Unit 3: Introduction to Management Information System

Content:

- Data, Information
- Computer based Information System (CBIS), Information System Resources
- Management Information System (MIS)
- Transaction Processing System (TPS)
- Decision Support System (DSS)
- Executive Information System (EIS)
- SCM, CMRS and International Systems: Introduction, Supply Chain Management Systems, Customer Relationship Management System
- Enterprise systems and challenges of Enterprise Systems Implementation – Managing the implementation
- International Information System – Outsourcing and Off-shoring

Data

Data are raw facts and figures that are set of isolated, unrelated and un-interpreted. Data can be collected from various sources obtained through interview, questionnaire, on-site observation, counting, measuring, weighing, sampling. Data is processed or transformed into information, which is used in the decision-making process. Example: In a bank account number, account name, amount, and date in a cheque provided by the user are the data.

Information

Information is the processed data. It is a set of organized, validated, corrected and collected data. It is the processed data into a form that is meaningful to the user so that decision maker may take necessary actions. Example: Total deposited or withdrawn amount in a branch of a bank in a day are the information.

Characteristics of Information

Subjectivity: The value and usefulness of information are highly subjective because what is information for one person may not be for another. For example even small change in the price of share of company may influence buying and selling shareholder, however to none-shareholder person a share price of may be just a number with little or no meaning.

Relevance: Information is good only if it is relevant that is meaningful to decision maker. For example a plant manager is trying to determine why a certain machine breaks down frequently. For that plant manager, the number of units that the machine has produced in the last 5 years is probably not relevant to the problem at hand.

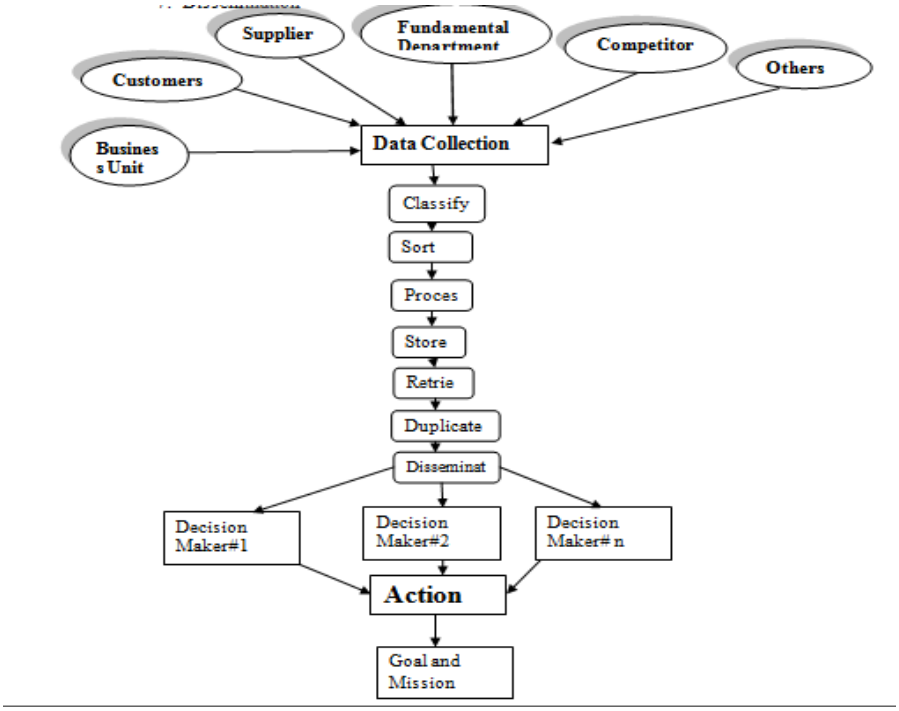
Timeliness: Information must be delivered at the right time and the right place to the right person. In the above example, if the manager gets information about the causes of machine failure a years after requesting it. The information is not timely and hence probably not used.

Accuracy: Information must be free of errors because erroneous information results in poor decisions and erode the confidence of users. For example great precision is not required in predicting the number of customers at restaurant but is critical for calculating salary of person.

Correct information format: Information must be in the right format to be useful to the decision maker. If manager wants to know the last year's total sales of product, the most appropriate format is an annual summary of sales figure for that product. The format should be such that it can be applied directly to the problem hand without further processing.

Completeness: Information is said to be complete if the decision maker can satisfy solve the problem at hand using that information. Although the completeness of information is highly desirable, often complete information is not available. Managers are compelled to make decision even when their information is in complete.

Process of converting data into information



Information System

The information system is interrelated components working together to collect data, process it, gives output and store using the resources of hardware, software, people, procedure and controlling mechanism. It helps to support decision making, coordination, control, analysis and visualization in an organization. The aim of an information system is to provide detailed information on a timely basis throughout the organization so that the top management can take proper action and effective decision.

The system that accepts data as input processes it to generate the information and provides the information to the user as output is the information system.

So, data are the major raw material for making an information system. The information system that uses the computer is called Computer Based Information System (CBIS). A CBIS is an organized integration of software and hardware technologies.

Information system creates, processes, stores, and retrieves information. Information system is guided by set of policies, principles, procedure, and resources. Various social, technical and environmental factors influence the design and development of such system.

Resources of Information System

1. Hardware – physical component of the system
2. Software – programs and documentation to perform specific task
3. People – end users, technical person, system administrator, developer
4. Data – facts and figures
5. Network – interconnectivity of computers

Components of Information System

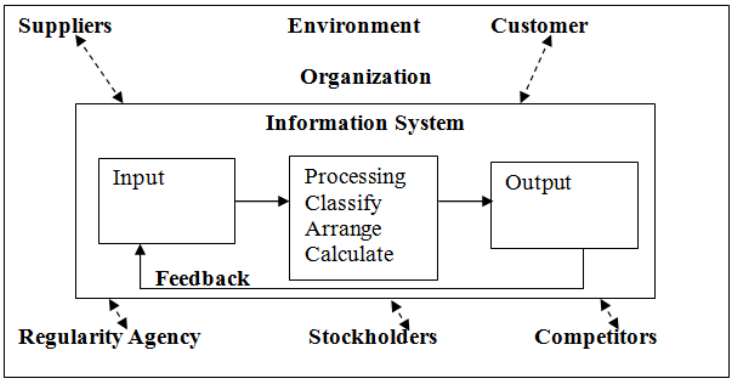


Fig. Function of information system.

An information system contains information about organizations and its surrounding environment. Three basic activities; **input**, **processing**, **output** produce the information organization need. Feedback is output returned appropriate people or activities in the organization to evaluate and refine the input environmental factors such as customers, suppliers, competitors, stockholders, and regulatory agencies interact with the organization and its information.

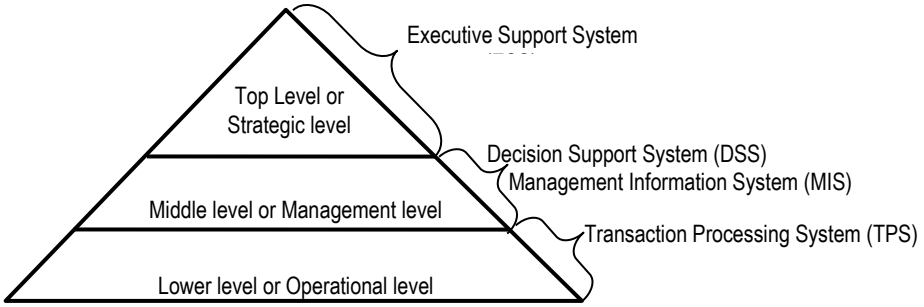
- **Input**: It is used to capture or collects raw data from within the organization of from its external environments for processing in an information system.
- **Processing**: The conversion, manipulation and analysis of raw input into a form that is more meaningful to humans.
- **Output**: The distribution of processed information to the people who will use it or to the activities for which it will be used.
- **Feedback**: Output that is returned to appropriate members of the organization to help them evaluate or correct input.

Types of Information System

There are *four* main different types of Information Systems, these are:

1. Transaction Processing System (TPS)
2. Management Information System (MIS)
3. Decision Support System (DSS)
4. Executive Support System (ESS)

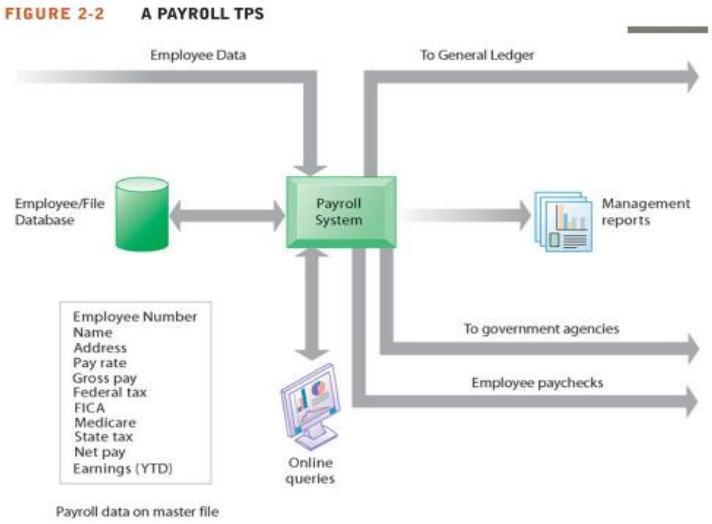
Different levels of management use different information systems for their effective management in their organization.



The organization has an *executive support system* (ESS) at the strategic level or at the top level; *management information system* (MIS) and *decision support system* (DSS) at the management level or at the middle level and finally *transaction processing system* (TPS) at the operational level or at the lower level.

Transaction Processing System (TPS):

A TPS is a basic business system, which serves the most elementary day-to-day activities of an organization. It supports the operational level of the business that supplies data for higher-level management decisions (e.g. MIS, EIS). It is often critical to the survival of the organization. A TPS also collects and stores information about transactions, and controls some aspects of transactions. Example of TPS includes, system used for billing in departmental store, ATM operation.



A TPS for payroll processing captures employee payment transaction data (such as a time card). System outputs include online and hard-copy reports for management and employee paychecks.

Management Information System (MIS):

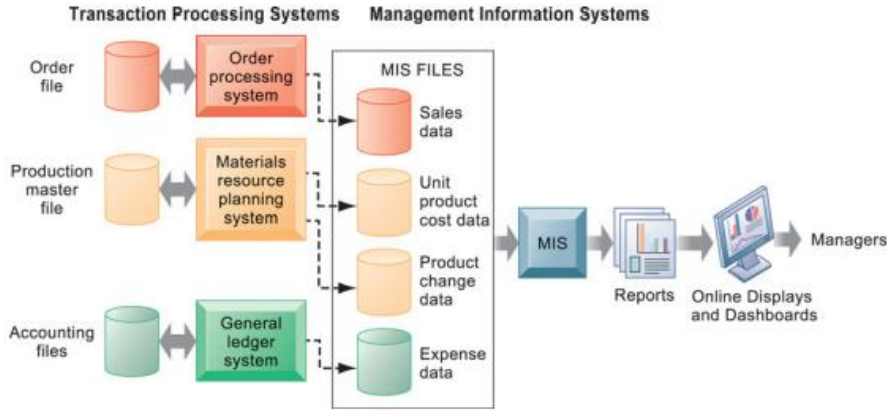
Management information system provides information to managers of an organization. It is primarily intended for providing information from the data after processing them. The data are generated, collected, recorded, stored, processed, and retrieved after it has been generated by business operations in an organization. It is a system or process that provides the information necessary to manage an organization effectively. MIS have large quantities of input data and produces summary reports as output. It is used by middle-level managers. It should be supportive of the institution's longer-term strategic goals and objectives. An annual budgeting system is an example of Management information system.

MIS summarize and report on the company's basic operations using data supplied by transaction processing systems. The basic transaction data from TPS are compressed and usually presented in reports that are produced on a regular schedule.

Characteristics of MIS

1. Management-oriented
2. Management directed
3. Integrated
4. Common data flows
5. Heavy planning – element
6. Sub-system concept
7. Common database
8. Computerized
9. User friendly/flexibility
10. Information as a resource

Difference between a TPS and an MIS:



In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

- The primary goal of a TPS is to record and process transaction that take place in the company, while the primary goal of an MIS is to produce summary and exception reports used in tactical decision making.
- Second, the output of a TPS becomes the input to an MIS, and although the TPS is not the only source of data to the MIS, it is primary sources.
- The above figure shows that transaction data are input into a TPS and that the output of a TPS becomes the input to an MIS.
- Finally, a TPS helps managers primarily with operational or day to day decisions, while an MIS helps managers make tactical decisions over a longer period of time, such as weekly, monthly, and yearly.

Decision Support System (DSS):

Decision Support System (DSS) is created to help people to make decisions by providing access to information and analysis tools. A DSS creates a mathematical model of the system, which helps in decision making about actions affecting a person of the organization. A DSS allows the users to use different options and find out what the outcomes would be, so that, proper action can be identified. A DSS depends upon the accuracy of the math involved in creating the model and the ability of the user to accurately interpret the resulting data. DSS is flexible, adaptable and quick. The user can control input and output. It supports the decision process and often is sophisticated modeling tools, so managers can make simulations and predictions. Their inputs are aggregate data, and they produce projections. An example of a DSS would be a 5-year operating plan.

DSS is a set of well integrated, user friendly, computer-based tools that combine internal and external data with various decision making models to solve semi-structured and unstructured problems. Among the functions of a DSS are "What if" analysis, model building, goal seeking, and graphical analysis.

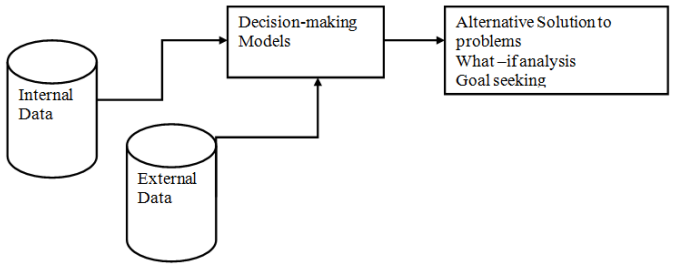


Fig. DSS integrates internal and external data with different module to produce alternative solution to given problem.

A DSS can present a manager with different pricing alternative and help answer **"What if"** Question such as these: what if the price of raw materials increases by 4.5% a years? What if demand for a product increase by 10%? What if a competitor reduces its price for a similar product by 20%?

A DSS also allows managers to perform **goal-seeking**, which specifies the actions a manager should take in order to accomplish a certain goal. For example suppose the goal of the company is to increase sales of product A by 10%. A DSS can help a marketing manager decide on the course of action to take regarding operation costs, product pricing, advertising, and other related issues in order to achieve the goal.

Characteristics of DSS

1. It facilitates semi-structure and unstructured decision making by bringing together data, models, and human judgment.
2. It can provide decision support for several interdependent decisions.
3. It supports a wide variety of decision-making processes and Business intelligence
4. It assists the decision maker to make decision under dynamic business condition.
5. It helps the decision maker address ad hoc queries.

Business intelligence is type of software applications used for organizing, analyze current and historical data to find patterns and trends and aid decision-making. It support middle and senior management.

Executive Support System (ESS):

It is also known as Executive Information System (EIS). It provides executives information in a readily accessible, interactive format. It is a form of MIS intended for top-level executive use. An ESS usually allows summary over the entire organization and also allows drilling down to specific levels of detail. It also uses data produced by the ground-level TPS, so the executives can gain an overview of the entire organization. It is used by top level (strategic) management. It is designed to the individual. Thus, it allows the CEO of an organization tie into all levels of the organization. It is very expensive to run and require extensive staff support to operate.

It is primarily used by top level management, is user friendly, interactive system, designed to meet information needs of top management engaged in long-range planning, crisis management, and other strategic decision(unique, non-repetitive and future oriented), which address ling-term issues such as emerging markets, merger and acquisition strategies, new product development and investment strategies. Such system assists in the making of decision that requires an in-depth understanding of the firm and of the industry in which the firm operates.

Characteristics of an ESS

DSS and EIS have many functions in common, including "what-if"analysis, goal seeking, risk analysis, and graphical analysis, in addition to these an EIS has two special functions:

Derived-information function: A function of an EIS that allows mangers to find the cause or source of a certain problem through detailed data analysis. Like a portal, which uses a Web interface to present integrated personalized business content.

The drill-down function: A function of an EIS that can precisely locate and retrieve necessary information at any desired level of detail like digital dashboard, which displays on a single screen graphs and charts of key performance indicators for managing a company. Digital dashboards are becoming an increasingly popular tool for management decision makers.

The following are the key characteristics of ESS:

1. It is a computer based information system that serves the information need of top executives.
2. It is user friendly, supported by graphics and exception reporting and drill down capabilities.
3. It provides rapid access to timely information and direct access to management reports.
4. It is capable of accessing both internal and external data.
5. It is easily connected to Internet (with online information services and e-mail).
6. It provides extensive online analysis tool like trend analysis, market conditions etc.
7. It can easily be given a DSS support for decision making.

Difference between TPS, MIS, DSS and EIS

	TPS	MIS	DSS	EIS
Targeted Audience	Operational management	Operational /Middle management	Middle management	Top management
Primary purpose	Capture transaction data	Generate summary and exception report	Facilitate decision making	Generate clear, concise, enterprise-wide information
Nature of tasks	Highly structured	Highly structured	Semi or unstructured	Semi or unstructured
Kind of data	internal	Internal	Internal and externals	Internal and external

Enterprise Resource Planning (ERP) System

- ERP provides solution to overall business problems.
- ERP helps to integrate five major resources of an organization namely: man, material, money, machine and market.
- ERP involves managing a large volume of data, large number of users and multiple system components distributed in different locations.
- ERP is a software solution that addresses the enterprise need by tightly integrating all functions of an enterprise. In simple words, ERP includes one database, one application and one user interface for entire enterprise.
- It is an overall business management system that caters need of all the people connected with the organization. It is an enterprise-wide information system designed to coordinate all the resources, information, and activities needed to complete business processes.
- Accounting and Finance function is considered as backbone for any business. Hence, Financial and Accounting Systems are an important and integral part of ERP systems. ERP system also includes variety of business processes like: Manufacturing, Supply Chain Management, Financials Project, Human Resources Management and Customer Relationship Management.
- Some of the well-known ERPs in the market today include SAP, Oracle ERP, MFG Pro, MS Axapta etc.
- Today, many ERP systems (ERP suites) run in the **cloud** as a SaaS (Software as a Service). A cloud ERP makes it easier and more secure for businesses to manage their information. These systems can be maintained by a company who specializes in upkeep on servers and databases, keeping them secure, and can make it easier to scale as your business grows.
- For companies that cannot have or do not want their data in the cloud, **on- premise** ERP can run on a company's data center.
- Alternatively, a company can have a hybrid ERP that runs some of their systems in the cloud and other systems on premise.

Table 2.2.7: Free and Open Source ERP software

S. No.	ERP Software	S. No.	ERP Software
1	Adempiere, a Java based ERP-System which started as a fork of Compiere	11	OpenBlueLab
2	Compiere, a Java based ERP-System	12	Openbravo, a Java based ERP-System
3	Dolibarr, a PHP based ERP system	13	OpenERP (formerly Tiny ERP)
4	ERP5, a Python based ERP system	14	Opentaps (Java based)
5	GNU Enterprise	15	OrangeHRM
6	GRR (software), a PHP/MySQL - based, web-accessed free ERP system	16	Postbooks from XTuple
7	JFire, a Java based ERP-System from NightLabs	17	SQL-Ledger
8	Kuali Foundation	18	Stoq
9	LedgerSMB	19	WebERP
10	OFBiz		

Benefits of an ERP System

1. Information integration: the components of ERP are integrated and hence has the ability to automatically update data between related business functions and components.
2. Reduction to Lead-time: The elapsed time between placing an order and receiving it is known as the lead-time. EDI (Electronic Data Interchange) in ERP reduce the lead time and make it possible for the organizations to have the items at the time they are required.
3. On-time Shipment: By integrating the various functions and automating the procedures and task the ERP system ensure on-time delivery of goods and customers.
4. Reduction in Cycle Time: Cycle time is the time between placement of the order and delivery of the product. In an ERP System, all the data, updated to the minute, is available in the centralized database and all the procedures are automated, almost all these activities are done without human intervention. This efficiency of the ERP systems help in reducing the cycle time.
5. Improved Resource utilization: The efficient functioning of the different modules in the ERP System like manufacturing, material management, plant maintenance, sales and distribution ensures that the inventory is kept to a minimum level, the machine down time is minimum and the goods are produced only as per the demand and the finished goods are delivered to the customer in the most efficient way.
6. Better Customer Satisfaction: Customer satisfaction means meeting or exceeding customer's requirement for a product or service. With the help of web-enabled ERP systems, customers can place the order, tract the status of the order and make the payment sitting at home.
7. Improved Supplier Performance: ERP Systems provide vendor management and procurement support tools designed to coordinate all aspect of the procurement process. They support the organization in its efforts to effectively negotiate, monitor and control procurement costs and schedules while assuming superior quality.
8. Increased Flexibility: ERP Systems help the companies remain flexible by making the company information available across the departmental barriers and automating most of the processes and procedures, thus enabling the company to react quickly to the changing market conditions.
9. Reduced Quality Costs: The ERP System's central database eliminates redundant specifications and ensures that a single change to standard procedures takes effect immediately throughout the organization. It also provides tools for implementing total quality management programs within an organization.
10. Better Analysis and Planning Capabilities: Another advantage provided by ERP Systems is the boost to the planning functions. By enabling the comprehensive and unified management of related business functions, it becomes possible for making better and informed decisions.
11. Improved information accuracy and decision-making capability: The three fundamental characteristics of information are accuracy, relevancy and timeliness. The information needs to be accurate, relevant for the decision-maker and available to the decision-makers when he requires it.

12. Use of Latest Technology: ERP packages are adapted to utilize the latest development in Information Technology such as open systems, client/server technology, cloud computing, mobile computing etc.

Challenges in implementing ERP:

1. It is very important, that implementation is done in stages. Trying to implement everything at once will lead to a lot of confusion and chaos.
2. Appropriate training is very essential during and after the implementation. The staff should be comfortable in using the application or else, it will backfire, with redundant work and functional inefficiencies.
3. Lack of proper analysis of requirements will lead to non-availability of certain essential functionalities. This might affect the operations in the long run and reduce the productivity and profitability.
4. Lack of Support from Senior Management will lead to unnecessary frustrations in work place. Also, it will cause delay in operations and ineffective decisions. So, it is essential to ensure that the Senior Management supports the transformation.
5. Compatibility Issues with ERP Modules lead to issues in integration of modules. Companies associate different vendors to implement different ERP modules, based on their competency. It is very essential that there is a way to handle compatibility issues.
6. Cost Overheads will result, if requirements are not properly discussed and decided during the planning phase. So, before execution, a detailed plan with a complete breakdown of requirements should be worked out.
7. Investment in Infrastructure is very essential. ERP applications modules will require good processing speed and adequate storage. Not allocating suitable budget for infrastructure will result in reduced application speed and other software issues. Hardware and Software Security is also equally important.

Supply Chain Management (SCM) Systems:

- It helps to manage relationships with their suppliers. These systems help suppliers, purchasing firms, distributors, and logistics companies share information about orders, production, inventory levels, and delivery of products and services so that they can source, produce, and deliver goods and services efficiently.
- The ultimate objective is to get the right amount of their products from their source to their point of consumption in the least amount of time and at the lowest cost.
- These systems increase firm profitability by lowering the costs of moving and making products and by enabling managers to make better decisions about how to organize and schedule sourcing, production, and distribution.
- A firm's supply chain is a network of organizations and business processes for procuring raw materials, transforming these materials into intermediate and finished products, and distributing the finished products to customers.
- It links suppliers, manufacturing plants, distribution centers, retail outlets, and customers to supply goods and services from source through consumption.
- Materials, information, and payments flow through the supply chain in both directions Goods start out as raw materials and, as they move through the supply chain, are transformed into intermediate products (also referred to as components or parts), and finally, into finished products.
- The finished products are shipped to distribution centers and from there to retailers and customers. Returned items flow in the reverse direction from the buyer back to the seller.
- Inefficiencies in the supply chain, such as parts shortages, underutilized plant capacity, excessive finished goods inventory, or high transportation costs, are caused by inaccurate or untimely information.

  For example, manufacturers may keep too many parts in inventory because they do not know exactly when they will receive their next shipments from their suppliers. Suppliers may order too few raw materials because they do not have precise information on demand. These supply chain inefficiencies waste as much as 25 percent of a company's operating costs.

  If a manufacturer had perfect information about exactly how many units of product customers wanted, when they wanted them, and when they could be produced, it would be possible to implement a highly

efficient **just-in-time strategy.** Components would arrive exactly at the moment they were needed and finished goods would be shipped as they left the assembly line.

Major task of SCM:

1. Decide when and what to produce, store, and move
2. Rapidly communicate orders
3. Track the status of orders
4. Check inventory availability and monitor inventory levels
5. Reduce inventory, transportation, and warehousing costs
6. Track shipments
7. Plan production based on actual customer demand
8. Rapidly communicate changes in product design

Customer Relationship Management (CRM)

- It help to manage the relationship with the customers.
- CRM systems provide information to coordinate all of the business processes that deal with customers in sales, marketing, and service to optimize revenue, customer satisfaction, and customer retention.
- This information helps firms identify, attract, and retain the most profitable customers; provide better service to existing customers; and increase sales systems:
- CRM is focused on attracting the new customers and retaining the existing customers.
- CRM is based on the concept: "The Customer is Always Right - So Always be Right about Your Customers"
- It allows businesses to develop long-term relationships with customers by providing them best of the services.

Benefits of CRM:

1. Provide product information and technical assistance to customers.
2. Acquire and retain good customers.
3. Increase the importance of customers for organization.
4. Identify each individual customer to define quality and provide customized services.
5. Provide mechanism of all possible contacts between organization and customers.
6. Help to identify problem areas quickly.
7. Provide a user friendly mechanism to register customer's complaints.
8. Provide a fast mechanism to handle customer's complaints and solutions.
9. Help to track customers preferences, interest etc. and provide service accordingly.
10. Help to provide services in faster and best possible manner.

Knowledge Management System (KMS)

It enables organizations to better manage processes for capturing and applying knowledge and expertise. These systems collect all relevant knowledge and experience in the firm, and make it available wherever and whenever it is needed to improve business processes and management decisions. They also link the firm to external sources of knowledge.

When an organization is able to easily access, share, and update business knowledge, it can become more productive and cost-efficient. The ability to access the right knowledge at the right time, via a robust knowledge management system, informs accurate decision-making and stimulates collaboration and innovation.

As your enterprise grows, so too will the need to access a reliable knowledge database in order to effectively run your business, serve your clients, and increase revenue. Without a knowledge management system in place, your employees will be forced to learn and relearn processes and information. That's an inefficient and costly practice. Plus, you may also run the risk of losing those processes or information if a knowledge leader or legacy employee leaves your company

International information systems:

This model is characterized by a computer network that operates in more than one nation-state and in which data crosses international borders in the process of completing a transaction. This model is now increasingly based on the Internet as its medium of data transfer.

Outsourcing

- It involves handing off internal functions to a third party.
- The basic philosophy is to delegate transactional tasks to professional, allowing a company to concentrate on its core competencies.
- It is a corporate process in which a firm hires a third party to provide tasks and produce products that were formerly done in-house by the company's own employees and staff.
- It is a cost-cutting strategy used by business to reduce cost.

Benefits of outsourcing:

1. Improved focus on core business activities
2. Increased efficiency
3. Controlled costs
4. Increased reach
5. Greater competitive advantage

Problems from outsourcing:

1. Service delivery – which may fall behind time or below expectation
2. Confidentiality and security – which may be at risk
3. Lack of flexibility – contract could prove too rigid to accommodate change
4. Management difficulties – changes at the outsourcing company may lead to friction
5. Instability - the outsourcing company could go out of business

Offshoring

- Offshoring is the practice of relocating a business's operations unit such as production of services to a distant country where labor or materials are cheaper.
- The company's goal here is to reduce the cost of production and other supporting services.
- Offshoring not only encompasses the processing of tangible objects, but also the provision of services. The Indian IT industry, for example, has benefited by Western technology firms.

Benefits of offshoring

1. Concentrate on Core business
2. Cost reduction
3. Cheap and skilled workforce
4. Complete assistance
5. Better control
6. Streamline process
7. 24/7 operations
8. Tax and other benefits
9. Risk mitigation

Problems from offshoring

1. Language and communication barrier
2. Long distance locations
3. Ethical issues
4. Socio-cultural problems
5. Geographical or political problems
6. Security and safety issues

Comparison between Outsourcing and Offshoring

Outsourcing refers to an organization contracting work out to a third party, while **offshoring** refers to getting work done in a different country, usually to leverage cost advantages.

It's possible to outsource work but not offshore it; for example, hiring an outside law firm to review contracts instead of maintaining an in-house staff of lawyers. It is also possible to offshore work but not outsource it; for example, a Dell customer service center in India to serve American clients.

Offshore outsourcing is the practice of hiring a vendor to do the work offshore, usually to lower costs and take advantage of the vendor's expertise, economies of scale, and large and scalable labor pool.

	Offshoring	Outsourcing
Definition	Offshoring means getting work done in a different country.	Outsourcing refers to contracting work out to an external organization.
Risks and criticism	Offshoring is often criticized for transferring jobs to other countries. Other risks include geopolitical risk, language differences and poor communication etc.	Risks of outsourcing include misaligned interests of clients and vendors, increased reliance on third parties, lack of in-house knowledge of critical (though not necessarily core) business operations etc.
Benefits	Benefits of offshoring are usually lower costs, better availability of skilled people, and getting work done faster through a global talent pool.	Usually companies outsource to take advantage of specialized skills, cost efficiencies and labor flexibility.

Practice Questions:

1. Explain data, information and information system with example.
2. Why information is important? Explain the characteristics information with example.
3. Explain Management information system and its usage in the organization.
4. Explain Transaction processing System with its major characteristics.
5. How does DSS add value for organization explain with proper example?
6. Comparatively differences among TPS, MIS, DSS, ESS.
7. How do enterprise systems help businesses achieve operational excellence?
8. How do supply chain management systems coordinate planning, production, and logistics with suppliers?
9. How do customer relationship management systems help firms achieve customer intimacy?
10. What types of companies are most likely to adopt cloud-based ERP and CRM software services? What companies might not be well-suited for this type of software?
11. List and describe the challenges posed by enterprise applications.
12. Which enterprise application should a business install first: ERP, SCM, or CRM? Explain your answer.