee Performance appraisal Capital Budgeting Program Budgeting	Product Planning Mergers and Acquisitions Site Location
Structured	Inventory Control	Program Control	Overall Management Decisions

2.9 Decision Support Systems (DSS)

Decision support systems ("DSS") are specifically designed to help management make decisions in situations where there is uncertainty about the possible outcomes of those decisions. A decision is considered unstructured if there are no clear procedures for making the decision and if not all the factors to be considered in the decision can be readily identified in advance. DSS comprise tools and techniques to help gather relevant information and analyses the options and alternatives. DSS often involves in data warehouses, executive information systems (EIS). Decision-support systems are data and decision logic oriented.

A key factor in the use of decision support systems is determining what information is needed. In well-structured situation it is possible to identify information needs in advance, but in an unstructured environment, it is difficult to do so. As information is acquired the manager may realize the additional information is required; that is, having information may lead to the realization of other requirements.

Consider the decision process followed by banking officers who must decide whether to begin offering cash management accounts or installing automatic teller machines – both completely new banking services. Among the many questions to be addressed are these: What will watch service cost? How many teller locations will be needed? How will the competition respond to this? What limits should be placed on withdraws at any one time? Can a charge be imposed for this service? Will this service result in additional deposits and thus more cash inflow for the bank?

In such cases, it is impossible to pre – design system report formats and contents. A decision support system must therefore have greater flexibility than other information systems. The user must be able to request reports by defining their content and even by specifying how the information is to be produced. Similarly, the data needed to develop the information may alginate from many different files or databases, rather than from a single master file, as is often the case with transaction systems and many reporting systems.

Manager judgment plays a vital role in decision-making where the problem is not structured. The decision support system supports, but does not replace, manager judgment.

Information systems expressly designed to support individual and collective decision making by making it possible to apply decision models to large collections of data. These systems are designed to support the decision-making process, rather than render a decision.

Types of DSS

Data Analysis System

Data analysis systems are developed using simple data processing tools and business rules. These systems rely on comparative analysis, application formula, and use of algorithms. Such systems are generally used for conducting cash flow analysis and fund flow analysis.

Information Analysis System

Information available to the management needs to be analyzed to arrive at a result. The analyzed data is print in the form of reports for the perusal of the decision maker. By going through these reports, the decision makers can take decisions. Such information analysis systems are used form:

Generating sales analysis reports etc.

Accounting Systems

Though accounting systems do not contribute directly to decision making, they can be of great value in tracking business functions. These systems track information regarding cash, inventory, ad personnel. In most of these systems, predetermined standards are used a comparison made between the actual and the standards. The results of such comparison help the management exercise in the organization and arrive at a decision.

Status Enquiry System

Some decisions in the operational and middle management level do not require any elaborate computations, analysis, selection etc. These decisions can be taken easily if the current status is known. Railway reservation systems are an example of status enquiry systems. The system displays the status based on availability.

ENTERPRISE RESOURCE PLANNING (ERP)

3.1. ENTERPRISE RESOURCE PLANNING (ERP)

3.1.1. Concept

Enterprise Resource Planning as a term derives from material resource planning. Enterprise Resource Planning systems (ERPs) integrate (or attempt to integrate) all data and processes of an organization into a unified system. A typical ERP system will use multiple components of computer software and hardware to achieve the integration. A key ingredient of most ERP systems is the use of a unified database to store data for the various system modules.

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

"ERP is the technological backbone of e-business, an enterprise-wide transaction framework with links into sales order processing, inventory management and control, production and distribution planning, and finance."

Typically, before ERP implementation, each department has its own computer system optimized for the requirements that a department needs. ERP combines all the business requirements of the company together into a single, integrated software programs that runs off a single database so that the various departments can more easily share information and communicate with each other. As shown in **figure 3.1,** conceptually ERP replaces the old standalone computer systems in finance, HR, manufacturing, etc., with a single software program that facilitates various functional modules.
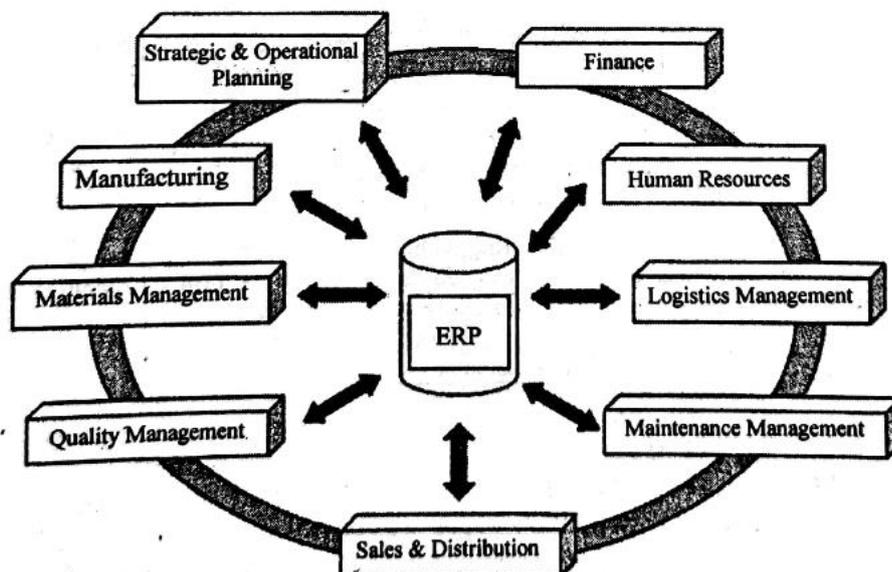

Figure 3.1: ERP Systems

Thus everybody from the finance, manufacturing, purchasing, etc. will still get their own advantages of software, along with the added feature of availability of information across other departments to improve decision quality. **For example,** someone in finance can use ERP to see if any sale order has been shipped from the warehouse so that he can now confidently plan for working capital management for the next period.

3.1.2. Origin of ERP

Figure 3.2 shows the various phases of development in relation to time, development in resource planning systems, and the evolution of the concept of ERP.
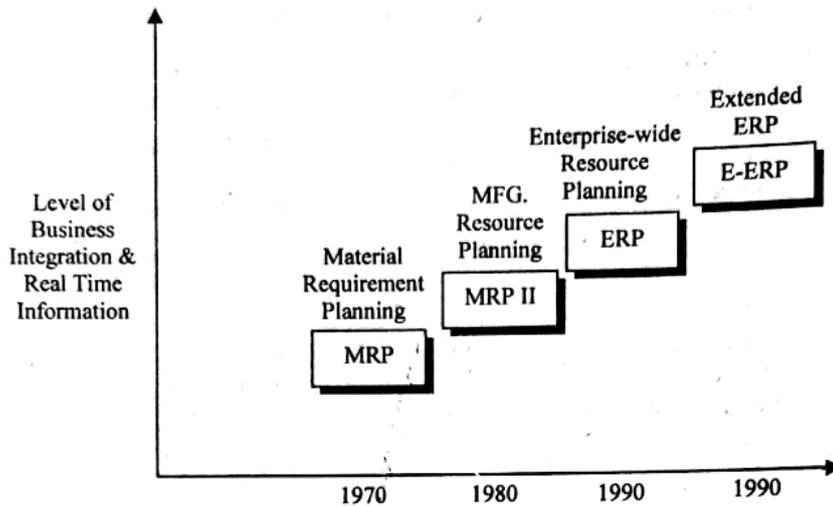

Figure 3.2: ERP Historical Overview

Table 3.1 shows the historical evolution of ERP systems.

Table 3.1: Historical Evolution of ERP Systems

| Types of Systems	Time	Purpose	Systems
Recorder Point Systems	1960s	Used historical data to forecast future inventory demand; when an item falls below a predetermined level, additional inventory is ordered	Designed to manage high-volume production of a few products, with constant demand; focus on cost
Materials Requirement Planning (MRP) Systems	1970s	Offered demand-based approach for planning manufacture of products and ordering inventory	Focus on marketing; emphasis on greater production integration and planning
Manufacturing Resources Planning (MRP-II) Systems	1980s	Added capacity planning; could schedule and monitor the execution of production plans	Focus on quality; manufacturing strategy focused on process control, reduced overhead costs, and detailed cost reporting
MRP-II with Manufacturing Execution (MES) Systems	1990s	Provide ability to adapt production schedules to meet customer needs; provide additional feedback with respect to shop floor activities	Focus on the ability to create and adapt new products and services on a timely basis to meet customers' specific needs
ERP (Enterprise Resource Planning) Systems	Late 1990s and onward	Integrate manufacturing with supply chain processes across the firm; designed to integrate the firm's business processes to create a seamless information flow from suppliers, through manufacturing, to distribution to the customer	Integrates supplier, manufacturing, and customer data throughout the supply chain

3.1.3. Need of ERP Systems

The following are some of the direct benefits which shows, why an ERP system is needed:

1) **Business Integration:** The reason why ERP packages are considered to be integrated, is the automatic data updation (automatic data exchange among applications) that is possible among the related business components. Since conventional company information systems were aimed at the optimization of independent business functions in business units, almost all were weak in terms of the communication and integration of information that transcended the different business functions. In the case of ERP packages, the data of related business functions is also automatically updated at the time a transaction occurs. For this reason, one is able to grasp business details in real time, and carry-out various types of management decisions in a timely manner, based on that information.

2) **Flexibility:** The second need of ERP packages is their flexibility. Different languages, currencies, accounting standards and so on can be covered in one system, and functions that comprehensively manage multiple locations of a company can be packaged and implemented automatically. To cope with company globalization and system unification, this flexibility is essential, and one can say that it has major advantages, not simply for development and maintenance, but also in terms of management.

3) **Better Analysis and Planning Capabilities:** By enabling the comprehensive and unified management of related business and its data, it becomes possible to fully utilize many types of decision support systems and simulation functions. Furthermore, since it becomes possible to carry-out, flexibly and in real time, the filing and analysis of data from a variety of dimensions, one is able to give the decision-makers the information they want; thus enabling them to make better and informed decisions.

4) **Use of Latest Technology:** ERP vendors were very quick to realize that in order to grow and to sustain that growth; they had to embrace the latest developments in the field of Information Technology. Therefore, they quickly adapted their systems to take advantage of the latest technologies like open systems, client/server technology, Internet/Intranet, CALS (Computer-Aided Acquisition and Logistics Support), electronic-commerce, etc. It is the quick adaptation to the latest changes in Information Technology that makes the flexible adaptation to changes in future business environments possible.

3.1.4. Characteristics of ERP

Some of the salient features of ERP are:
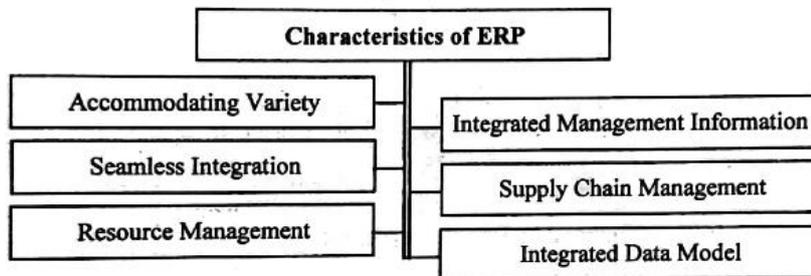
1) **Accommodating Variety:** The ERP software solution provides both multi-lingual and multi-currency capabilities. Also, multi-mode manufacturing and multi-facility provide the capability required to compete and succeed globally.

2) **Integrated Management Information:** Today's business managers use ERP for:
   i) Flexible reporting tools to extract the information as and when needed without depending on an information system department (MIS department).
   ii) Electronic data interchange (EDI) to electronically accept customer information like purchase orders, schedule amendments or cash payments and electronically send order acknowledgement and invoices to customers.
   iii) Imaging to provide the ability to display drawings or specifications, ability to store original sale orders, purchase orders, quotations, and contracts.
   iv) **Database Creation:** Starting with time and attendance reporting, monitoring and control of machines and post-sales statistics.

3) **Seamless Integration:** Integration of new product introductions or changes to existing products fully into the enterprise system, also known as 'engineering change management', is crucial to the enterprise. The engineering change management should include electronic approval, routing, change-order process routing, revision-level control and automatic generation of product structures.

4) **Supply Chain Management:** End-to-end supply chain management is crucial for enterprises having multiple manufacturing units and distribution networks. Intelligent Resource Planning (IRP) is used to optimize the overall flow of demand and supply data and to build relationship between various activities to optimally identify the demand supply chain.

5) **Resource Management:** The resources such as equipment and human resources should be effectively managed. To facilitate effective management of equipment resources, on line records of equipment location and status need to be kept and proper accounting methods need to be followed in respect of operating costs and maintenance costs.

To manage human resources effectively, functions such as employee database job descriptions and evaluations, applicant tracking, requisition management, performance review, cost benefits, career and succession planning, creating alternate organization structures, taking care of training needs etc., are provided by the ERP software package.

6) **Integrated Data Model:** The heart of any ERP system is the creation of an integrated data model which has a true integration capability over the entire enterprise system particularly providing the data for employees, suppliers and customers.

3.1.5. ERP Structure

The two popular types of ERP architecture are:

1) **Two-Tier Architecture:** In this type, the server handles application and database duties. The clients present the data and pass user input back to the server. While there may be multiple servers and the clients may be distributed across several types of local and wide area links, this distribution of processing responsibilities remains the same. **Figure 3.3** depicts the two-tier architecture.
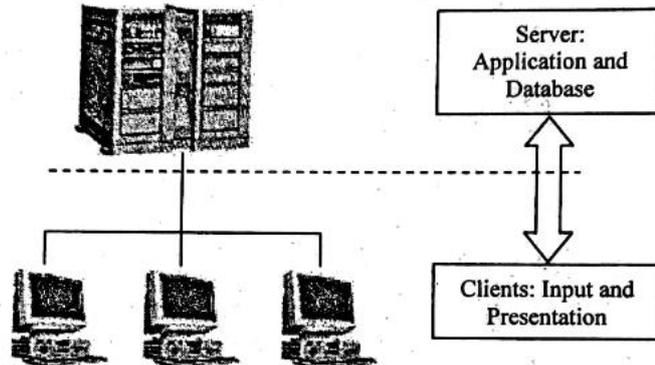

Figure 3.3: Two-tier Architecture

2) **Three-Tier Architecture:** In three-tier architectures, the database and application functions are separated. In this scenario, satisfying client requests requires two or more network connections. Initially, the client establishes communications with the application server. The application server then creates a second connection to the database server. **Figure 3.4** gives a pictorial view of three-tier architecture.
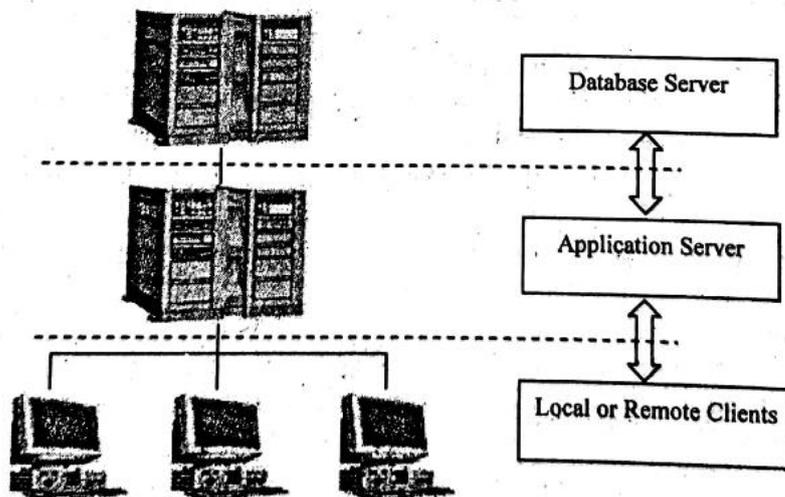

Figure 3.4: Three-tier Architecture

Any ERP Architecture has to be designed for three basic functional areas:

1) **Database:** The central repository for all the data transferred to and from the client.

2) **Clients:** Here raw data gets inputted, request for information is submitted, and data satisfying this request are presented.

3) **Application component:** Acts as an intermediary between the client and the database.

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Types of ERP Modules

Some of the important and common ERP modules offered by all the ERP vendors (**figure 3.6**) are:

1) **Finance Module:** Finance pervades all activities of business – production, marketing, planning and the like. Knowledge of economics, accounting, production and marketing is necessary to understand the finance function of the business. Finance includes investment decision, finance decision and dividend decision. There are traditional and modern approaches to financial management. Financial management is concerned with not only the adequate acquisition of funds at the appropriate time but also its proper utilization in the interest of one and all.
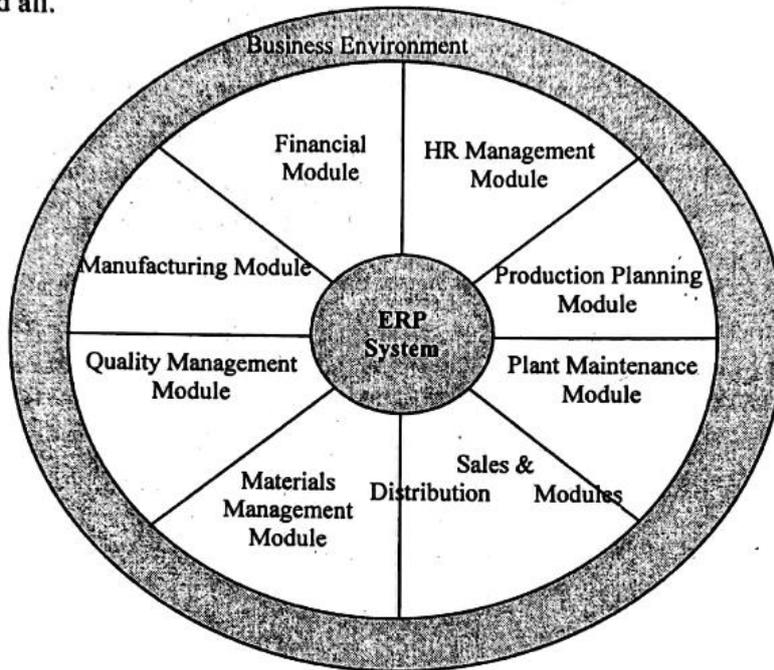

Figure 3.6: ERP Modules

2) **Manufacturing and Production Module:** The term **production** or operations is often used interchangeably with manufacturing, because modern production methods were first developed and applied in manufacturing industries. But even though a service like dry cleaning does not produce a tangible object, production figures into the services. On viewing production as a process, it becomes clear that even services such as dry cleaning begin with resources – cleaning fluid, machines, presses and people – and end up with a product – clean clothes.

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.

3) **Sales and Distribution Module:** The Sales and Distribution Module of an ERP package helps the organization to achieve its business targets through its key elements. The organization needs to maintain its customers' details, order details and supplier details. Then, the product once billed, it has to he properly delivered. Determining the cost of the product involves pricing strategies adopted by the company. Based on the customer's order suitable purchase orders have to be placed to the suppliers at right time to ensure proper delivery to the customers. All these activities will take place continuously and should be monitored and necessary directions have to be given to the concerned departments of the organization for smooth functioning of the sales and distribution process.

4) **Human Resources Management Module:** An HR module is an important module in an ERP package. Many organizations prefer to replace their existing system by an HR module of ERP package. The HR module aims at automating the Human Resource Management activities and helps the organization to have a continuous monitoring over thousands and thousands of their employees. The HR module of an ERP package also helps the organization to speed up the process, reduce the manpower in the HR team, effective decision making, significant forecast of human resource requirements, and interface with financial management, appraising the employees, training, and career advancement and so on.

5) **Plant Maintenance Module:** The Plant Maintenance module provides an integrated solution for supporting the operational needs of an enterprise – wide system. 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. Plant Maintenance supports various options for structuring technical systems with its object, type and function-related views, and enables flexible navigation. Data concerning the planning, processing and history of maintenance tasks is documented in the system and complies with business verification requirements.

6) **Material Management Module:** Materials Management Module (MM) is the preferred module for most of the manufacturing companies than any other ERP module. The main difficulties faced by these organizations are the poor maintenance of stock, inabilities to meet the deadlines and to provide smooth services to the suppliers and to ensure proper service to the customers and so on. MM Module of the ERP package is provided with all these features and helps the organization to have its inventory properly managed and monitored. Based on the MM module reports, the top management can take suitable steps to improve its position to retain suppliers and customers, who are backbone of any manufacturing company.

7) **Quality Management Module:** 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. These standards require that Quality Management systems penetrate all processes within an organization. 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.

3.1.2. Advantages of ERP

1) **Reduction of Lead-Time:** The 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. 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 competition.

2) **On-Time Shipment:** 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.

3) **Reduction in Cycle Time:** Cycle time is the time between receipt of the order and delivery of the product. Cycle time can be reduced by the ERP systems. 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 that is closest to the customer and which has the item in stock is identified.

4) **Improved Resource Utilization:** The capacity planning features of most ERP systems offer, both rough-cut and detailed capacity planning. ERP systems also have simulation capabilities that help the capacity and resource planners to simulate the various capacity and resource utilization scenarios and choose the best option. Thus, the ERP systems help the organization in drastically improving the capacity and resource utilization.

5) **Better Customer Satisfaction:** 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.

6) **Improved Supplier Performance:** ERP systems provide vendor management and procurement support tools designed to coordinate all aspects of the procurement process. They support the organization in its efforts to effectively negotiate, monitor, and control procurement costs and schedules while assuring superior product quality.

7) **Increased Flexibility:** Flexibility is a key issue in the formulation of strategic plans in companies. ERP systems not only improve the flexibility of the manufacturing operations, but also the flexibility of the organization as a whole.

8) **Decision-Making Capability:** ERP systems will help in improving the accuracy of information and thus help in better decision-making.

3.1.3. Disadvantages of ERP

1) **Expense and Time in Implementation:** Getting the full benefits of ERP takes time and money. Although ERP offers many strategic advantages by streamlining a company's TPSs, large firms typically need three to five years and spend tens of millions of dollars to implement a successful ERP system.

2) **Difficulty Implementing Change:** In some cases, a company has to radically change how it operates to conform to the ERP's work processes – its best practices. These changes can be so drastic to long-time employees that they retire or quit rather than go through the change. This exodus can leave a firm short of experienced workers. Sometimes, the best practices simply are not appropriate for the firm and cause great work disruptions.

3) **Difficulty Integrating with Other Systems:** Most companies have other systems that must be integrated with the ERP system, such as financial analysis programs, e-commerce operations, and other applications. Many companies have experienced difficulties making these other systems operate with their ERP system. Other companies need additional software to create these links.

4) **Risks in Using One Vendor:** The high cost to switch to another vendor's ERP system makes it extremely unlikely that a firm will do so. After a company has adopted an ERP system, the vendor has less incentive to listen and respond to customer concerns. The high cost to switch also increases risk – in the event the ERP vendor allows its product to become outdated or goes out of business. Selecting an ERP system involves not only choosing the best software product but also the right long-term business partner.

5) **Risk of Implementation Failure:** Implementing an ERP system is extremely challenging and requires tremendous amounts of resources, the best IS and business people, and plenty of management support. Unfortunately, installations occasionally fail, and problems with an ERP implementation can require expensive solutions.

3.1.1. Difference Between Traditional Methods and ERP

Table below shows the difference between traditional methods and ERP.

Table 3.2

Basis	Traditional Methods	ERP
Cycle Time	Costly bottlenecks	Time and cost reduction of business processes.
Transactions Processing	Multiple transactions use multiple data files	Faster transactions, using common data, Reduces the time and cost of multiple updates.
Financial Management	Increased cost of excess inventory, cost of overdue accounts receivable	Improves operational performance (e.g., less excess inventory, reduction in accounts receivable).
Business Processes	Proliferation of fragmented processes with duplication of effort	Re-engineering around a business model that conforms to "best practices".
Productivity	Lack of responsiveness to customers and suppliers	Improvements in financial management and customer service.
Supply Chain Management	Lack of integration	Linkages with suppliers and customers.
eBusiness	Web-based interfaces support isolated systems and their components	Web-based interfaces are front-end to integrated systems.
Information	Lack of tactical information for effective monitoring and control of organizational resources	Allows cross-functional access to the same data for planning and control. Provides widely available information.
Communications	Lack of effective communications with customers and suppliers	Facilitates organizational communications with customer and suppliers.

9.4 In-house Implementation: Pros and Cons

As designing and implementing a software package is not the business of most of the companies, the system that their in-house team develops are not having quality, scope, functionality or technology as compared to software created by software firms. Hence it is better for a company to concentrate on their business and leave the job of ERP implementation on software firms who are in that business. But to get maximum benefit – out of packaged solution, the company should participate fully during a package implementation.

The company should plan the participation of employees so every person could have an appropriate role in the implementation project so that, it has enough experts in-house once the implementation is over.

The people who are implementing ERP system should have the good knowledge of product along with following skills:

1. Knowledge of how to organize and run a project of this magnitude, i.e., good organizational skill, project management, team management skill and knowledge of scientific method of software project management

2. Enough experience in handling problem and issues that arise during the implementation e.g. problems like cost over runs, time overruns etc.

3. Good people skills: ERP implementation will face resistance from the employee i.e. will be ignorance about the product, fear of an un-employment, fear of training, fobia of technology etc. That's why it is very important that people in the implementation team are very good, diplomats, adapt at diffusing crises situations.

4. Good leadership skills: An ERP implementation involves many people, thus is necessary for vendors to adapt good communication and leadership skills. This is required for implementation with existing employees.

5. Excellent – training skills: As the team training and end user training are the important phases of implementation process, the excellent training should provided by the vendor.

As the end users are handling the whole systems, the success of an ERP implementation is in their hands. The training should be given perfectly before leaving the company by a ERP vendor.

Besides this the successful ERP implementation also depends on the post implementation (maintenance mode) scenario.

What happens if company itself goes for a ERP development or project?

As today's business trend is to reduce the manpower and focus on company's competitors, the responsibilities of ERP implementation taken by in-house resources is rightly justified.

If a company wants to plan in-house implementation, it might hire experts and have them on the company's rolls. This is expensive proposition as once the implementation is over, there is no need of keeping experts in the business.

In post implementation phase itself company trained the in – house people so that, they can help company in implementation efforts on other units of company and in providing training to the other employees using of system. This saves lot of money of company that would have been spent on hiring trainers.

New Trends Emerging in Enterprise Resource Planning (ERP)

ERP software has its foundations in the manufacturing industry since the nineties wherein the ERP application were utilized for manufacturing resource planning (MRP). Still, ERP has developed itself to cover all the crucial activities of a business, no matter which industry sector it has been implemented. Now, both public and private sector use ERP for their core business operations in some or the other form. ERP applications tend to be compatible in nature, sharing significant business information which is controlled by a centrally located database.

ERP software still stay fundamental in the present business setup which allows quick and effective decision making. Numerous organizations are taking up ERP software solutions for accomplishing operational excellence without realizing that it is in a state of constant change, which implies that the fate of ERP is probably going to be influenced by upcoming technology and social patterns. However, ERP users can avail benefits if they adopt new ways to innovation.

Enterprise Resource Planning (ERP) has lot to benefit from accepting an open way to new technological changes and innovations. Here are some trends that can shape the future of ERP, if it is implemented correctly:

1.Big Data: -
Organizations have turned out to be more subjective to IT and, therefore, they have aggregated lots of information that has been normally underutilized. By using analytical devices, organization can start to utilize this information to make accurate forecasts that will help in proposing business strategy.

2.Cloud ERP: -
Cloud ERP will proceed to rise and will be largely acknowledged with most ERP systems. Decreased expenses in capital uses and IT resources, enhanced flexibility and maintenance, and in addition improved security and failure improvement will make the cloud attractable to all organizations.

3.Acceptance of ERP software by small and mid-sized business: -
With expanded ease of use and cloud arrangement choices, small and mid-sized businesses will look for the additional value of an ERP system. Decreased cost to adopt and implement ERP will make it a suitable asset for organizations of all sizes.

4.Mobile ERP Accessibility: -

The organizations employees, executives always need real-time access to various information at any given place and time, either its workplace or on site. Therefore, it is believed that organizations will start accepting the Mobile ERP to deal with ERP reports, dashboard in real time to perform quicker decisions.

5.Social Media Trend: -

Number of ERP merchants have seen the value of web-based social networking and have integrated it into their systems. They even have made their user interface like the well-known social media channels where the client and the vendor can have live interaction about ERP. Sales, Customer Service and Marketing can interface with clients and customers allowing for purposeful marketing activities and increased brand loyalty.

Functional Areas That an ERP System can Automate

Organizations implement ERP systems for a variety of reasons. While one organization may want to streamline its order-to-cash process, another might be more interested in refining its hiring practices.

To address these unique needs, ERP vendors have developed systems that address a variety of functional areas. Below are examples of five functional areas that can be improved with the implementation of a modern ERP solution:

Finance, Accounting, Payables and Receivables

Virtually every organization that invests in an ERP system does so in order to gain greater control over their financial operation. All financial activity within your organization can benefit from an integrated ERP system. It enables your organization to successfully manage financials with a modern, integrated interface geared to higher levels of productivity and transparency.

Customer Service

Many ERP systems have e-commerce functionality. Others integrate well with standalone e-commerce systems. In either case, you can gain better data insights by ensuring your e-commerce function isn't siloed. Better data insights can in turn improve your customer service. One of our process manufacturing clients implemented an integrated ERP system that automated their inbound customer service, giving reps more time for outbound calls.

Supply Chain Management

Successfully refining the supply chain management function is the holy grail for manufacturing companies that deal with materials, inventory, assembly and line personnel. ERP software can help

you streamline your manufacturing processes domestically and internationally. When dealing with variations such as manufacturing compliance from country to country, currency fluctuations and import/export laws, an ERP solution well-versed in supply chain management can be a valuable asset.

Order Processing

An order processing module within an ERP system is designed to help an organization better manage order entry, credit checking, shipping, sales analysis and reporting. Oracle SCM Cloud and others like it provide the capability to manage inventory, shipping and other fulfilment tasks. Many of these systems also feature customer interface modules that can integrate into your company's website and various modules with IoT capability.

Human Resources

ERP solutions with a human resources module can improve the management of staff system-wide and is a great benefit for any organization no matter the size. Robust capabilities are not necessary for every organization, but for those that do require them, there are a few providers that offer it.

Project Management

When activities such as billing, expense management and human capital management must be accounted for and incorporated into your overall balance sheet, ERP solutions can play an important role in helping your organization run smoothly and accommodate when scalability is necessary.