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❖ TYPES OF INFORMATION SYSTEMS

Primarily, information systems may be classified into three broad categories depending upon their focus on the kind of activities in a business enterprise. These categories are as follows:

a) Operations Support systems
b) Management Support systems
c) Office Automation systems.

❖ OPERATIONS SUPPORT SYSTEMS

The operations support systems focus on the operations of the enterprise. The basic objective of these systems is to improve the operational efficiency of the enterprise. As these systems are not concerned primarily with operations, they use internal data primarily for managers at the lower levels.

The operations support systems may be further classified into the following categories:

- Transaction Processing systems
- Management Information Systems
- Enterprise resource Planning Systems.

❖ Transaction Processing systems:

- ✓ A transaction processing system (TPS) focuses on the recording and processing of economic events (transactions) in the enterprise.
- ✓ Its scope encompasses the entire scope of daily routines of the enterprise including financial accounting, inventory control, payroll, and sales order processing system.
- ✓ Generally, the TPS is structured around the type of transactions in an organization. For example, a financial Accounting system would be structured around financial accounting transactions such as receipts, payments, invoices, purchase bills, journal transactions, etc.
- ✓ There are modules for processing of each of these transactions.

➢ *Features of TPS*

a) Large volume of data:

- ✓ As TPS is transaction oriented it, generally, contains large volume of data.
- ✓ These systems require greater storage capacity and their major concern is to ensure that the data regarding the economic events in the organizations are captured quickly and correctly.

b) Automation of basic operations:

- ✓ Any TPS aims at automating the basic operations of a business enterprise and plays a critical role in the day-to-day functioning of the enterprise.
- ✓ Any failure in the TPS for a short period of time can play havoc (confusion) with the functioning of the enterprise.
- ✓ Any weakness of TPS may lead to failure in either obtaining input from environment or provide output to environment.
- ✓ TPS links the enterprise with elements of the external environment (e.g. Customers, Vendors, shareholders, etc.).
- ✓ Thus, TPS is important source of up-to-date information regarding the operations in the enterprise.

c) Benefits are easily measurable:

- ✓ TPS reduces the work load of the people associated with the operations and improves their efficiency by automating some of the operations.
- ✓ Most of the benefits of TPS are tangible and easily measurable.
- ✓ Therefore, cost benefit analysis regarding the desirability of TPS is easy to conduct.
- ✓ As the benefits from TPS are mainly tangible, the user acceptance is easy to obtain.

d) Source of input for other systems:

- ✓ TPS is the basic source of the internal information for other information systems.
- ✓ Heavy reliance by other information systems on TPS for this purpose makes TPS important for tactical and strategic decisions as well.

❖ **Management Information Systems**:

- ✓ A Management Information system(MIS) aims at meeting the information needs of managers, particularly with regard to the current and past operations of the enterprise.
- ✓ They offer summary reports on the operations of the enterprise and sometimes provide on-link link to individual transaction as well.
- ✓ That is why these systems are also called operations support systems.

➢ ***Features of MIS***

a) Summary Information:

- ✓ MIS helps managers by providing summary information regarding the operations. Such summary information is generally provided in the form of reports.
- ✓ These reports may be periodic, on call or exception reports. Earlier MIS were quite rigid in report formats and periodicity.
- ✓ However, with changing software technologies, modern MIS would generally offer online data query facility as well as flexible report writers that are quite simple to use.
- ✓ As MIS offer summary reports, without using much of data analysis tool, they are also termed as reporting systems.

Summarisation:
Summarization is an important activity in the process of generation of information. There can be four different ways in which data may be summarized. There are:

i) Aggregation:

- ✓ The most frequently used method of summarization of data is the aggregation of numeric values for each category or attribute.

- ✓ For example, daily sales of product for each day in a month may be summed up to get monthly sales figure.
- ✓ The aggregation could be for values over a period or across various organizational units at a point of time.
- ✓ The aggregation may be single level or multiple level. For example, obtaining total sales for the day is single level aggregation.
- ✓ Summation of daily sales to get weekly, monthly and yearly sales is an example of multiple level aggregation.

ii) Compacting:

- ✓ Text is aggregated with the help of compacting. In this this form of summarization, insignificant data is eliminated.
- ✓ For example, the statement "As per the notice issued by the secretary, the meeting of the members of the Purchase committee is scheduled to be held at 2.00 pm" may be summarized as "Meeting of Purchase committee at 2.00 pm".

iii) Statistics:

- ✓ Statistics offers a variety of ways in which data may be summarized. Averages, ratios, percentages, variances, etc. are the forms of summarization commonly used in business.
- ✓ Most MIS have restricted themselves to simple aggregation of numeric values. They have lacked in the summarization process.

Reporting:

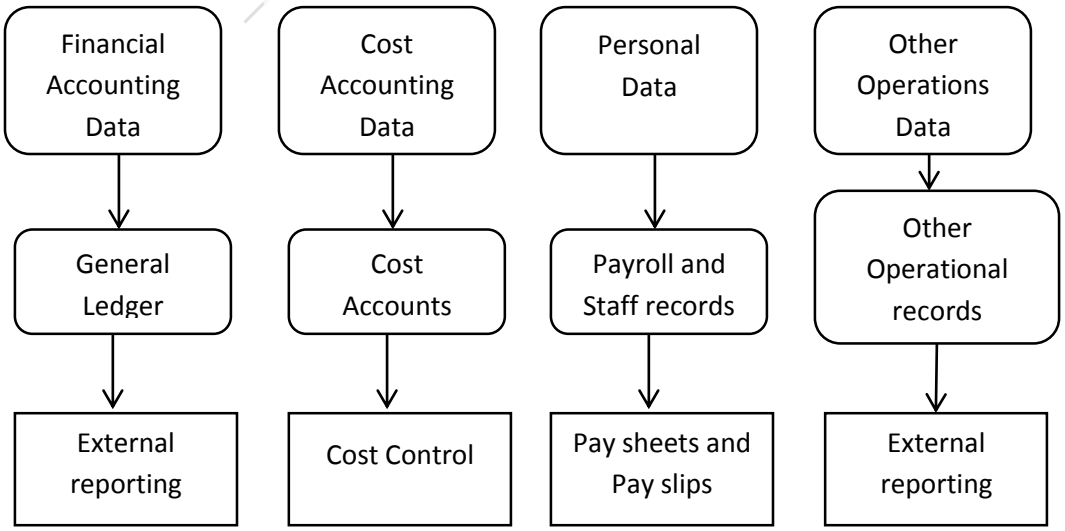
Information may be reported using verbal communication or presented using media such as paper, video, micro-fiche, etc. the formal communications originating from MIS are non-verbal reports containing narrative descriptions, tables, graphs, pictures, video clippings, etc. Business reports can be broadly classified as periodic, exception, key indicators, and on-call reports. MIS should aim at providing these types of reports as per the requirements of the users.

b) Operational Control:

- ✓ MIS also offers information regarding planned levels, previous period values and deviations. This helps in operational control and improving operational efficiency.
- ✓ MIS uses **internal data** and do not, generally, use any data from the external environment.

c) Focus on Internal Information:

- ✓ MIS primarily uses TPS or databases as source of input information. Thus, the focus of MIS is the internal environment.



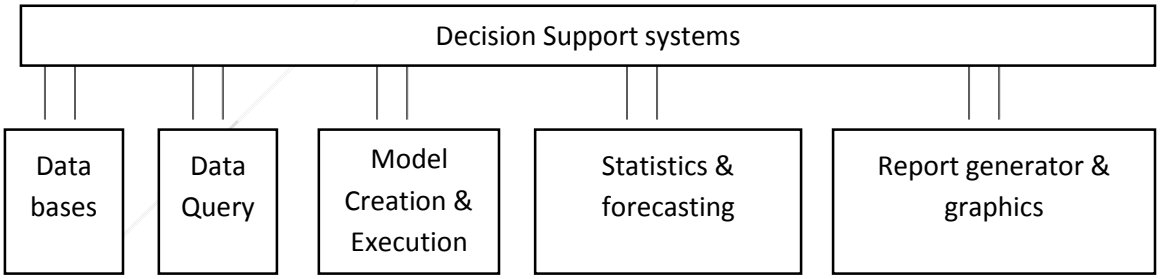
- ✓ As the role of internal information in managerial decision making is limited, MIS has only limited applications in the managerial process. The below diagram illustrates such applications:

d) Structured Decisions:

- ✓ AS the focus of MIS is internal information, it lacks advanced tools of data analysis, and as such are useful mainly for structured decisions in predictable type of decision making situations.

❖ Decision Support system

- ✓ Decision Support System (DSS) are designed to support the decision making process of managers to improve their effectiveness and thereby efficiency of enterprise.
- ✓ They are based on the premise that managerial judgment cannot be replaced by any computer based solution.
- ✓ However, by offering the support of data and models, it is possible to improve the decision making process even in the case of semi-structured and unstructured problems.
- ✓ The basic purpose of DSS is to extend the capability of a manager's decision making process by supporting tools and data made available to him under his direct control.
- ✓ DSS neither presupposes specific information requirements and predefined tools for analysis for different types of decisions nor does it impose any solutions on a manger.
- ✓ Thus it gives flexibility to the manager to decide the input data, tool of analysis, depth of analysis and reliance on the outcome of analysis for decision making.
- ✓ DSS offers an interactive environment for users and thus permits manager to experiment with data and models to develop the optimal decision making strategy in a given situation.
- ✓ DSS are also described as **interactive** information systems that help managers utilize **data analysis models** to solve **unstructured problems.**
- ✓ DSS uses technologies that may be termed as its building blocks. They are represented in the figure.



➢ *Types and Features of DSS*

- ✓ DSS may be data oriented or model oriented DSSs have greater input of data retrieval and data analysis.
- ✓ The model oriented DSS has powerful facilities for simulation of decision of decision scenarios by estimating the outcome of an action and generating suggestions.
- ✓ In fact, it is difficult to find a DSS exclusively for data retrieval and analysis or, simply, for modeling.
- ✓ In fact, most DSSs contain a mix of both types of facilities.

- ✓ DSSs have the following features that make them distinct from other types of information systems:
    1. DSS does not aim at any specific type of decisions. It has the **flexibility of use** in various unexpected decision situations.
    2. The **user friendly interface** of DSS makes it different from other types of information system. Once a manager has used a DSS from sometime, its irregular use does not adversely affect the ease of use.
    3. The **report generators and graphic facilities** in DSS provide better ways of representing the information generated by use of models in DSS. These facilities add value to the information.
    4. DSS offers any user complete control over the system. The input, method of processing and output are **controlled by the user.**

➢ ***Benefits from DSS:***

- ✓ An information system must have its own justification to be a candidate worth considering for inclusion in the applications portfolio of an enterprise.
- ✓ The justifications are generally in terms of the benefits in generating information to assist in external reporting and managerial decision making process. The benefits that a DSS can offer includes:
    - Evaluation of a larger number of alternative as the facilities in DSS reduce the time and effort in collecting and analysis of data for different alternatives.
    - Modeling and forecasting becomes easy for managers using DSS enabling them to get more insight into the business processes.
    - Usefulness in intra-group and inter-group communication because it makes it possible to explain to others, how one has arrived at a particular conclusion. The rationale assigns respectability to conclusions and earns the backing of others in the enterprise.
    - Facilities for quicker analysis of data for unstructured decision making, thereby, improving the speed of response in unexpected decision making situations.
    - Quicker spotting of variances and exceptions. Frequent users of DSS have found that DSS enables them to anticipate out-comes with the help of efficient ad hoc query facility.
    - In-depth analysis of data and therefore, more effective use of data resource.

➢ ***Applications of DSS:***

- ✓ DSS have found success in enterprises of medium to large size in decision scenarios requiring in-depth analysis of internal and external data.
- ✓ The success of DSS depends to a large extent, on top management support, regularity and length of use, training of managers and variety of decision making situations.
- ✓ If the business process is simple and repetitive in nature, DDSS may not be able to justify its costs.
- ✓ DSS applied to structured decisions only to add to costs and confusion. DSS have been found to be useful in decision areas where flexibility in data and modeling is required for better decision making.
- ✓ The typical areas of applications of DSS in production and finance functions of business are:
    - **Production:**

- Procurement analysis, cost estimation and analysis, production planning and scheduling, make or buy decisions, inventory planning and control, manpower loading, etc.

- **Finance**
  - Capital budgeting, financial planning and analysis, tax planning, strategic financial planning, budgeting, cash and working capital management, debt and equity financing analysis, foreign exchange risk management, financial performance analysis, variance analysis, etc.

✓ The decision Support Systems are developed using a process different from the traditional system development process as they are supposed to process internal as well as external data.

✓ They need to be independent and interactive.

❖ Executive Information Systems

✓ DSS are designed to cater to the information needs of managers at middle to top levels. They relate to rule-based work doing modeling and analysis of data in order to make it useful in decision making.

✓ However, at the top of managerial level, there is a need to focus more on packaging and delivery of information than on generation of information.

✓ The top manager deserves better environment for information access than that provided by DSS.

✓ The top executives need fast access to up-to-date, concise (short) information and exception reports with facilities to personalized information and analysis.

✓ The information systems designed to cater to such needs of top executives are called Executive Information systems (EIS) or Executive Support Systems.

✓ These systems act as electronic briefing systems and offer tremendous flexibility in use. EIS uses internal as well as external information and offers an interactive and a user friendly operating environment.

➢ *Applications of EIS:*

- **Executive Briefing:**

✓ EIS offers up-to-date information on different aspects of the executive's interest. The briefing is generally, related to the performance of various profit centers and offers status reports on various activities of the enterprise.

✓ Though a certain amount of briefing takes place in DSS as well the information comes as and when it is asked for, from the databases.

✓ In EIS, the information is automatically downloaded periodically from the databases in the form of finished reports.

✓ This automatic downloading ensures that executive does not remain out of touch for long during the days of extreme pressure of workload.

- **Personalised Analysis:**

✓ EIS offers facilities for data analysis using the model of users choice. Spreadsheets and statistical techniques are available in EIS for asking.

✓ The different, here, is that EIS not only helps the user in analysis of data, but also in interpretation of the outcome of the analysis.

- **Exception Reporting:**

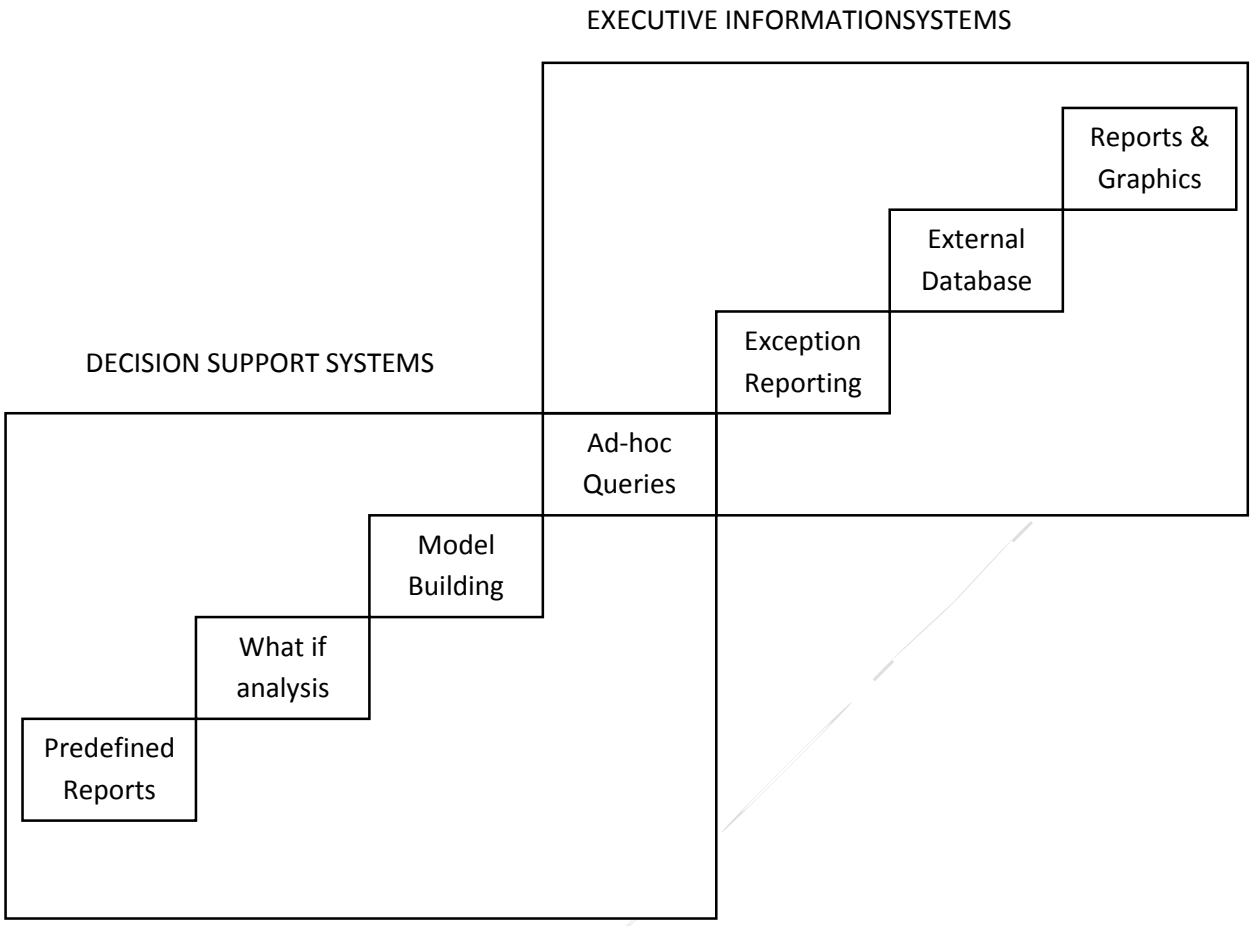
✓ An important component of EIS is the exception reporting module.
✓ EIS caters to this requirement of executives effectively and forewarns the executive of the substantial variations from the plans.
✓ They permit, with varying degrees, further investigation into the reasons for deviations and possible impact of proposed salvage (recover) operations.
✓ This ability to probe into the matter to get a little more than just the exception makes EIS a very useful tool for the executive in the efficient discharge of his functions.

- **Model Based Analysis:**

✓ EIS has facilities for model based information analysis and this feature is common with DSS.
✓ But, the model based analysis in EIS is different from that in DSS in the sense that the input data in EIS is limited and obtained from both internal and external source.
✓ It may be noted that EIS is not isolated collection of computer reports of information for executive.
✓ EIS is a set of integrated tools and technologies woven (merged) into the total information system environment of the enterprise.
✓ It may be noted that EIS supports all the users and not necessarily the top executives of the enterprise.
✓ All those who help top executives should have access to EIS and it must cater to the information needs of all such people.

➢ ***DSS and EIS***

✓ Some of the facilities in EIS are also found in DSS and, as such, the line of distinction sometimes becomes blurred.
✓ The overlapping cannot be ruled out in such systems.
✓ The next figure shows the type of information support that these two systems provide to a manager.



- ***Benefits of EIS:***

  EIS offers the following benefits to a business enterprise:

  a) Information support for strategic decisions:

  ✓ EIS helps executives in relying more on facts than on intuition and business judgement for their strategic decisions.

  b) Changing the focus:

  ✓ A top executive's frequent queries regarding a set of critical success factors have an impact on the priorities of people at lower levels of management.

  ✓ Thus, it is easier for an executive using EIS to pass on the message to functional managers regarding the need to maintain quality standards, just by making frequent queries from EIS regarding the quality of products.

  ✓ The executive's queries can set the thrust of activities in the enterprise and thus change the priorities in the enterprise.

  ✓ EIS said to be one of the important information systems that present an opportunity for the top management to get a real feel of the usefulness of information systems in strategic decision making.

  ✓ Such as a system in an enterprise, is also likely to promote understanding between top management and IT professionals and improve communication between these important players in development of IT infrastructure.

  ✓ Successful EIS can provide the visibility and credibility to information systems as a whole and help in implementing other information systems in the enterprise.

- ***Critical success factors in EIS implementation:***

✓ EIS intends to provide first-hand knowledge to top executives regarding the potential benefits of information systems in the enterprise.

✓ Therefore, it is necessary to ensure that EIS, once planned, must be implemented successfully.

✓ The problems of implementation in EIS can be numerous but a few of the common ones are as follows:

a) Difficulty in system specification:

- The target users of EIS are neither clear about their specific requirement nor have the time to chalk out the specifications of the information systems.
- The users, thus, deserve a few options to try out before they are able to specify the services required by them.
- Prototyping is considered to be a better strategy in the design of EIS.

b) Large volumes of data:

- Ad hoc Query facilities demand access to a large volume of data. The satisfaction of such queries may require use of statistical tools processing bulk data before it can meet the requirement of information in the query.
- This may take time and the response of the system may be slow.
- It is, therefore, essential to anticipate the broad issues on which the queries are likely to focus and information regarding such issues may be regularly generated and stored separately for access to EIS.

c) Resistance from lower levels:

- EIS is likely to face resistance from the people at almost all kevels and more from managers at lower levels.
- It is so because now the boss has access to latest information regarding the day-to-day functioning in each department even before the departmental heads have gone through and understood it.
- Rochart anticipates serious implications of such access to databases on the politics of data ownership among the managers.
- However, a database manager can address this problem by carefully handling distribution of data.

d) Management styles:

- It would be difficult to implement EIS in the case of enterprises having an IT adverse culture. Some top executives do not favor use of IT in decision making.
- They have more confidence in their Business judgement and wish to leave data analysis either to their subordinates or to the domain experts who help them.
- This problem is quite serious. Therefore, EIS in such environments are aimed at top positions.
- They are limited, in scope, to services where the success rate is known to be very high.
- Once the confidence in IT and EIS is generated EIS may add more services to itself.

e) Increased size and cost:

- If the manager finds an EIS useful, he expects his subordinates also to use it.

- Those who do not use it, find it very difficult to live up to the expectations of their boss in so far as awareness regarding the business environment is concerned.
- Thus, the EIS gets overloaded and costs climb up sharply because the number of users shall grow in geometric proportions.

✓ Thus, implementation of EIS should be undertaken very carefully.
✓ It is advisable to select an opportune time for implementation. People resist changes more when the going is smooth and are more willing to try out something new in a crisis.
✓ Therefore, the most opportune time of EIS implementation is when people are searching for new solutions to their problems.
✓ Pilot installation is considered the most suitable installation strategy for EIS. A selective approach is better in the initial stages of EIS design and new services are added in EIS only after the initial model is successful.
✓ User involvement and support are critical in the successful implementation of EIS.

❖ Expert systems

✓ The increasing complexities and dynamism in the emerging business environment require greater interaction of functional manager with the experts so as to get timely advice.
✓ These experts would not only sift information from vast pools of diverse information, but also use their expertise to offer advice.
✓ Traditionally, the expertise available in an organization has provided an important basis for achieving, improving and maintaining its competitive position.
✓ All other things being equal, firms without comparable expertise are at disadvantage.
✓ Human experts may not be able to cope with the new challenges, given the constraints of time and complexities of the new environment.
✓ Besides, there may not be uniformity and consistency of advice for a given decision situation over a period.
✓ This is so because of the obvious inability of human beings to capture the impact of various decision variables all the time.
✓ The information Fatigue Syndrome and the limitations of human experts in the changing business environment have resulted in increasing popularity of business expert systems. (BES).
✓ These systems simulate human activity and keep capturing and systematizing business knowledge, extending the decision making capabilities of expensive and scares human experts, so that others can use their decision experiences. They offer the advantage of flexibility in capturing and representing information of different types in diverse forms.
✓ A business expert system receives a problem from the user, identifies its data requirements, analyses the relevant data against the decision rules (contained in a knowledge system)
✓ Once the problem is solved, the system through its inference engines reports the solution to the user and is also able to explain its line of reasoning in reaching that solution.
✓ A business expert system can act as an aid to managerial effectiveness by providing advice. Its solution / advices are always consistent, uniform, through and methodical. It functions as a standardized problem, solver.

- ✓ The business expert system is able to explain the line of reasoning it uses for solving a problem.
- ✓ A user can study the rationale and is free to accept, modify or reject the solution. Unlike other expert system in the field of medicine, engineering etc. the objective of the business expert system is not to replace evaluation by human expert(s) by the computer program.
- ✓ Rather the objective is to acquire the expertise of the human expert and make it available in a standardized form to human expert(s) and others in the organization.
- ✓ They work our strategies to use knowledge in the application areas so as to develop plausible solutions to the problems.
- ✓ The typical areas of application of expert system in business include:
    - Make or buy decision
    - New product launch decision
    - Determining credit limits
    - Product development
    - Investment counseling
    - Performance evaluation
    - Incentive systems
    - Customer query
    - Project evaluations
    - Production scheduling
    - Routing decisions

❖ OFFICE AUTOMATUON SYSTEMS

- ✓ With the increasing proportions of the knowledge workers in business enterprises, there is increasing concern for improving the work environment.
- ✓ The productivity of knowledge workers can be improved by providing secretarial help and better communication facilities. This can be achieved with the help of automation of office systems. The office systems generally facilitate the following activities.
    a) Producing outgoing documents (using text processors)
    b) Storage and retrieval of documents (using document management systems)
    c) Transmission of messages (using message communication systems)
    d) Scheduling and meeting management (using video-conferencing systems).
- ✓ A variety of office automation devices are in use in modern offices. These products include fax machines, copiers, EPBX etc. However, most of these devices are standalone machines serving their designated purposes.
- ✓ They are neither linked with other devices nor can they be shared remotely. This results in a lot of wastage of time of executives in gathering the documents and information, taking them to the place in the office where the device is located and wait in the queue for use of equipment.
- ✓ Since this equipment is not to be shared automatically, they are underutilized for most part of the working hours and overcrowded during the peak hours.
- ✓ Computer based office automation is gaining popularity among managers, because such automation offers integrated solutions that can be shared automatically.
- ✓ They are more efficient and handle a variety of office automation activities and data. These office automation systems use hardware, software and human resources to collect,

process, store, retrieve and communicate message, among individuals, work groups and organizations.

- ✓ These messages may be in the form of documents or spoken words or expressed in other forms such as pictures, still or video images etc. the computer based office automation systems not only serve the communication needs of office managers within the company but also with external entities such as customers, vendors, investors, etc.
- ✓ The building blocks of a typical office automation system are represented in figure.