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M.C.A. (SEM III)

PAPER – VI

MANAGEMENT INFORMATION
SYSTEM

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CONTENTS

Sr. No.	Title	Page No.

❖❖❖

SYLLABUS

MANAGEMENT INFORMATION SYSTEMS

Lecture : 4 Hrs/week   Tutorial : 1 Hr/week
One paper : 100 marks / 3 Hrs duration   Term work : 25 marks

1. **Managing the digital firm**
   Why information system?
   Perspectives on information system
   Contemporary approach to Information system
   Learning to use information systems : New opportunities with technology

2. **Information System in the Enterprise**
   Major types of system in organization
   Systems from functional perspectives
   Integrating functions and business processes : Introduction to Enterprise application

3. **Information Systems, Organizations, management and Strategy**
   Organisations and Information Systems
   How information system impact organizations and business firms
   The impact of IT on management decision making
   Information business and business strategy

4. **Decision making**
   Decision making concepts
   Decision methods, tools and procedures
   Behavioral concepts in decision making
   Organizational decision making
   MIS and Decision Making Concepts

5. **Information**
   Information Concepts
   Information : a quality product
   Classification of information
   Methods of data and Information collection
   Value of information
   General model of a human as a information processor
   Summary of information concepts and their implications
   Organization and information
   MIS and Information concepts

6. **Development of MIS**
   Development of Long Range Plans of MIS
   Ascertaining the class of Information
   Determining the Information Requirement
   Development and Implementation of MIS
   Management of Quality in MIS
   Organisation for development of MIS
   MIS : the factors for Success and Failure

7. **Choice of Information Technology**
   Introduction : Nature of IT decision
   Strategic decision
   Configuration decision
   Evaluation
   Information Technology Implementation plan
   Choice of the Information Technology and the Management Information System

8. **Enterprise Applications and Business Process Integration**
   Enterprise Systems
   Supply chain management systems
   Customer relationship management systems
   Enterprise Integration trends

9. Decision Support System
      DSS : Concept and Philosophy
      DSS : Deterministic Systems
      AI Systems
      Knowledge based expert system
      MIS and Role of DSS

Term work/Assignment : Each candidate will submit a journal in which assignments based on the above syllabus and the internal test paper. Test graded for 10 marks and Practical's graded for 15 marks.

References :

1. Management Information System, Oz Thomson Learning 5th edition
2. Management Information System, W.S.Jawadekar, 3rd edition, TMH
3. Management Information System, James O'Brien, 7th edition, TMH
4. Information Systems the foundation of E-Business, Steven Alter, 4th Edition Person education
5. Information Technology for management, Turban, McLean, Wetherbe, 4th edition, Wiley
6. Management Information Systems, Loudon and Loudon, 10th edition, Pearsons Educations
7. Management Information Systems, Jaswal Oxford Press

Case based approach can be adopted to explain various concepts during tutorials (Internal Evaluation)

Assignments

USE of IS in different domains as Hospitality, Retail, Supply chain, vendor management, inventory, etc.

At least 5 website's critical analysis in any of the domain as a market survey for designing the website for the particular business.

- Research paper on any topic of their interest of this paper

- Optional

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Bibliography

Management Information Systems   - By W.S.Jawdekar, Second Edition. TMG Publications

Management Information Systems - By W.S.Jawdekar, Third Edition. TMG Publications

Management Information Systems - Managing the Digital Firm- By

Kenneth Laudon and Jane Laudon PHI Publications, Ninth Edition

Management Information Systems - Managing the Digital Firm- By

Kenneth Laudon and Jane Laudon PHI Publications, Tenth Edition

Management Information Systems - By Gordon and Olson Edition.

TMG Publications

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MANAGING THE DIGITAL FIRM

Units :

1.1 WHY INFORMATION SYSTEMS?

We are in the midst of a swiftly moving river of technology and business innovations that is transforming the global business landscape. An entirely new Internet business culture is emerging with profound implications for the conduct of business. You can see this every day by observing how business people work using high-speed Internet connections for e-mail and information gathering, portable computers connected to wireless networks, cellular telephones connected to the Internet, and hybrid handheld devices delivering phone, Internet, and computing power to an increasingly mobile and global workforce.

The emerging Internet business culture is a set of expectations that we all share. We have all come to expect online services for purchasing goods and services, we expect our business colleagues to be available by e-mail and cell phone, and we expect to be able to communicate with our vendors, customers, and employees any time of day or night over the Internet. We even expect our business partners around the world to be "fully connected."

Internet culture is global.

Information technology (IT) refers to all of the computer-based information systems used by organizations and their underlying technologies. Briefly, information technologies and systems are revolutionizing the operation of firms, industries, and markets.

1.2 CAPITAL MANAGEMENT

Information technology has become the largest component of capital investment for firms in the United States and many industrialized societies. In 2005, U.S. firms alone will spend nearly $1.8 trillion on IT and telecommunications equipment and software. Investment in information technology has doubled as a percentage of total business investment since 1980, and now accounts for more than one-third of all capital invested in the United States and more than 50 percent of invested capital in information-
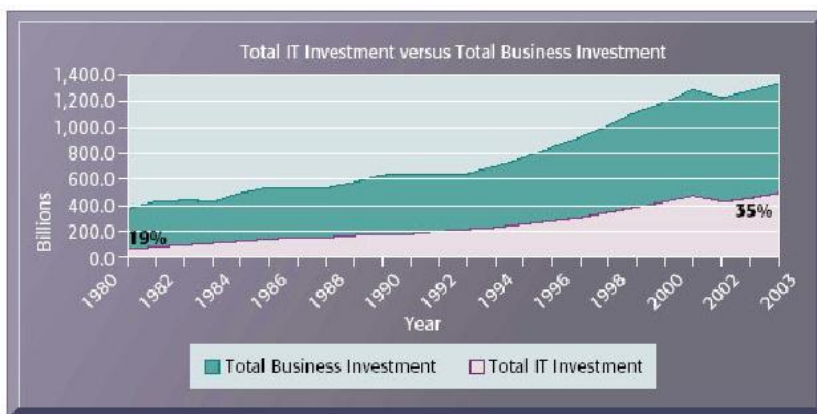
Information Technology capital investment

Information technology capital investment, defined as hardware, software, and telecommunications equipment, expanded from 19 percent of all business investment to 35 percent during the period from 1980 to 2003. in the United States and more than 50 percent of invested capital in information-

Intensive industries, such as finance, insurance, and real estate.
Fig shows that between 1980 and 2003, private business investment in information technology (hardware, software, and telecommunications equipment) grew from 19 percent to more than 35 percent of all domestic private business investment. If one included expenditures for managerial and organizational change programs and business and consulting services that are required to use this technology effectively, total information technology expenditures would rise above 50 percent of total private business investment.

As managers, many of you will work for firms that are intensively using information systems and making large investments in information technology. You will certainly want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If you make poor choices, you will be wasting valuable capital.

1.3 FOUNDATION OF DOING BUSINESS:

In many industries, survival and even existence without extensive use of information systems is inconceivable. Obviously, all of e-commerce would be impossible without substantial IT investments and firms such as Amazon, eBay, Google, E*Trade, or the world's largest online university, the University of Phoenix, simply would not exist. Today's service industries—finance, insurance, real estate as well as personal services such as travel, medicine, and education—could not operate without IT. Similarly, retail firms such as Wal-Mart and Sears and manufacturing firms such as General Motors and General Electric require IT to survive and prosper. Just like offices, telephones, filing cabinets, and efficient tall buildings with elevators were once of the foundations of business in the twentieth century, information technology is a foundation for business in the twenty-first century.
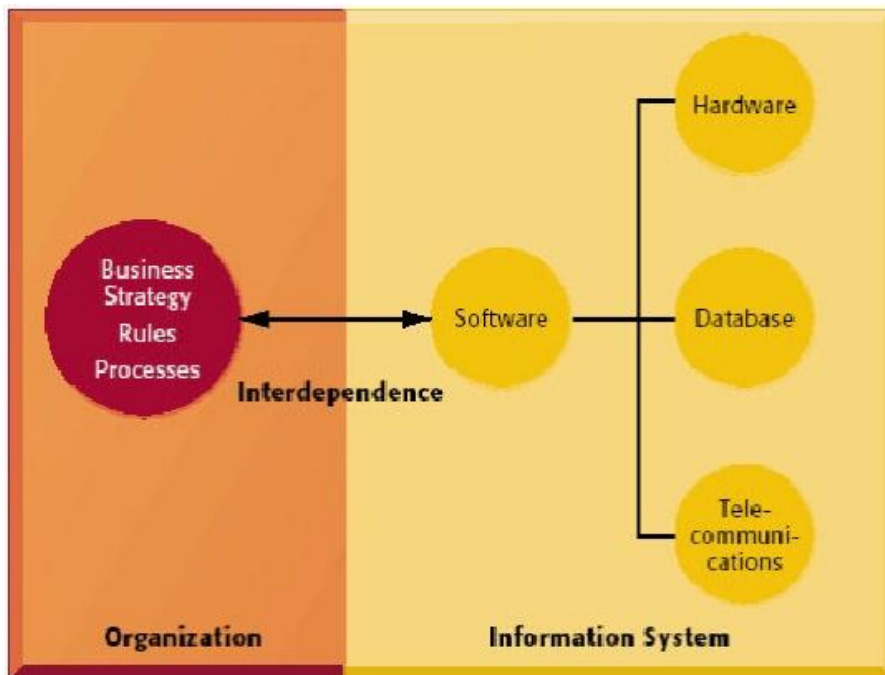
□ **The interdependence between organizations and information Systems.**

There is a growing interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve corporate goals as shown in fig. What a business would like to do in five years often depend on what its systems will be able to do. Increasing market share, becoming the high-quality or low-cost producer, developing new products, and increasing employee productivity depend more and more on the kinds and quality of information systems in the organization. The more you understand about this relationship, the more valuable you will be as a manager.

In contemporary systems there is a growing interdependence between a firm's information systems and its business capabilities. Changes in strategy, rules, and business processes increasingly require changes in hardware, software, databases, and telecommunications. Often, what the organization would like to do depends on what its systems will permit it to do.

1.4 PRODUCTIVITY:

Today's managers have very few tools at their disposal for achieving significant gains in productivity. IT is one of the most important tools along with innovations in organization and management, and in fact, these innovations need to be linked together. Investment in IT plays a critical role in increasing the productivity of firms, and entire nations.

For instance, economists at the U.S. Federal Reserve Bank estimate that IT contributed to the lowering of inflation by 0.5 to 1 percentage point in the years from 1995 to 2000.

Firms that invested wisely in information technology experienced continued growth in productivity and efficiency.

1.5 STRATEGIC OPPORTUNITIES & ADVANTAGE

If you want to take advantage of new opportunities in markets, develop new products, and create new services, chances are quite high you will need to make substantial investments in IT to realize these new business opportunities. If you want to achieve a strategic advantage over your rivals, to differentiate yourself from your competitors, IT is one avenue for achieving such advantages along with changes in business practices and management. These advantages might not last forever, but then again most strategic advantages throughout history are short-lived. However, a string of short-lived competitive advantages is a foundation for long-term advantages in business, just as is true of any athletic sport or race.

1.6 HOW MUCH DOES IT MATTER?

"IT Doesn't Matter," which is significant debate issue in the business community. This argument in a nutshell is that because every firm can purchase IT in the marketplace, because any advantage obtained by one company can easily be copied by another company, and because IT is now a commodity based on standards (such as the Internet) that all companies can freely use, it is no longer a differentiating factor in organizational performance.

So that no firm can use IT to achieve a strategic edge over its competitors any more than it could with electricity, telephones, or other infrastructure. Therefore, it is mentioned that firms should reduce spending on IT, follow rather than lead IT in their industry, reduce risks by preparing for computer outages and security breaches, and avoid deploying IT in new ways.

Most management information system (MIS) experts disagree. Many highly adept firms continually obtain superior returns on their investment in IT, whereas less adept firms do not.

Copying innovations of other firms can be devilishly difficult, with much being lost in the translation. There is only one Dell, one Wal-Mart, one Amazon, and one eBay, and each of these firms has achieved a competitive advantage in its industry based in large part on unique ways of organizing work enabled by IT that have been very difficult to copy. If copying were so easy, we would expect to find much more powerful competition for these market leaders.

Although falling prices for hardware and software and new computing and telecommunications standards such as the Internet have made the application of computers to business much easier than in the past, this does not signal the end of innovation or the end of firms developing strategic edges using IT. Far from the end of innovation, commoditization often leads to an explosion in innovation and new markets and products. For example, the abundance and availability of materials such as wood, glass, and steel during the last century made possible a continuing stream of architectural innovation.

Likewise, the development of standards and lowering costs of computer hardware made possible new products and services such as the Apple iPod and iTunes, the Sony Walkman portable music player, Real Media online streaming music, and the entire online content industry. Entirely new businesses and business models have emerged for the digital distribution of music, books, journals, and Hollywood films.

It is surely correct in stating that not all investments in IT work out or have strategic value. Some are just needed to stay in business, to comply with government reporting requirements, and to satisfy the needs of customers and vendors. Perhaps the more important questions are how much does IT make a difference, and where can it best be deployed to make a competitive difference? Entrepreneur can use information technology and systems to create differentiation from your competitors and strategic advantage in the marketplace. We need to achieve any measure of "success," investment in IT must be accompanied by significant changes in business operations and processes and changes in management culture, attitudes, and behavior. Absent these changes, investment in IT can be a waste of precious investor resources.

1.7 WHY IT NOW? DIGITAL CONVERGENCE AND THE CHANGING BUSINESS ENVIRONMENT

A combination of information technology innovations and a changing domestic and global business environment makes the role of IT in business even more important for managers than just a few years ago. The Internet revolution is not something that happened and then burst, but instead has turned out to be an ongoing, powerful source of new

technologies with significant business implications for much of this century.

There are five factors to consider when assessing the growing impact of IT in business firms both today and over the next ten years.
• Internet growth and technology convergence
•Transformation of the business enterprise
•Growth of a globally connected economy
•Growth of knowledge and information-based economies
•Emergence of the digital firm
These changes in the business environment, summarized in number of new challenges and opportunities for business firms and their managements.

- Internet Growth & technology Convergence
New business Technologies with the favorable cost
E-business, E-commerce, E-government
Rapid changes in market & market structure
Increased obsolescence of traditional business models

- Transportation of the business enterprise
Flattening
Decentralization
Flexibility
Location Independence
Low transaction & co-ordination cost
Empowerment
Collaborative work & teamwork

- Globalization
Management & control in a global market place
Competition in market
Global workgroups
Global delivery systems

- Rise in the Information Economy
Knowledge & information-based economics
New products & services
Knowledge as a central productive & strategic asset
Time-based competition
Shorter product life cycle
Limited employee knowledge base

- Emergence of the digital firm
Digitally enabled relationships with customers, suppliers & employees
Digital networks
Digital management
Agile sensing & responding to environmental changes

The internet is bringing about a convergence of technologies, rolling markets, entire industries & firms in the process. New organization structure is built up, Telephone networks are merging to internet etc. Traditional markets & distribution channels are weakening & new markets are being created.

1.8 TRANSFORMATION OF BUSINESS ENTERPRISE:

Along with rapid changes in markets and competitive advantage are changes in the firms themselves. The Internet and the new markets are changing the cost and revenue structure of traditional firms and are hastening the demise of traditional business models.

For instance, in the United States, 20 percent of travel sales are made online, and experts believe that 50 to 70 percent of travel sales will be online within a decade. Realtors have had to reduce commissions on home sales because of competition from Internet real estate sites. The business model of traditional local telephone companies, and the value of their copper-based networks, is rapidly declining as millions of

consumers switch to cellular and Internet telephones.

The Internet and related technologies make it possible to conduct business across firm boundaries almost as efficiently and effectively as it is to conduct business within the firm. This means that firms are no longer limited by traditional organizational boundaries or physical locations in how they design, develop, and produce goods and services. It is possible to maintain close relationships with suppliers and other business partners at great distances and outsource work that firms formerly did themselves to other companies.

For example, Cisco Systems does not manufacture the networking products it sells; it uses other Companies, such as Flextronics, for this purpose. Cisco uses the Internet to transmit orders to Flextronics and to monitor the status of orders as they are shipped. .

At the Orbitz Web site, visitors can make online reservations for airlines, hotels, rental cars, cruises, and vacation packages and obtain information on travel and leisure topics. Such online travel services are supplanting traditional travel agencies.

In addition to these changes, there has also been a transformation in the management of the enterprise. The traditional business firm was—and still is—a hierarchical, centralized, structured arrangement of specialists who typically relied on a fixed set of standard operating procedures to deliver a mass-produced product (or service). The new style of business firm is a flattened (less hierarchical), decentralized, flexible arrangement of generalists who rely on nearly instant information to deliver mass- customized products and services uniquely suited to specific markets or customers.

The traditional Teams and individuals working in task forces, and a customer orientation to achieve coordination among employees. The new manager appeals to the knowledge, learning, and decision making of individual employees to ensure proper operation of the firm. Once again, information technology makes this style of management possible.

1.9 GLOBALIZATION

A growing percentage of the American economy—and other advanced industrial economies in Europe and Asia—depends on imports and exports. Foreign trade, both exports and imports, accounts for more than 25 percent of the goods and services produced in the United States, and even more in countries such as Japan and Germany. Companies are also distributing core business functions in product design, manufacturing, finance, and customer support to locations in other countries where the work can be performed more cost effectively. The success of firms today and in the future depends on their ability to operate globally.

Today, information systems provide the communication and analytic power that firms need to conduct trade and manage businesses on a global scale. Controlling the far-flung global corporation—communicating with distributors and suppliers, operating 24 hours a day in different national environments, coordinating global work teams, and servicing local and international reporting needs—is a major business challenge that requires powerful information system responses.

Globalization and information technology also bring new threats to domestic business firms: Because of global communication and management systems, customers now can shop in a worldwide marketplace, obtaining price and quality information reliably 24 hours a day. To become competitive participants in international markets, firms need powerful information and communication systems.

1.10 RISE IN THE INFORMATION ECONOMY

Many of the industrial powers are being transformed from industrial economies to knowledge-and information-based service economies, whereas manufacturing has been moving to lower-wage countries. In a knowledge-and information-based economy, knowledge and information are key ingredients in creating wealth.

Today, most people no longer work on farms or in factories but instead are found in sales, education, health care, banks, insurance firms, and law firms; they also provide business services, such as copying, computer programming, or making deliveries. These jobs primarily involve working with, distributing, or creating new knowledge and information.

In knowledge-and information-based economies, the market value of many firms is based largely on intangible assets, such as proprietary knowledge, information, unique business methods, brands, and other "intellectual capital." Physical assets, such as buildings, machinery, tools, and inventory, now account for less than 20 percent of the market value of many public firms in general.

Knowledge and information provide the foundation for valuable new products and services, such as credit cards, overnight package delivery, or worldwide reservation systems. Knowledge- and information-intense products, such as computer games, require a great deal of knowledge to produce, and knowledge is used more intensively in the production of traditional products as well. In the automobile industry, for instance, both design and production now rely heavily on knowledge and information technology.

1.11 EMERGENCE OF THE DIGITAL FIRM:

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. The digital firm can be defined along several dimensions. A digital firm is one in which nearly all of the organization's significant business relationships with customers, suppliers, and employees are digitally enabled and mediated. Core business processes are accomplished through digital networks spanning the entire organization or linking multiple organizations.
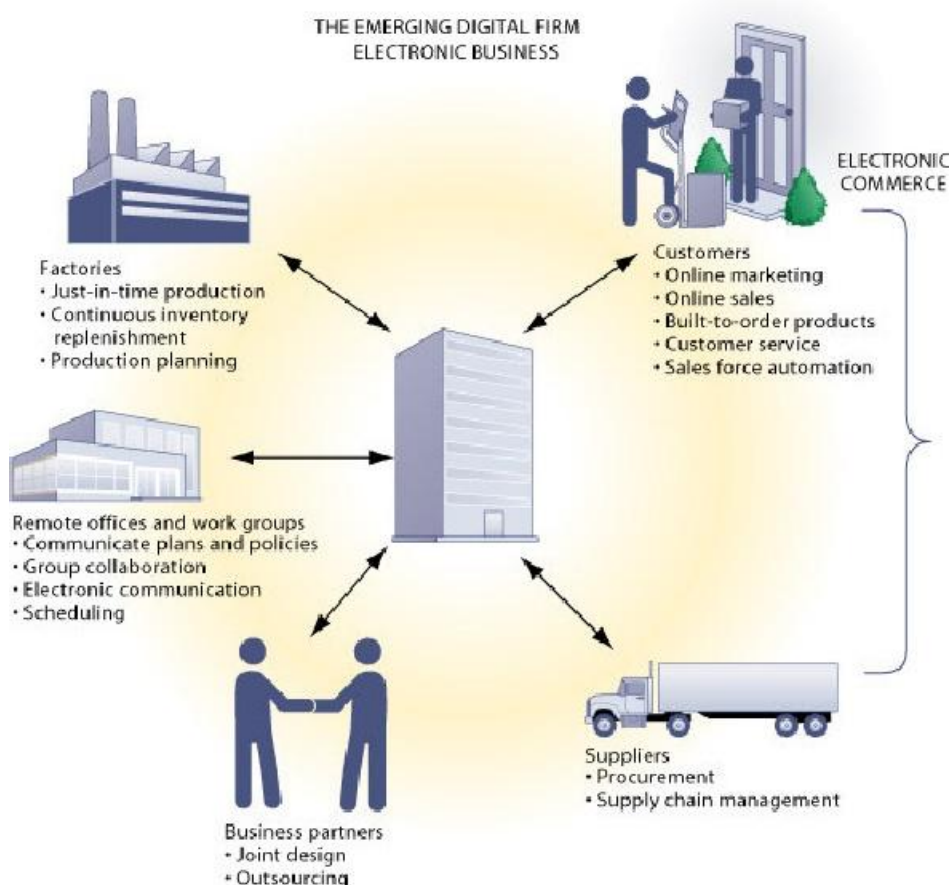
Business processes refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated. Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations accomplish their business processes can be a source of competitive strength.

Key corporate assets—intellectual property, core competencies, and financial and human assets—are managed through digital means. In a digital firm, any piece of information required to support key business decisions is available at any time and anywhere in the firm.

Digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in turbulent times. Digital firms offer extraordinary opportunities for more global organization and management. By digitally enabling and streamlining their work, digital firms have the potential to achieve unprecedented levels of profitability and competitiveness. Electronically integrating key business processes with suppliers has made this company much more agile and adaptive to customer demands and changes in its supplier network. Fig illustrates a digital firm making intensive use of Internet and digital technology for electronic business. Information can flow seamlessly among different parts of the company and between the company and external entities—its customers, suppliers, and business partners. More and more organizations are moving toward this digital firm vision.

Companies can use Internet technology for e-commerce transactions with customers and suppliers, for managing internal business processes, and for coordinating with suppliers and other business partners. E-business includes e-commerce as well the management and coordination of the enterprise.

A few firms, such as Cisco Systems or Dell Computers, are close to becoming fully digital firms, using the Internet to drive every aspect of their business. In most other companies, a fully digital firm is still more vision than reality, but this vision is driving them toward digital integration. Firms are continuing to invest heavily in information systems that integrate internal business processes and build closer links with suppliers and customers. The Window on Organizations describes such a digital firm in the making. Cemex, a world leading global cement and construction materials firm, has achieved impressive results through ruthless focus on operational excellence. Management took an enterprise-wide view of its business processes and developed a series of information systems to turn the company into a lean, efficient, agile machine that could instantly respond to changes in customer orders, weather, and other last minute events.

THE EMERGING DIGITAL FIRM
ELECTRONIC BUSINESS

ELECTRONIC COMMERCE

Factories
• Just-in-time production
• Continuous inventory replenishment
• Production planning

Customers
• Online marketing
• Online sales
• Built-to-order products
• Customer service
• Sales force automation

Remote offices and work groups
• Communicate plans and policies
• Group collaboration
• Electronic communication
• Scheduling

Suppliers
• Procurement
• Supply chain management

Business partners
• Joint design
• Outsourcing

Electronic business and electronic commerce in the emerging digital firm

1.12 PERSPECTIVE OF INFORMATION SYSTEMS:

Information systems can be best be understood by looking at them from both a technology and a Business perspective. An information system can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products. Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By information we mean data that have been shaped into a form that is meaningful and useful to human beings. Data, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.
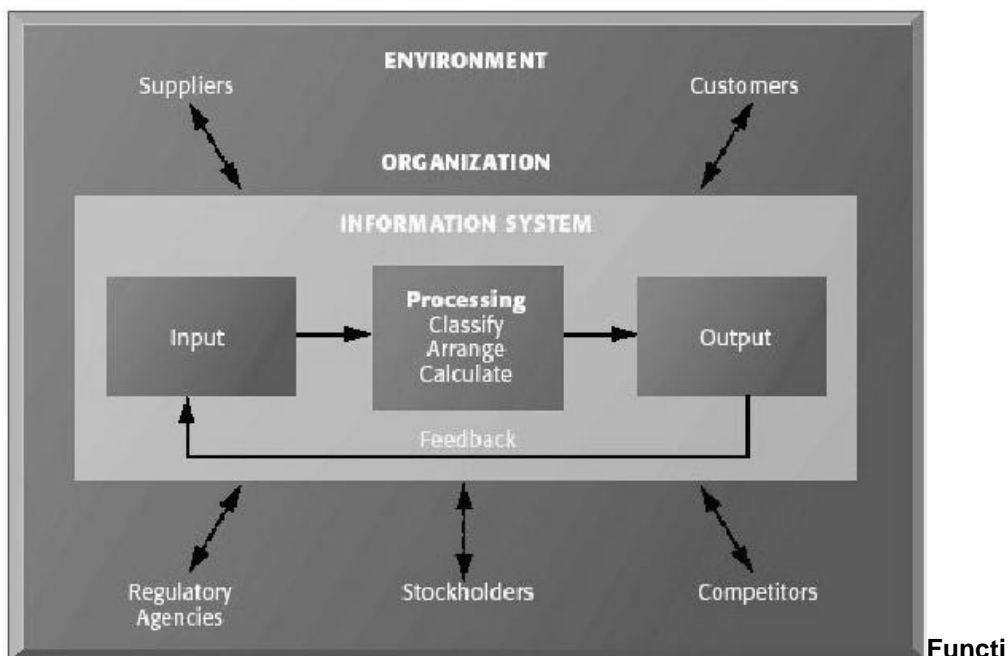
Functions of an information system

Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output. Input captures or collects raw data from within the organization or from its external environment. Processing converts this raw input into a more meaningful form. Output transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require feedback, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to 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 systems.

Eg.: In Integrated Volume Planning system of vehicles, raw input consists of dealer identification number, model, color, and optional features of cars ordered from dealers. Computers store these data and process them to anticipate how many new vehicles to manufacture for each model, color, and option package. The output would consist of orders to suppliers specifying the quantity of each part or component that was needed and the exact date each part was to be delivered to production facilities to produce the vehicles that customers have ordered. The system provides meaningful information such as what models, colors, and options are selling in which locations; the most popular models and colors; and which dealers sell the most cars and trucks. The system requires numbers or codes for identifying each vehicle part or component and each supplier. Informal information systems (such as office gossip networks) rely, by contrast, on unstated rules of behavior. There is no agreement on what is information or on how it will be stored and processed. Such systems are essential for the life of an organization, but an analysis of their qualities is beyond the scope of this text.

Formal information systems can be either computer based or manual. Manual systems use paper-and-pencil technology. These manual systems serve important needs. Computer-based information systems (CBIS), in contrast, rely on computer hardware and software technology to process and disseminate information. From this point on, when we use the term information systems, we are referring to computer-based information systems—formal organizational systems that rely on computer technology.

Eg.: United Parcel Service (UPS) invests heavily in information systems technology to make its business more efficient and customer-oriented. It uses an array of information technologies including bar-code scanning systems, wireless networks, large mainframe

computers, handheld computers, the Internet, and many different pieces of software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics.

Although computer-based information systems use computer technology to process raw data into meaningful information, there is a sharp distinction between a computer and a computer program on the one hand, and an information system on the other. Electronic computers and related software programs are the technical foundation, the tools and materials, of modern information systems. Computers provide the equipment for storing and processing information. Computer programs, or software, are sets of operating instructions that direct and control computer processing. Knowing how computers and computer programs work is important in designing solutions to organizational problems, but computers are only part of an information system.

Using a handheld computer called a Delivery Information Acquisition Device (DIAD), UPS drivers automatically capture customers' signatures along with pickup, delivery, and time-card information.UPS information systems use these data to track packages while they are being transported.

A house is an appropriate analogy. Houses are built with hammers, nails, and wood, but these do not make a house. The architecture, design, setting, landscaping, and all of the decisions that lead to the creation of these features are part of the house and are crucial for solving the problem of putting a roof over one's head. Computers and programs are the hammer, nails, and lumber of CBIS, but alone they cannot produce the information a particular organization needs. To understand information systems, you must understand the problems they are designed to solve, their architectural and design elements, and the organizational processes that lead to these solutions.

The business information value chain
Managers and business firms invest in IT and systems because they provide the economic value to the business. From a business perspective, information systems are part of a series of value-adding activities for acquiring, transforming and distributing the information that managers can use to improve decision making, enhance organizational performance to increase the firm profitability.

Using the information systems it is expected to understand the organization, management and IT shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment
.
Dimensions of Information Systems
Organization
Information system is the integral part of the organization. The key elements of organization are its people, structure, business process, politics, and culture. Organizations are composed of different levels and specialties in terms of levels and functions. An organization coordinates work through a structured hierarchy. It can be formal or informal in nature. Organisation requires many different kinds of skills and people such as knowledge workers, data workers and production workers. Each organization has a unique culture. Different levels and specialties in an organization create different interests and points of view.

Management
Management is responsible to take a sense out of many situations faced by organizations, make decisions and formulate action plans to solve the problems. It rests to the managerial level people. It is important to know the managerial roles and decisions vary at different levels of the organization such as senior, middle, operational and junior manager. All the level of management is expected to be creative, to develop novel solutions to a broad range of problems. Each level of management has different needs and requirements.

Technology
IT is one of the tools to cope up with the change. Computer hardware is the physical equipment used for input, processing and output activities in system. Computer software consists of detailed preprogrammed instructions that control and coordinate the hardware components. Storage technology includes both the physical media for storing data in magnetic disk, optical disk, tape etc. Communication technology consisting both the physical and software recourses links the various parts of hardware and transfers data from one location to other. Computers and communication equipments can be connected into network for sharing the resources.

Contemporary approaches to information system
Multiple perspectives on information systems show that the information systems are the sociotechnical systems. It can be divided into two approaches:

Technical approach
This emphasizes mathematically based models to study information systems as well as the physical technology and formal capabilities of these systems. Computer science is concerned with establishing methods of computation, storage and access. Management science emphasizes on development of models for decision making and management practices.

Behavioral approach
It is concerned with the issues like strategic business integration, design, implementation, utilization and management. It majorly focuses on the cognitive style of an individual. It also focuses on technical solutions, changes in attitudes, management and organizational policies.

Learning to use information systems: New opportunities with technology
There are few key management issues in terms of the challenges confronted to managers
- The information systems investment challenge: It focuses on how can organization obtain business value from their information systems?
- The strategic business challenge: It is concerned with what complementary assets are needed to use the information technology effectively?
- The globalization challenge: It emphasizes on "how can firms understand the business and system requirements of global economic environment?
- The information technology infrastructure challenge: It explains how can organizations develop in information technology infrastructure that can support their goals when business conditions and technologies are changing so rapidly?
- Ethics and security: The responsibility and control challenge: It describes hoe can organization ensure that their information systems are used in an ehically and socially responsible manner?

EXERCISE QUESTIONS:

1) What are the dimensions of information system?
2) Describe the capabilities of digital Firm. Why are digital firms so powerful?
3) Explain the term Globalization.
4) List and describe why information systems are so important for business today.
5) What is the purpose of information system from business perspective? What role does it play in the business information value chain?

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INFORMATION SYSTEM IN THE ENTERPRISE*.*

Units :

2.1 Types of Information Systems
2.2 Integrating functions and business processes:

An **Enterprise Information System** is generally any kind of computing system that is of "enterprise class". This means typically offering high quality of service, dealing with large volumes of data and capable of supporting some large organization ("an enterprise").

Enterprise Information Systems provide a technology platform that enables organizations to integrate and coordinate their business processes. They provide a single system that is central to the organization and ensure that information can be shared across all functional levels and management hierarchies. Enterprise systems are invaluable in eliminating the problem of information fragmentation caused by multiple information systems in an organization, by creating a standard data structure.

A typical Enterprise Information System would be housed in one or more Data centers , run Enterprise software, and could include applications that typically cross organizational borders such as Content management systems.

2.1 TYPES OF INFORMATION SYSTEMS:-

For most businesses, there are a variety of requirements for information. Senior managers need information to help with their business planning. Middle management needs more detailed information to help them monitor and control business activities. Employees with operational roles need information to help them carry out their duties.

The main kinds of information systems in business are described briefly below:

Information System	Description
Executive Support Systems	An **Executive Support System ("ESS")** is designed to help senior management make strategic decisions. It gathers analyses and summarizes the key internal and external information used in the business. Example:- Imagine the senior management team in an aircraft cockpit - with the instrument panel showing them the status of all the key business activities. ESS typically involves lots of data analysis and modeling tools such as "what-if" analysis to help strategic decision-making.

Management Information Systems	A **management information system ("MIS")** is mainly concerned with internal sources of information. MIS usually take data from the transaction processing systems and summaries it into a series of management reports.MIS reports tend to be used by middle management and operational supervisors.
Decision-Support Systems	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. DSS comprise tools and techniques to help gather relevant information and analyze the options and alternatives. DSS often involves use of complex spreadsheet and databases to create "what-if" models.

Systems from functional perspective

Information can be classified by the specific organizational function.

- Sales and marketing systems:
  It is responsible for selling the products or services. Marketing is concerned with the customers for the firm`s products, determining the customer needs and advertising and promoting the product accordingly. Sales are concerned with contacting customers, selling the products, taking orders and follow up the sales.

- Manufacturing and Production systems:
  It is responsible for actually producing the firm`s goods and services. It deals with the planning, development and maintenance of production facilities. It keeps track of the production at various levels.

- Finance and accounting system:
  It is responsible for managing the firm`s financial assets, such as cash, stock, bonds, other investment. The accounting function is responsible for maintaining and managing the firm`s financial records such as receipts, depreciation, payroll etc.

- Human resource system
  It is responsible for attracting, developing and maintaining the firm`s workforce. It supports the activities such as identifying the potential employees, maintaining the records etc. Strategic level detects the manpower requirements.

2.2 INTEGRATING FUNCTIONS AND BUSINESS PROCESSES:

Business process and information systems:

Business processes are referred to sets of logically related activities for accomplishing the specific business result. It supports major functional areas. Eg order processing, accounting, manufacturing etc.

Systems for Enterprise- wide process integration:

Enterprise system creates an integrated organization wide platform coordinate key internal processes of the firm. It can be done with the help of Supply Chain Management and Customer Relationship Management.

EXERCISE QUESTIONS:

1) What are the different types of systems in organization? Explain.
2) What are the enterprise systems? How do they change the way of organization work?
3) What is the role of knowledge management system in the enterprise?
4) Describe the relationship between ESS, MIS, and DSS.

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3

INFORMATION SYSTEMS, ORGANIZATION, MANAGEMENT AND STRATEGY.

Units :
3.1 Organizations and information systems
3.2 Common features of Organizations
3.3 Routines and Business processes:
3.4 Organizational politics
3.5 Organizational culture
3.6 How information systems impact organizations and business firms
3.7 The impact of IT on management decision making

3.1 ORGANIZATIONS AND INFORMATION SYSTEMS.

The interaction between IT and Organization is complex and is influenced by many mediating factors, including organization structure, standard, politics, culture and management decision.

The organization is a stable, formal social structure that takes resources from the environment and processes them to produce outputs. There are three main elements of organization: Capital and labor are primary production factors provided by the environment. The organization transforms these inputs into products and services in organization. Then it consumed by environment in returns for supply inputs. An organization is more stable than informal group. Organization is a collection of rights, privileges, obligations, and responsibilities that is delicately balanced over a period of time through conflict and conflict resolution. Organizations are social structures because they are collection of several elements. In behavioral view of the firm, people who work in the organization develop customary ways of working: they gain attachments to existing relationships; they make agreements with subordinates and superiors about the work.

3.2 COMMON FEATURES OF ORGANIZATIONS

Based on the hierarchical structure of an organization all the organizations shares same characteristics like:

Clear division of labor, hierarchy, explicit rules and procedures, impartial judgments, technical qualifications for positions, maximum organizations efficiency. All organizations develop business processes, politics, and cultures.

3.3 ROUTINES AND BUSINESS PROCESSES:

Individuals in the firm develop a routine for producing goods and services. Routines sometimes called as standard operating procedures in terms of rules, procedures. As employees learn these routines they become highly productive and efficient. Business processes describes the functions involved in the firm.

3.4 ORGANIZATIONAL POLITICS:

People in organization occupy different positions with different specialties, concerns and perspectives. Political resistance is one of the great difficulties bringing about organizational changes. Managers who know how to work with the politics of an organization will be more successful than less skilled managers.

3.5 ORGANIZATIONAL CULTURE:

Organizational culture is the set of fundamental assumptions about what products the organization should produce, when, why, and for whom. Organizational culture is a powerful restraint on change in technological changes.

3.6 HOW INFORMATION SYSTEMS IMPACT ORGANIZATIONS AND BUSINESS FIRMS:

Information systems have become integral, online, interactive tools in the operations and decision making of the firm. Information systems created a impact on the business form the following point of view:

- **Economic Impacts:**

IT changes both the relative costs of capital and the costs of information. IT can be viewed as a factor of production that can be substituted for capital and labor. IT also affects the cost and quality of information and changes the economics of the information. IT helps firms contract in size because it can reduce the transaction cost. Use of networks can help firms lower the cost of market participation. IT can reduce internal management costs. It helps to oversee the large number of employees in the firm.

- Organizational and behavioral impact: Following issues suggests the changes in the behavior of the firm.

  ✓ In complex organizations IT is more useful.

IT flattens organization: IT facilitates flattening of hierarchies by broadening the staffing levels to improve the management efficiency. IT pushes decision making rights lower in the organizations because the lower level employees receive the information and they need to take decision without any supervision. This change also reduces the span of control in the organization.

  ✓ Postindustrial organizations and virtual firms:

In these authorities highly relies on the knowledge and competence but not on the formal positions. More firms may operate as virtual firms in which work no longer is tied to geographic location. It uses to link people, assets and ideas. Information systems can reduce the number of levels in an organization by providing mangers with information to supervise larger numbers of workers and by giving lower level employees more decision making authority.

  ✓ Increasing flexibility of organizations:

IT helps to increase the ability to sense and respond to changes in the marketplace and to take advantage of new opportunities. In small systems Information systems helps in keeping the track of inventory, manufacturing department. Large organizations can use IT to achieve some of the functions of small organizations. Information systems can make the production process more flexible.

  ✓ Understanding organizational resistance to change:

Implementing information systems has consequences for task arrangements, structures, technology and people. Information systems potentially change in organization structure, culture, politics and work. The most common reason for failure is a political resistance to change in the organization.

  ✓ The internet and organizations:

The internet mainly WWW is beginning to have an important impact on the relationships between the firms and external entities and even on the organization of business processes inside the firm. The internet increases the accessibility, storage and distribution of information and knowledge for organization.

3.7 THE IMPACT OF IT ON MANAGEMENT DECISION MAKING:

IT and systems helps to reduce information uncertainty which results in improvement in decision making. The positive impact of IT on management decision making is measurable form productivity measures and the overall performance of the firm. Here a role of a manager is very complex since manager is responsible to take various types of decisions. Manager's responsibility ranges from making

decisions, to writing reports, to attending meetings etc. This is more understandable by the classic model of management. There are some functions of a manager described by Henry Fayol as planning, organizing, co-coordinating, and controlling which can be called as formal functions of manger. But it is unsatisfactory to understand the detail working of manager. This can be depicted by some behavioral models.

Behavioral models:

Behavioral models state that the actual behavior of manager appears to be less systematic, more informal, less reflective, more reactive, and less organized one. Manager's behavior has five attributes:

- ✓ Managers perform a great deal of work without stopping the work.
- ✓ Managerial activities are fragmented.
- ✓ Managers prefer investment in terms of ROI (Return on Investment) terms.
- ✓ They prefer oral communication.
- ✓ Managers give high priority to maintain the system towards the achievements of goals.

Managerial roles fell into three categories as interpersonal roles, informational roles and decisional roles. There are several models of decision making:

Rational model: As per this model of human behavior an individual identifies the goals, ranks all the possible actions by their contribution towards the goals.

Organizational Model: It considers the structural and political characteristics of an organization.

Bureaucratic model: It is used to preserve the organization i.e. to reduce the uncertainty.

Political model: It gives the working of organization as a result of political bargains struck among the key leaders and interest groups.

Information systems and business strategy:

Business strategy is a set of activities and decisions. This helps in strategic planning of an organization. It determines the decisions related to products and services, competition, long term goals. To understand hoe IT fits into the strategic planning it is necessary to consider the three levels o business strategy such as Business level strategy, firm level strategy, industry level strategy.

Business level strategy: It is based on the value chain model for managing supply chain. It is concerned with the leveraging technology, information system products and services, systems to focus on market trends, supply management and customer relationship.

Firm level strategy: It focuses the usability of information technology. It helps to understand the concept of enhancing core competencies,

Industry level strategy: It analyzes the strategy at industry level. The principal concept of this strategy is information partnership, the competitive forces model, business systems, and network economics.

EXERCISE QUESTIONS:

1) What are the features of organization?
2) What are the impact of the internet on organizations and the process of management?
3) What is information system? What is its strategy?
4) What is the impact of IT in decision making?

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DECISION MAKING

Units :

4.1 DECISION MAKING CONCEPTS:-

The word decision is derived from the Latin root 'decido' that is cut off. Decision can be settlement, a fixed intention on bringing conclusive result, a judgment on a solution. A decision is a choice out of several action made by the decision maker to achieve some objectives in the given situation. Business decisions are those which are made in the process of conducting the business to achieve its objective in the given environment.

  ✓ According to Haynes and Massie," A decision is a course of action which is consciously chosen for achieving a desired result."
  ✓ According to Trewatha and Newport," Decision making involves the selection of course of action from among two of more possible alternatives in order to arrive at a solution for a given problem.

4.2 CHARACTERISTICS OF DECISION MAKING:-

  • Sequential in nature.
  • Situation based activity
  • Influenced by personal values.
  • Exceedingly complex due to risk and trade off.
  • Made in institutional setting and business environment.

In business decision making, the decisions are not individual. Each of them has relation to some other decision or situation.

Decision making is situational. It is differed from one situation to other taken by a single person.

The personal values of decision makers plays a major role in decision making i.e. the culture discipline and the individuals commitment to the goal will decide the process and success of decision.

The decision making process is the complex process in the higher management. The complexity is the result of many factors such as interrelationship among the decision makers, job responsibility, and question of feasibility, ethics and the probable impact on the business.

Decision making process requires creativity, understanding the human power, discovers number of human tangible and intangible factors affecting the decision process. It is made according to the business environment.

4.3 RATIONAL DECISION MAKING:-

A rational decision ensures the achievement of the goal effectively and efficiently for which decision is made.

Eg: If it is raining then it is rational to look for umbrella. The quality of decision making is to be judged on the rationality and not necessarily the result it produces. The rationality of decisions made is not same in every situation.

Fixing a price of the product must be greater than its manufacturing cost. Productivity is dependent on the type of customers as well a quality of product. Here a decision may be rational or irrational.

It will vary with the organization, situation and the individuals. Therefore rationality is having multi-dimensional concept. Any business decision if ask to be reviewed by share holder, consumer, employee; supplier will result in different criticism with reference to their individual rationality. This is because each one of them will view the situation in different context. There are three dimensions of rationality as satisfaction to an individual, feasibility in terms of objectives, consistency in decisions.

4.4 TYPES OF RATIONALITY:-

According to Simon Herbert a decision in a given situation can be of following types:
- Objectively rational: - If it maximizes the value of the objective.
- Subjectively rational: -If it maximizes the value in the relation to knowledge.
- Consciously relational: - To the extent the process of decision making is a conscious one.
- Organizationally rational: - To the degree of orientation towards organization.
- Personally rational: - To the extent it achieves the individual's personal goals.

4.5 THE PROBLEMS IN MAKING THE RATIONAL DECISION:-

- Ascertaining the problem.
- Insufficient knowledge.
- Not enough time to be rational.
- Environment may not co-operate.
- Other limitation.
- Ascertaining the problem: - According to Peter Ducker the most common source of mistakes in the management decision is the emphasis on finding the right answer rather than the right question. The main task is to define the right problem in clear terms.

Eg. sales are declining. The real problem may be in the quality of the product and you may be thinking in improving the quality of advertisement.
- Insufficient knowledge: - The total information leading to the complete knowledge of the subject is necessary. The main function of the manager is to provide the enough information to all the divided lines.
- Not enough time to be rational: - Decision maker may be under the pressure to make the decision. If the time is limited he may take the hasty decision which may not satisfy the test of rationality.
- The environment may not corporate:- The decision may get fail when the test of rationality as the environment factors considered in decision making turned out to be untrue.

Eg: The factor of oil and petroleum product price is considered as stable but post decision environment proves it to be wrong.
- Other limitations: - They are the need for comprising the different position, misjudging, the motives, poor communication, risks, values of the people etc.

Advantages of decision making:
- ✓ Achievements of business objectives
- ✓ Facilitates optimum utilization of resources.
- ✓ Satisfactory to ever one in the organization.
- ✓ Promote the whole management process.
- ✓ Rational decision making is innovative.

4.6 STEPS IN THE DECISION MAKING PROCESS:

- Identifying the problem: It is necessary to diagnose the real problem into given situation and find out whether it is controllable or not.
- Analyzing the problem: After defining the problem it is expected to detect the scope and impact of various decisions in different situations.
- Collecting relevant data: Information collected based on the data should be more clear in terms of covering all aspects of problem.
- Developing alternative solution: It is essential to determine some alternative course of actions in order to solve the problem.
- Selecting the best solution: After generating different alternatives the next step is decision making process. In this process decisions are assessed as per the feasibility study.
- Converting decisions into actions: After selecting the good alternative, a manager is supposed to convert decision into actions in order to execute the decision.
- Ensuring feed back: It is reliable to control the decisions by taking a review of the decision in a situation.

4.7 DECISION METHODS TOOLS AND PROCEDURES
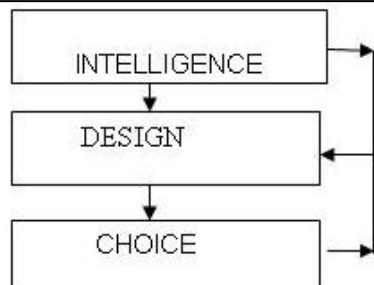
Herbert Simon Model

Herbert Simon model, describes the model in three phases: intelligence, design, choice. Intelligence indicates raw data collected processes and examined. It identifies the problem calling for a decision. Design phase means creating, developing and analyzing the different decision alternatives by testing the feasibility of implementation. It asses the values of decision outcome. Choice means selecting one alternative as decision based on the selection criteria.

In the intelligence phase, MIS collect the data; the data is scanned, examined, checked and edited. Further it is sorted and merged with the other data and the computations are made, summarized and presented.

In this process, the attention of the manager is drawn to the entire problem situation by highlighting the differences between actual and expected things.

In design phase the manager develop a model of problem situation on which he can generate and test the different decisions to fascinate its implementation. In case of different alternatives he can turn it to the choice.

In the phase of choice, the manager evolves selection criteria such as maximum profit, least cost and time. In these 3 phases if the manager fails to reach a decision, he can start the process all over again from the intelligence where the additional information is collected.

Decision-Making systems:-

There are 2 types of systems based on the manager's knowledge about the environment.

i) Closed decision making: - If the manager operates in a known environment then it is called as closed decision making. The conditions of a closed decision-making systems are:

a) The manager has a known set of decision alternatives with their outcomes fully in terms of values if implemented.

b) The manager has a model, a method, rules where the decision alternatives can be generated, tested and ranked.

c) The manager can choose one of the alternatives based on the goals and objectives. Example: Examination system to declare a pass and fail.
Banking system to penalties a loan interest to the customer.

ii) Open decision making:- If the manager operates in an environment not known to him then the decision-making is called as open decision making. The condition are
a) The manager doesn't know all the decision alternatives.

b) The outcome of the decision is also not known fully i.e. the knowledge of the outcome may be probabilistic one.

c) No method, rule or model is available to study and finalize one decision among the set of decision alternative.
It is difficult to decide objectives and goals. Therefore the manager reports to that decision where aspirations and desires meet.
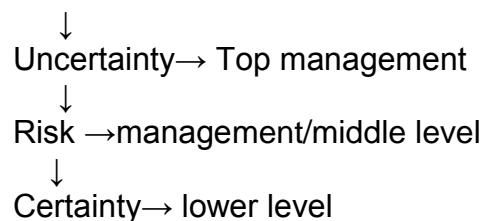
Example: Pricing a new product.
An establishment of a new business.

Types of decisions:-
The types of decisions are based on the knowledge about the outcome on the events yet to take place. If the manager has full and precise knowledge of event or outcome which is to be occurring then there is no problem in decisions & may be termed as successful decisions.
If the manager has full knowledge of system then it is situation of certainty. If the manager has partial or probabilistic knowledge then it is a risk situation. If the manager does not have any knowledge of the situation then it is decision making under uncertainty.

Good MIS

$\downarrow$

Uncertainty$\rightarrow$ Top management

$\downarrow$

Risk $\rightarrow$management/middle level

$\downarrow$

Certainty$\rightarrow$ lower level

Nature of decisions:-
Decision making is a complex situation. Decisions are classified in programmed decision and non-programmed decisions.
i. Programmed decision: - If a decision is based on rules, methods or some guidelines then it is called as programmed decision. The programmed decision making can be delegated to a lower level in the management. Eg: If a stock level of an item is 200 number then a decision to raise purchase requisition for extra items in few numbers.
ii. Non- programmed decision: - A decision which cannot be made using a rule or method is called as non programmed decisions. This decision making is non-deterministic and is handled by top management. Eg. Stock level is 200.

The Law of requisite variety:-
In a programmed decision making it is necessary for the manager to enumerate all the stages of decision making situation and provide the necessary support through the rules and formula for each one of them. The failure to provide the decision making rules in each of them will lead to uncertainty. Therefore the requisite varieties of situations arise means that for efficient programmed decision making it is necessary for the manager to provide:
a) All the decision alternatives and choices in each state.
b) The decision rules to handle the situation
c) The system to generate decision choice.
Closed decision making is more efficient than Open decision making.

4.9 METHODS OF DECIDING THE DECISION ALTERNATIVES: -

There are several methods to decide the best way among several alternatives. These methods basically are search processes to select the best alternatives satisfying certain goals.

- **Optimization techniques: -**
  These methods are used in case where decision making situation is closed, deterministic and require optimizing the resources under the constraints. To handle this situation software packages are available. These methods are termed as operational research methods. It balances any 2 aspects of business under a condition.

Example: In linear programming model use resources v/s demand to balance the maximization of profit. In inventory control model the cost of handling inventory v/s cost of procuring / budget cost is used to balance the demand.

- **Pay of analysis:-**

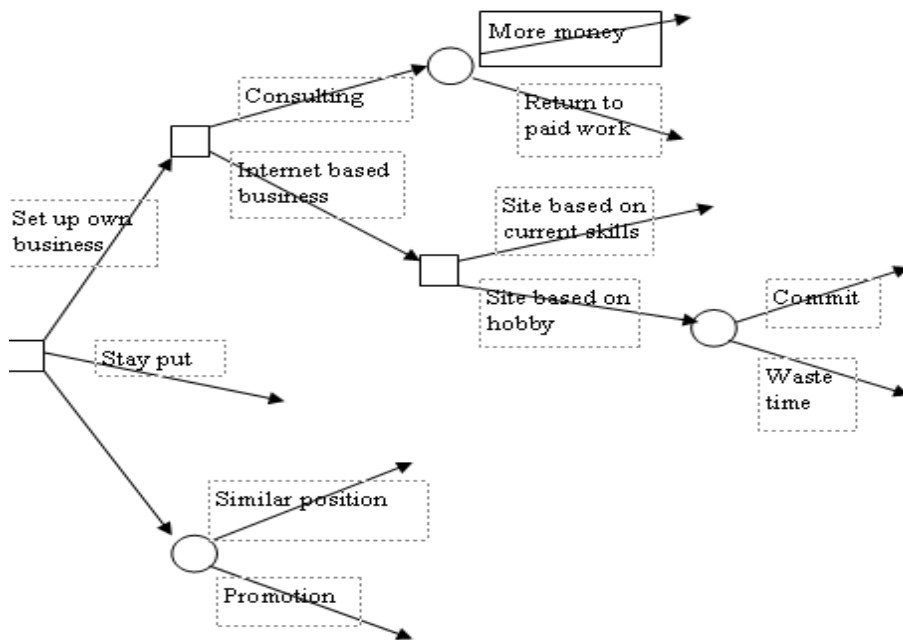| Decision	Probability	No change	Increase	Decrease	Expected gain
		0.50	0.20	0.30	
No change in price		4	5	8	5.40
Increase the price		6	4	3	4.70
Decrease the price		10	12	4	8.60

When all the alternatives and their outcomes are not known with certainty the decision is made with the help of pay of analysis. The pay of matrix is constructed where the rows shows alternatives and the columns show the condition with the probability of occurrence. The intersection of columns and rows shows the values of the outcome resulting out of the alternatives and state of the nature.

Eg: If the decision chosen is no change in price and the competition does not change it then the gain is 4. The decision is taken by choosing the decision alternative which has maximum expected value of the outcome i.e.10 indicate that the decision to decrease the price. The decision can be on the basis of utility of the decision in terms of money value. In this case, it is expected to look after the expected gain of the outcome.

- **Decision tree analysis:-**

When the decision makers have to make the sequence of decision, the decision tree analysis is used in selecting a set of sequence decisions. Decision trees are the pictorial way of showing the sequence of interrelated decisions and outcomes that include the probabilities and are evaluated using the expected values. Decisions points are represented by square node and their outcomes by solid or hollow circle.

The decision nodes are the points where a choice exists between the alternatives and the managerial decision is made based on estimates and the calculations of returns expected. The outcome nodes are the points where the events depend on the probability. Decision trees are evaluated from right to left working back from the later decisions to the first.

Set up own business — Consulting — More money / Return to paid work

Internet based business — Site based on current skills / Site based on hobby — Commit / Waste time

Stay put — Similar position / Promotion

Decision making behavior:-

- Decisions are differed on the behavioral platform because the response of every human being may not be same.
- The managers differed in their approach towards decision making in the organization, therefore they can be classified into:

a. Achievement oriented: - looking for the excellent result.

b. Task oriented: - looking for completion of the task.

- The manager personal values also influence the behavior of decision making. Their behavior shows a distinct pattern indicating a conservative approach to the decision-making i.e. choice of the decision-making tools may differ from motives of manager.
- The behavior is also influenced by the position that the manager holds in the organization i.e. it is influenced by fear, personal value or image, carrier prospects etc.

Organizational decision making:-

An organization is an arrangement of the individuals having different goals. Each individual handles different powers and the rights because of his position, function and the importance in the organization. Since there is an imbalance in the power structure the different individuals cannot equally influence the behavior and the management process. In case of inconsistence goals the conflicts in the organization increases affecting the organizational performance. To avoid this inconsistency the organizational decision-making theory provides different methods of conflict resolution about the rationality of goals setting the goals, acceptable goals; achieve the goals in sequential manner.

Dealing with uncertainty:-

The market uncertainty, fluctuations, the changes in government, policy, technological changes are some of the factors which make the business environment uncertain. To deal with uncertainty the organization will vote for the decision with the highest probability with minimum profit. Example: 90% chance of earning $1 million against a decision which has 10% chance of earning $10 million. In this the highest probability decision are chosen.

There are 2 methods of dealing with the uncertainty:
1. Decide for a limited short period and make a provision to correct the decision.
2. Negotiate some decision to convert uncertainty decision to certainty.

MIS and decision making concepts:-

MIS provides Herbert-Simon model of decision making which allows analyzing the data and it provides the problem situation model to generate the different decision alternative. It then allows selecting any option from the group of certain decisions. MIS provides programmed and non-programmed decision making to handle the variability. It also provides open and closed system in providing the decision flexibility. Operational research models are available to find the best decision.

Optimization model provides static and dynamic model calls for the problem of pay of analysis. It also defines the behavioral and organizational aspects of decision making to handle the organizational culture and constraints in MIS. The organizational learning makes the designer aware of the strength of MIS. Hence MIS is having a good support as a decision asking organization.

EXERCISE QUESTIONS:

1) What is Decision? What are its types? How is it differed in nature?
2) What are the characteristics of decisions?
3) What is rational decision? Why is it difficult to implement? Explain.
4) What are the problems in rational decision making? Explain.
5) Describe Herbert Simon model of decision making.
6) Explain the term: Law of requisite variety.
      Pay-off analysis
      Decision Tree analysis.
7) Differentiate between open decision making and closed decision making.

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5

INFORMATION

Units :
5.1 Information Concept
5.2 Information Presentation
5.3 Bias in Information
5.4 Methods to avoid the misuse of information
5.5 Attributes of information
5.6 Information a quality product
5.7 Parameters of quality
5.8 Classification of information
5.9 Classification of information in terms of its application
5.10 Methods of data and information collection
5.11 General Model of a Human as an Information Processor
5.12 Organization and information
5.13 Summary of Information concepts and their implications
5.14 MIS and Information Concepts

5.1 INFORMATION CONCEPT:-

The information has a precise meaning & it is different from data. The information concept has a value in decision-making but the data has not. Information brings the clarity. Data is like raw material, while information is equivalent to the final product after processing the raw material. Eg. In the report of IT students Roll number, Name, Class, Gender, Marks are the data attributes. But the actual information can be received by filling the records in respective data.

The characteristics of information are like:
1. Improves the representation of an entity.
2. Updates the level of knowledge.
3. Provides the surprise value.
4. Reduces uncertainty.
5. Helps in decision-making.

The information is said to be the basis for decision making. David and Olson define it as" Data that has been processed into a form that is meaningful to the recipient and is of real and perceived value in current decisions." The quality of the information can be decided depending on the above mentioned characteristics. The information is the meaningful representation of data to the recipient & is of real or perceived value in the current or the prospective actions or decisions of the recipient. Data can be a group of non-random symbol in the form of text, images or voice, actions & objects.

The information must be transferred from the source to the destination without loss of data. Fig. shows the general model of communication. Fig. shows the general model of communication.
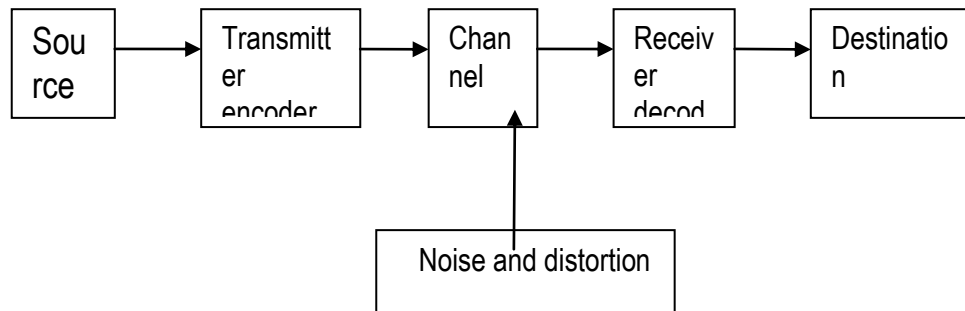
MIS is equivalent to the transmitter which provides information and sends through the report channel to the various receivers which is decoded at the destination. The poor quality of information due to various factors would create the confusion and misunderstanding which is equivalent to the noise and distraction in communication model. A good MIS communicates the information without noise and distraction to the user.

5.2 INFORMATION PRESENTATION

If the information is not presented properly, it may fail to communicate the degree of communication. The degree of communication is affected by methods of transmission, the manner in which the information is handled and the limitation and the constraints of the receiver as the information processor and organization as information user.

The methods used for improving the communication are **summarization** and **message routing**.

The concept of summarization is used to provide the information which is needed in the form and content. The summarization information can be represented by the key factors.

The principle of summarization is that it suppresses the noise and distortion i.e. confusion, misunderstanding or missing the purpose and aim of the information due to extra information.

Eg: Management position - responsibility - General Manager, Divisional Head, Marketing, Materials.

Message routing is another method of improving the degree of communication. The principle here is to distribute the information to all the places that are accountable for the subsequent action or decision in any manner. This is achieved by sending the copies of report and documents to all the concerned people. The principle of message routing achieves the spread of information to the appropriate quarters. Eg. Hierarchical structure of an organization suggests the flow of information.

5.3 BIAS IN INFORMATION:-

The appropriate method of communicating the information always referred as unbiased information. While using the techniques of classifications or filtering the information it may happen that certain information get eliminated or does not classify i.e. deliberate bias in covering the certain information is to be avoided. The bias enters because people try to block sensitive information which affects them.
To overcome this biasing a formal structure of an organization should be adopted; the type of information and its receiver should be decided by the top management. Many times the data & the information are suppressed but the inferences are informed with no or little possibility of verification or rethinking. In this case one who draws

inferences may have a bias in the process of collection, processing & presentation of information. There are possibility of personal bias, organizational bias & management bias reflected in information. The presentation of information will generate a bias & may influence by the user. Eg. If the information is presented in alphabetical order & if it is lengthy, the first few entities will get more attention. Other part of data may be neglected.

5.4 METHODS TO AVOID THE MISUSE OF INFORMATION:-

1. Delayed delivery of information reduces the immediate course of action.
2. Changes in format and content of report insist to provide precise information.
3. Analyze, filter the information as confidential and sensitive in nature to identify the cost of information.
4. The presentation of the information can also generate a bias and may influence a user.
5. Suppress the details & references of data & information. This makes it difficult to collect & process the data as per the requirement.

E.g. If the information is presented in alphabetical order and if it is lengthy the first few entities will get more attention. The choice of exception also creates a bias.

5.5 ATTRIBUTES OF INFORMATION

- Accuracy: -The degree of precision decides the accuracy in the representation.
- Presentation: -Forms may be qualitative or quantitative, numeric or text, picture or graphics, print or display, summarized or detail.
- Frequency: How often the information is needed and updated?
- Scope of reporting: -the coverage of information is represented in terms of area entities.
- Source of collection:- It can be internal or external to the organization.
- Timescale:- Information may be related to past, current, future or it can cover the entire time span.
- Relevance: The information has relevance to the situation and also to the decision-making and data.
- Complete: The information that covers all the aspect of decision, scope is known as complete information.
- Timeliness: The receipt of information on time when needed is highly useful.
- Redundant information: The extra unnecessary repetition of data is called as redundant information.

5.6 INFORMATION A QUALITY PRODUCT

Information is a product of data processing. The quality of information is high if it creates the managerial impact leading to attention, decision and action. The quality of the information can be measured in four dimensions:
- Utility.
- Satisfaction.
- Errors.
- Bias.

Utility dimension has 4 facets: the firm, the time, access and the possession. If the information is represented in the form manager requires then its utility increases. If the information is available when needed then the utility is optimized. If the information is easily and quickly accessible through the online process, its utility gets efficient technology. If the information is possessed by the manager who needs it then its utility is highest. To increase the utility the cost factor should be increased.

Since the information is available to many users in system the subjectiveness would vary. The degree of satisfaction could determine the quality of information. If the organization has high degree of satisfaction then the information can be available at all the levels to the manager.

Errors occur because of various reasons such as incorrect data measurement, incorrect data collection, failure in data processing, incomplete data, poor application of data and control system and deliberate biasing. To clear the errors it is necessary to follow the methods of system analysis & design.

Procedure of communicating the information should be such that the system is able to detect the degree and the nature of the bias and correct information accordingly.

5.7 PARAMETERS OF QUALITY

The users being many, the information is difficult to control. Following parameters are used to control the quality of the information.
- Impartiality: Impartial information contains no bias and has been collected without any distorted view of the system.
- Validity: The validity of the information creates to the purpose of the system or the scope of the information. It also dependent on how it is used.
- Reliability: It is connected to the representation and the accuracy of what is being described in the information.
- Consistency: The information is termed as inconsistent if it derived from a data which does not have a consistent pattern of the period.
- Age: If the information is too old, it will not be useful in today's system. The currency of information makes all the differences to the user. If the information is old, it doesn't provide any characteristic as the update of knowledge, the element of surprise, representation and the reduction of uncertainty.

5.8 CLASSIFICATION OF INFORMATION

There are types of information:
- **Strategic information:** This information is required by top management for strategic decision making.
- **Tactical information**: The information is required by middle management for running the organization.
- **Operational information**: The decisions for day to day activities referred at this level. It is used by operational level users.
  According to John Dearden information can be classified in the following way:
- **Action v/s no action information**: - The information which includes the action is called as action information. The information which communicates only the status of situation is called as no action information.
  E.g. There is no stock of item A in a shop suggests purchasing action.
  Stock ledger shows the stock balance=400 provide just the status of situation i.e. no action information.
- **Recurring v/s nonrecurring information**: - The information generated at regular interval is recurring information.
  E.g. Monthly sales report
  The financial analysis or the reports of marketing research is non-recurring information.
- **Internal v/s External**: - The information generated from internal source of organization is termed as internal information. The government represents industry survey, research information are the external information as it is taken from the outside sources to the organization.

5.9 CLASSIFICATION OF INFORMATION IN TERMS OF ITS APPLICATION: -

- **Planning information**: Certain standards, norms and the specification are used in planning of any activity. Such information is called as planning information.
  E.g. Time constraint, operational standard, designing standards etc.
- **Control information**: Reporting the status of an activity through a feedback mechanism is called as control information.
- **Knowledge information**: A collection of information through the different library reports, research studies to buildup knowledge base as information source for decision making is known as knowledge information.
  The information can be classified on its usage:
- **Organization information**: The information used by everyone in the organization is called organization information.
- **Database information**: The information used for multiple purposes in different applications is called as database information.
- **Operational information**: The information used in the business functions is called as operational or functional information.

5.10 METHODS OF DATA AND INFORMATION COLLECTION:-

There are several internal and external sources of collecting the data such as:
- Observation.
- Experiment.
- Survey.
- Subjective estimation.
- Transaction processing.
- Purchased from outside.
- Publication.
- Government agencies.
- Interviewing
- Case study

Observation method depends on the observer and influenced by the bias.

Information can be collected through designing of the experiment where the quality of information depends on the experimentation technique. It is performed on trial basis of controlling the specific parameters.

Survey method occurs through the questioners' session. According to the quality of question, quality of information can be decided.

Subjective estimation can be called as sub expert. If the above ways are unsuccessful then this applied to collect expert opinion.
Transaction processing: This method consists of data processing leisure, representation throughout the organization.

Publication provides various public forums. Eg. Newspapers, government agencies, online information etc.

The information can be purchased from outside at the specific rate easily. It may be expensive and it may have a bias depending on the source.

Government agencies: It is available but cannot be directly used by all. E.g. RBI Publications.

Interviewing is a technique that is primarily used to gain an understanding of the underlying reasons and motivations for people's attitudes, preferences or behavior. Interviews can be undertaken on a

personal one-to-one basis or in a group. They can be conducted at work, at home, in the street or in a shopping centre, or some other agreed location.

The term case-study usually refers to a fairly intensive examination of a single unit such as a person, a small group of people, or a single company. Case-studies involve measuring what is there and how it got there. In this sense, it is historical. It can enable the researcher to explore, unravel and understand problems, issues and relationships.

5.11 GENERAL MODEL OF A HUMAN AS AN INFORMATION PROCESSOR:-
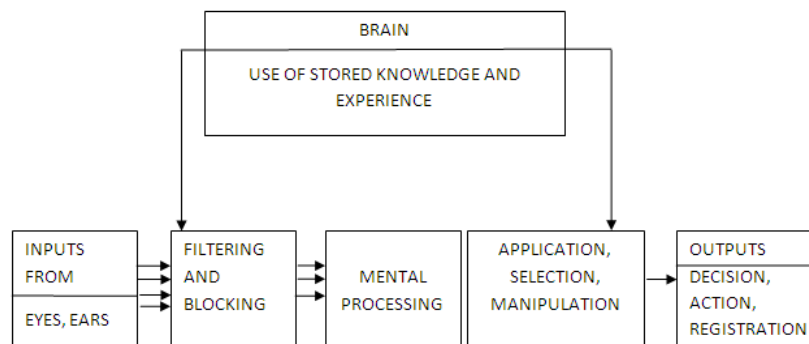
GENERALISED MODEL OF INFORMATION PROCESSOR

A decision maker uses his receptor normally eyes and ears to pick up the information and transmit it to the brain for processing and storage. The result of this processing will be a response which may be decision, an action or at least recognition of the event for future use. Hence a manager can be said to be an information processor. Filtering is a process whereby a manager selectively accepts that much input which his mental ability can manage 2 processes. The filtering process locks the unwanted and inconsistent data or the data which does not match its frame of reference. This filtered data can be selected by individuals mental processing and manipulation by providing several choices.
There are few methods of filtering the data such as –
The frame of reference by using the knowledge & experience.
Consider only the important factors affecting the decision.
Universally claim the abnormal decision procedures for filtering.

5.12 ORGANIZATION AND INFORMATION

The management consists of a group of people who are placed in the organization at the various levels with an assigned tasks, job and responsibilities to achieve the goals. Depending on the level in organization the nature and complexity of the job is determined. The organization may be large or small performing at one or multiple location. The information need is typical. It is therefore necessary to understand need of information, the nature, the use of information with reference to the types and kevels in the organization.

The information has a value if it causes the changes in the action and behavior of the decision maker. The perfect information is the information which helps in converting the certainty or risk to certainty. It is a myth and difficult to achieve in an organization.

5.13 SUMMARY OF INFORMATION CONCEPTS AND THEIR IMPLICATIONS:-

Filtering: The valid information should not get eliminated as well should be related to the frame of reference of the user.

Simon model of Decision making: The designer should attempt to provide such information that explains the problem in clear terms leading to solution of the problem.

Format: The information can be complete in all respects which helps in decision making.

Cognitive Style: It is thinking pattern of an individual. It always differs from person to person.

Feedback loop: To execute the system as per the expectation it is necessary to review the system. The mechanism used to control and improve the system is called as feedback system.

Perceived value of data: Information may be useful as per the period of reference i.e. some information may not be useful in the current perspective but may be important in future.

Individual differences: The information needs of an individual may differed due to tolerance level, experience level, organization level, knowledge level, intelligence.

5.14 MIS AND INFORMATION CONCEPTS

The goal of the MIS should be to provide the information which has the surprise value and which produces the uncertainty. It should process the data to create a knowledge base in the organization. The information should be represented without any distorting in a summarized or centralized. Information is a quality product for an organization. The quality of the information can be measured by 4 dimensions: utility, satisfaction, error and bias.

The information can be controlled by the parameters such as validity, impartiality, consistency, reliability, and age.

The information can be distinguished from action, its sources and its utilization. The MIS should be designed such that it meets the needs of total recognizing. It is necessary to recognize that the information may be misused if it falls into wrong hand. The MIS should have features locking, separation and delayed delivered.

EXERCISE QUESTIONS:

1) What is Information? What are its characteristics?
2) What is communication? How does it represented and processed? Explain.
3) Explain the term: Bias in information.
4) What are the attributes of Information?
5) How do you measure the quality of information? Explain.
6) What is classification of information? Explain.
7) Describe the general model of an information processor.
8) Explain why information has no specification but it has a character and value.
9) How does the quality of the information improved?
10) What are the methods for the collection of data?
11) The character and value of information is linked to the people in the organization and to the management process in the organization. Explain.

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6

DEVELOPMENT OF MIS

Units :
6.1 Development of long range plans of MIS:
6.2 Contents of MIS plan or Long range plan:-
6.3 Ascertaining the Class of Information:
6.4 Determining Information Requirement
6.5 Development of MIS:
6.6 Life cycle:
6.7 Implementation of MIS:
6.8 Parameters of management of quality in MIS
6.9 Organisation for development of MIS:
6.10 MIS- The Factors Contributing To Success:
6.11 MIS-Factors Contributing to the Failure

6.1 DEVELOPMENT OF LONG RANGE PLANS OF MIS:

We need MIS flexible enough to deal with, changing information needs of the organisation. It should be conceived as an open system to interact with the business environment, with a built in mechanism to provide desired information as per the new requirement. The designing of such open information is complex. Therefore the planning of MIS is necessary. The MIS plan is concurrent to the business plan of organisation. The development plan of MIS is linked with the steps of implementation in business development plan in the form of short range plan, long range plan
.

	Business Plan	MIS Plan
1	Business Goals and objectives	Consistent with the business.
2	Business plan & . Strategy in MIS.	Business supports to strategy.
3	Strategic planning & decisions.	MIS itself is responsible for decision making.
4	Management plan for the execution & development.	MIS provides system development schedule & plan execution.
5	Operational plan for execution	Hardware & software plan for the procurement & the implementation.

6.2 CONTENTS OF MIS PLAN OR LONG RANGE PLAN:-

MIS plan is linked to the business plan where it is necessary to develop the goal and the objective for MIS which will support the business goal. This will consider the management philosophy, policy, constraints, business risks, internal external environment of the organisation and the business.
MIS follows the following steps in the long range plan.

- **Strategy for plan achievements:**
The designer has to take numbers of decision for the achievement, goods & objectives such as development approach, online batch real time.
a] system development: it can operational v/s functional, accounting v/s db v/s conventional, distributed v/s centralised ,SSAD v/s OOT.
b] resources for system development:
Internal v/s external customized development.
c] man power composition :
it considers the quality of manpower for analyst, programmer etc….

- **Architecture of MIS:**

It provides the sub-system structure and their I/O with links. It can also provide the relationship and functionality.

- **System development schedule:**

While preparing the schedule some considerations is given to the implementation of system in the overall information requirement. Schedule prepares the development steps against the timescale of execution of the system development.

- **Hardware and software plan:**

Hardware investment is considered from lower configuration to higher level. The process is to match the technical decisions with the final decisions. The selection of h/w & s/w architecture is the strategic decisions. It is important to consider the following issues
1. Organisation strategic plan should be the basis for MIS strategic plan
2. The system development should match the implementation schedule of business plan.
3. The choice of I.T. is a strategic decision is not a financial decision.

- **General model of MIS plan**

i] The corporate information focuses on the current operations and the environment position
ii] Corporate philosophy defines the policy, guidelines which form the work culture in the organisation.
iii] Corporate mission, goals, objectives defines the long term aspects of the system .
iv] Business risk and rewards defines the trade of between these factors to give the clear quantitative factors.
v] Business strategy and policy focuses on the key areas of information system.
vi] Information needs focuses on the critical information as well as how do we achieve the goals and the objectives in the system.
vii] Architecture of plan focuses on the tools for the achievement.
viii] System development schedule focuses on the details of system and sub-systems with their linkages charted against the timescale.
ix] Organisation and execution of the plan focuses on the individual toll in the system.
x] Budget focus on its cost investment schedule.

6.3 ASCERTAINING THE CLASS OF INFORMATION:

Organisational information:

Information Entity	Manager Personnel	Production	Administration	A/C
Employee Attendance	n	n	n	y
Salary Ages/ Overtime	n	n	y	y
Human Resource Information	n	n	n	y

Organisational information focuses on the user at all levels in the organisation structure. It defines the information required by the number of department, division, function etc. It can be determined in matrix form. It can be observed from the table that the information entity is one but its usage is different. Since the usage of the organisation information is different at different level for different purposes. It is advisable to store the data in the form of database which will be used by the user for generating their respective information needs.

Functional information:

Functional information is defined as a set of information required by the functional head in conducting the administration and management function. It is purely local to that functional organisation and by the definition it does not has any use elsewhere except for the manager. Functional information is largely factual, statically and detail in multidimensional functional information is normally generated at equal time interval for understanding the trends and making the comparison against time scale.

The functional information can be accessed on the following 3
parameters:

- Working design
- Responsibility
- Functional Objective

Work design specifies procedure, work culture etc. The functional responsibility of individuals is used for accounting and decision making for achieving the target to identify the performance. Each function has its own objective which is delivered out of the corporate goals.

The functional goals and objective are necessary to achieve.

Overall corporate achievement such information can be collected from the manager and their functional head who together executes the business activities.

Knowledge information:

It shows the trend of the activity or the result against the time scale. It creates an awareness of those aspects of the business where the manager is forced to think, decide and act. It highlights the deviation from non-standards and also the abnormal level. The knowledge information supports the function of middle and top management. It is recorded in the graphical format for quick grasp. If the sales are declining the trend is likely to continue. The product is continuously failing the reason can be process of manufacture.

Decision-support information:

The information doesn't act as a direct i/p to the decision making information. Information issued in decision-support system & model building & problem solving in two ways justifying the need of decision. It aids in decision making:
eg: The information on non-moving inventory justifies the decision of disposal of item.
The demand forecast information aids in the decision on determining the orders quantity for orders & sales. The source of this information may be internal or external.

Operational information:

This information is required by the operator and the lower level of the management . the main purpose of this information is fact finding and taking such action and decision which wil affect this operator at macro level.
The source of such information is largely internal through the transaction processing and the information relate to the small time span which is mostly current status.

6.4 DETERMINING INFORMATION REQUIREMENT

Based on the uncertainty level following methods are used to handle the uncertainty.

- Low knowledge (near certainty)
  It is handled by operation management by determining the needs for the system.
- Precise probabilistic knowledge(risk situation)
  It is handled by middle level management which determines the existing system, methods of decision making & problem solving.
- not able to determine probabilistic term (very risky)
  It is handled by the middle and the top level management which is

determined through critical functions & decision making system.
- High risk (Total uncertainty)

It is handled by top management which is determined by experimentation, modeling and sensitivity analysis.

Asking & interviewing, determine the information requirement when the user have to select one answer from finite set of answer. A closed question should be asked instead of open question which are the raw material used for making a product indicates a closed question, which are the raw materials used for a product indicates an open ques. the experts or the expertise users are suppose to give their best answers. This approach is called as Delphi method where the system designer has to check the validity separately.

The additional information required can be collected in minimum percent by decision making and problem solving where the other percent information is common to the existing.

For Example: payroll, accounting system etc.
Every business organisation performs successfully on the basis of certain critical factor which are important and the other plays a supportive role in functioning the organisation. Many times a function is singularly critical to the successful function of business organisation. The experimentation would define the methodology for handling the complex situation. If the method is finalized information needs can be determined. Models are used for determining initial needs and they are modified, determined during the implementation on stage.

6.5 DEVELOPMENT OF MIS:

When the system is complex the development strategy is prototyping the system. It is the progress of the information needs, development methodology trying it out in a smaller scale with respect to the data and complexity ensuring that it specifies the needs of the user and access the problem in development. This process identifies the problem area inadequacies in prototype the designer then takes the steps to remove inadequacies. The prototype approach brings the multiple users on same platform & changing their attitude towards a corporate goal is the managerial task of the system designer.

6.6 LIFE CYCLE:

There are many systems which have a life cycle that is starting and ending step which indicates that the system is very much structured and rule based. They have 100% clarity of input & their resources, definite set of o/p in terms of the contents and formats. This system can be developed in systematic manner
eg; accounting , payroll etc…

	Prototype Approach	Life Cycle approach
1	It refers to open system with high degree of uncertainty of information.	It refers to open system with high degree of certainty of information.
2	The system design is unstable due to uncertainty.	The system design is stable due to certainty.
3	It is necessary to try for fixed ideas and complete information.	Here it is not necessary because it is already structured.
4	It is necessary to find the cost, scope and application of the system. Experimentation is necessary.	Scope, cost of the system is fully determined in clear terms. Experimentation is not necessary.
5	Information needs are not fixed.	Information needs are fixed.
6	It is Custom oriented system.	Life cycle system is universal and governed by principles & practices

6.7 IMPLEMENTATION OF MIS:

For the successful implementation of the system. The system designer should

i] Satisfy all the information needs of the user

ii] Offer the services to the user.

iii] Respect the demands of the user

iv] Not to recommend the modification of the needs unless technically feasible.

v] Explain the nature of the system to the user to realise the information requirement of the current system.

vi] Have a better decision making capability

vii] Not expect the perfect understanding from the user as he may be the user of non-computerized system.

viii] Conduct a periodical user meeting on system where it is easier to get the opportunities to know the ongoing difficulties of the user.

ix] Lewin's model suggest 3 aspects in implementation of MIS

- Unfreezing: organisation to make people more receptive and interested in change.
- Choosing: A course of action where the process begins & reaches to the desired level.
- Refreezing: Where the changes are consolidated and equilibrium is reinforced.

6.8 PARAMETERS OF MANAGEMENT OF QUALITY IN MIS

i] Complete data of all the transaction achieves the integrity of data with respect to the period.

ii] Valid transaction input data ensures the validity of data and in turn assumes the valid information.

iii] Accuracy & precision assures that results are accurate & precisely correct based on rules.

iv] Relevance to user is appropriate in the quality of decision making.

v] If the information is received late it becomes useless with the view of decision making.

vi] Information should be complete & meaningful. It should be represented in proper format with references.

6.9 ORGANISATION FOR DEVELOPMENT OF MIS:

Organisation development consist of the following issues

i] Whether the function should be handled as centralised or decentralised activities. This can be resolved by accessing the information resources in the organisation i.e. information system management in centralised manner and information resource management in decentralised manner.

ii] The allocation of h/w & s/w resources are available depending upon the functional resources. In a decentralised setup the allocation of h/w is a centralised decision but the data processing is user's responsibility.

iii] The maintenance of service at an approx level is needed.

iv] Fitting the organisation of MIS in the corporate organisation, it's culture & management philosophy is the important issue in organisation.

6.10 MIS- THE FACTORS CONTRIBUTING TO SUCCESS:

i] MIS should have the adequate development resource for organisation.

ii] An appropriate information processing technology requires meeting the data processing & analysis is need of the users.

iii] MIS should be defined & designed in terms of user's requirement and the operational feasibility is ensured.

iv] MIS should be the open system in nature to modify the information needs.

v] MIS should focus on the result and the goals and highlight the factors & reasons for non-achievement.

vi] MIS should collect the complete information to avoid the noise in

the information.

vii] MIS must consider the factors in the management process according to the human behaviour.

viii] MIS should be easy to operate & user friendly.

ix] MIS should concentrate on all the level of information needs.

6.11 MIS-FACTORS CONTRIBUTING TO THE FAILURE:

i] MIS is conceived as a data processing not as information processing.

ii] MIS doesn't provide the managerial information.

iii] Underestimating the complexity in business system and not recognising.

iv] Adequate attentions not given to the quality control aspects of inputs , process and output.

v] MIS is developed without streamlining the transaction processing in the organisation.

vi] MIS does not meet certain critical factors for data processing.

vii] Administrative in discipline, wrong coding & deviation in system specification also cause failure.

viii] MIS does not give the perfect information.

EXERCISE QUESTIONS:

1) What are that planning, either short range or long range offers to the management?
2) Differentiate between Life cycle development and prototype development.
3) List the factors contributing the success of MIS.
4) How do you ascertain the class of information in the organization? Explain.
5) What are the contents of MIS Plan? Explain.

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7

CHOICE OF INFORMATION TECHNOLOGY

Units :

7.1 Nature of IT Decisions

7.2 Strategic Decision

7.3 Business operations

7.4 IT evaluation

7.1 NATURE OF IT DECISIONS

The choice of IT is a strategic decision making the long term impact on the effectiveness of MIS enterprise. The IT affects the people processes and organization of the system. It is a strategic business decision but not a financial decision taken on least cost approach.

The modern IT offers the number of different system configuration each being a solution to satisfy the needs of MIS. Therefore the IT decision is technical decision where it required deciding between the various configuration alternatives made of various hardware-software options. In case of multiple sites of the organization, IT decision must consider the communication problem and the interface between 2 hardware options so that the data sharing is optionally feasible. The choice of IT is made on the basis of availability of the people in the organization to run hardware software system.

IT design is made for current trends as well as the futuristic needs of the organization. IT decisions are complex and governed by a number of factors.

7.2 STRATEGIC DECISION

                         Business goals and mission

Technological issues   Mission critical application

        financial implication

                         Management style and culture

                         Work style and culture

                         Business operations

                         Business need

The information needs of the users in the organization arise from the process or the style by which the management runs the business. The quality of management process depends on the culture which affects the decision making process in centralized system; the delegation isn't effective and depends on central authority. In distributed system it is dependent on different nodal points. There are 3 types of IT decision:

1. Decision affecting the operational management.
2. Decision affecting the execution and control of the business.
3. Strategic decision.

In such cases the IT choice would be the front end processing connected back to the back office control system. Front end system takes care of operations management while the back office takes care of strategic control and operational planning.

Every business has one or more business critical application, serving the other information need of the critical strategic decisions.

The entire process values these applications. The organization IT choice is therefore based on the requirement of these applications serving the critical function. Due to the organizations infrastructure and the nature of business IT choice will be distributed at different decision center.

7.3 BUSINESS OPERATIONS

There are many organizations where the business operation are typical and their information needs are largely proceed. E.g. banking organization.

The decision making process i.e rule based governed by policies and guidelines in the organization. The IT should specify all the needs in the organization.

e.g. marketing system- In the marketing of the product, IT processes the data about sales, receipt and other inventory related information, procurement, actions etc.

e.g. there are certain business organizations, operations where the organization takes care of one or two function and most of the information needs would be satisfied by the hardware software resources. If the organization requires a mix of special platform then the IT choice will be based on the integration possibility of different IT platforms satisfying the information needs. IT considers the operational feasibility of the system in terms data sharing, resource sharing transaction processing etc. the number of possibilities emerges unless these factors are properly considered IT choice may go wrong. The IT choice therefore is strategic to the performance.

Configuration design:-

The details of IT are based on the following features:

1. Data type: Numeric, word, Image, voice and the capable software-hardware to handle these data type.
2. Data volumes: Floppy drive, hard-disk, CD-ROM with their capacities.
3. Storage capacity: Based on processing needs of the system.
4. Input/output operation: It decides the controller and speed of I/O processing.
5. Data sharing: If data is to be shared then storage capacity will be decided based on the size of the databases.

6. Process speed: Speed of processing decides CPU, memory processing architect.
7. RDBMS/4GL: Decided on the basis of volume, special data handling, integrity and security level.
8. Query processing: Decides SQL and 4GL application programs.
9. Communication protocol: If the different platforms need to be connected the TCP/ IP is necessary to be included.
10. Interface and gateways: Decided on the basis of data transfer need on various location and software-hardware platform.
11. Security and integrity: Decides the combination of hardware-software and operating system.
12. Languages and packages: Hardware-software will be decided on the basis languages and packages used for the system.

7.4 IT EVALUATION

It is evaluated in the following dimension:
1. **Technical Evaluation:** It deals with the testing parameters such as data transfer need, response level, connectivity, hardware platform.
   The IT designer and the decision on the following point would facilitate the system configuration such as memory, disk capacity, server terminate connection, e-mail, network hardware, output devices, Operating system. Standard like GUI, system software, interface, utility, RDBMS features etc. it also offer IT approach to the information processing needs of the information. It considers the performance related issues such as reliability, security, dependability. Evaluation also helps to break down the network on the time. Scale i.e. minimum requirement at the initial page and subsequent upgrade at the timescale.
2. **Operational Evaluation**: The options approved after the technical evaluation are tested on operation feasibility. It considers the people related issues and whether system procedure of the organization is complementary and conducive.
   The choice of technology determines recruitment and training. It also helps in designing the procurement plan of hardware and software. A large system plan development could go along in preparing the operational; and implementation plan of IT in organization.
3. **Financial Evaluation:** All the business investments are evaluated in terms of ROI Return On investment or certain payback period. They are judged from the budget consideration. The ROI terms are difficult to predict at initial step. The best approach in some cases is to judge the investment in terms of the value of information it gives on incremental scale. In regards to the budget restriction it would be advisable examine the possibility of software, hardware requirement. The system requirement concentrates on mission critical application covering the key business issues.

Information Technology implementation plan:
It is necessary to prepare the implementation plan covering the following features-
1. Site preparation: This is a major activity in which we prepare the site for the physical installation of the hardware i.e. computer peripheral architecture design. Most of IT installation needs infrastructure such as conference rooms, server rooms, demo room, laboratories.
2. System development plan: This is generally prepared while accessing hardware, software needs. It ranks the various steps in site preparation. System development plan also helps in planning the other activities such as recruitment and training. It also helps in procurement of requirements.
3. IT installation schedule: This schedule gives the item wise details of hardware arrival and its installation testing and maintenance. Many times it also considers the key issues like data conversion time, switching over from old to new system i.e. up gradation.
4. Recruitment and training of IT personnel: The implementation of IT needs the specific skills in manpower responsible for defective implementation. Skills may fall in the area of languages, tools of development and also in IT application. The change in IT indicates

the necessity to upgrade the skills of the existing manpower by providing a need based training in the absence of suitable manpower, the recruitment is called.

5. Training of users: The latest development in the IT requires its users to be well trained for its effective use. The users should be trained to use the various information technology facilities.

6. Investment plan: When all the facets of the information technology implementation is ready, it is possible to work out the monetary implications of such an implementation .Since the investment in the information technology is strategic, at the most it can be deferred. It is important to detect the budgetary limitations in the system.

Choice of information Technology and MIS:

The choice of IT is a backbone of MIS. It is critical, strategic decision affecting the business operations. It affects the people, processes and productivity and helps organization emerge with a new work culture. The IT changes are very rapid. To protect the investment in the IT, the selection criteria should include features such as scalable architecture, upgradeable software, open system, communication through gateways and interfaces.

EXERCISE QUESTIONS:

1) The selection of Information Technology is strategic decision in MIS development. Explain.
2) What is the nature of IT decision?
3) What are the three parameters used in the evaluation of the IT before decision is made?
4) How does the work culture, management style, and organization`s learning capability have a bearing on the IT or MIS decision.
5) What are the attributes of configuration Design?
6) What are the contents of IT implementation plan?

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8

ENTERPRISE APPLICATIONS AND BUSINESS PROCESS INTEGRATION

Units:
8.1 Enterprise systems (ES)
8.2 Supply chain management
8.3 Developments in Supply Chain Management
8.4 Supply chain business process integration
8.5 Enterprise integration trends

8.1 ENTERPRISE SYSTEMS (ES)

ESs are large-scale, integrated application-software packages that use the computational, data storage, and data transmission power of modern information technology (IT) to support processes, information flows, reporting, and data analytics within and between complex organizations. In short, ES are packaged enterprise application software (PEAS) systems, where all three adjectives, "packaged", "enterprise", and "application", in combination, restrict the set of things that can be called ES. It is convenient to use the term "enterprise system" to refer to the larger set of *all* large organization-wide packaged applications with a process orientation *including* Enterprise resource planning (ERP), Customer Relationship Management (CRM), Supply Chain Management (SCM). ES is a special class of enterprise application software (namely *packaged* enterprise application software), which, in turn, is a type of enterprise software. Here, the adjective "enterprise" is used to connote "enterprise class" software, i.e., software designed for use in large organizations. Clearly, under the preceding definition, ES is also a special class of application software (namely *packaged enterprise* application software).

Computer-based systems built using ES are types of Enterprise Information System, or Management Information System, which, in turn, are types of information system (IS). The distinction between ES and IS that "ES" refers to software, whereas an IS a social system that uses IT i.e., an IS includes people--often in an organizational setting-- as well as IT.

Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers. Supply Chain Management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption (supply chain).

8.2 SUPPLY CHAIN MANAGEMENT

Organizations increasingly find that they must rely on effective supply chains, or networks, to compete in the global market and networked economy. This inter-organizational supply network can be acknowledged as a new form of organization. However, with the complicated interactions among the players, the network structure fits neither "market" nor "hierarchy" categories. It is not clear what kind of performance impacts different supply network structures could have on firms, and little is known about the coordination conditions and trade-offs that may exist among the players. From a systems perspective, a complex network structure can be decomposed into individual component firms. Traditionally, companies in a supply network concentrate on the inputs and outputs of the processes, with little concern for the internal management working of other individual players. Therefore, the choice of an internal management control structure is known to impact local firm performance.

First, as an outcome of globalization and the proliferation of multinational companies, joint ventures, strategic alliances and business partnerships, significant success factors were identified, complementing the earlier "Just-In-Time", "Lean Manufacturing" and "Agile Manufacturing" practices. Second, technological changes, particularly the dramatic fall in information communication costs, which are a significant component of transaction costs, have led to changes in coordination among the members of the supply chain network.

8.3 DEVELOPMENTS IN SUPPLY CHAIN MANAGEMENT

Six major movements can be observed in the evolution of supply chain management studies: Creation, Integration, and Globalization, Specialization Phases One and Two, and SCM 2.0.

1. Creation Era
The term supply chain management was first coined by a U.S. industry consultant in the early 1980s. However, the concept of a supply chain in management was of great importance long before, in the early 20th century, especially with the creation of the assembly line. The characteristics of this era of supply chain management include the need for large-scale changes, re-engineering, downsizing driven by cost reduction programs, and widespread attention to the Japanese practice of management.

2. Integration Era
This era of supply chain management studies was highlighted with the development of Electronic Data Interchange (EDI) systems and developed through the introduction of Enterprise Resource Planning (ERP) systems. This era has continued to develop into the 21st century with the expansion of internet-based collaborative systems. This era of supply chain evolution is characterized by both increasing value-adding and cost reductions through integration.

3. Globalization Era
The third movement of supply chain management development, the globalization era, can be characterized by the attention given to global systems of supplier relationships and the expansion of supply chains over national boundaries and into other continents. Although the use of global sources in the supply chain of organizations can be traced back several decades (e.g., in the oil industry), it was not until the late 1980s that a considerable number of organizations started to integrate global sources into their core business. This era is characterized by the globalization of supply chain management in organizations with the goal of increasing their competitive advantage, value-adding, and reducing costs through global sourcing.

4. Specialization Era—Phase One: Outsourced Manufacturing and Distribution
Companies abandoned vertical integration, sold off non-core operations, and outsourced those functions to other companies. This changed management requirements by extending the supply chain well beyond company walls and distributing management across specialized supply chain partnerships.

This transition also re-focused the fundamental perspectives of each respective organization. OEMs became brand owners that needed deep visibility into their supply base. They had to control the entire supply chain from above instead of from within. Contract manufacturers had to manage bills of material with different part numbering schemes from multiple OEMs and support customer requests for work -in-process visibility and vendor-managed inventory (VMI).

The specialization model creates manufacturing and distribution networks composed of multiple, individual supply chains specific to products, suppliers, and customers, who work together to design, manufacture, distribute, market, sell, and service a product. The set of

partners may change according to a given market, region, or channel, resulting in a proliferation of trading partner environments, each with its own unique characteristics and demands.

5. Specialization Era—Phase Two: Supply Chain Management as a Service

Specialization within the supply chain began with the inception of transportation brokerages, warehouse management, and non-asset-based carriers and has matured beyond transportation and logistics into aspects of supply planning, collaboration, execution and performance management.

At any given moment, market forces could demand changes from suppliers, logistics providers, locations and customers, and from any number of these specialized participants as components of supply chain networks. This variability has significant effects on the supply chain infrastructure, from the foundation layers of establishing and managing the electronic communication between the trading partners to more complex requirements including the configuration of the processes and work flows that are essential to the management of the network itself.

Supply chain specialization enables companies to improve their overall competencies in the same way that outsourced manufacturing and distribution has done; it allows them to focus on their core competencies and assemble networks of specific, best-in-class partners to contribute to the overall value chain itself, thereby increasing overall performance and efficiency. The ability to quickly obtain and deploy this domain-specific supply chain expertise without developing and maintaining an entirely unique and complex competency in house is the leading reason why supply chain specialization is gaining popularity.

6. Supply Chain Management 2.0 (SCM 2.0)

Building on globalization and specialization, the term SCM 2.0 has been coined to describe both the changes within the supply chain itself as well as the evolution of the processes, methods and tools that manage it in this new "era".

Web 2.0 is defined as a trend in the use of the World Wide Web that is meant to increase creativity, information sharing, and collaboration among users. At its core, the common attribute that Web 2.0 brings is to help navigate the vast amount of information available on the Web in order to find what is being sought. It is the notion of a usable pathway. SCM 2.0 follows this notion into supply chain operations. It is the pathway to SCM results, a combination of the processes, methodologies, tools and delivery options to guide companies to their results quickly as the complexity and speed of the supply chain increase due to the effects of global competition, rapid price fluctuations, surging oil prices, short product life cycles, expanded specialization, near-/far- and off-shoring, and talent scarcity.

8.4 SUPPLY CHAIN BUSINESS PROCESS INTEGRATION

Successful SCM requires a change from managing individual functions to integrating activities into key supply chain processes. An example scenario: the purchasing department places orders as requirements become known. The marketing department, responding to customer demand, communicates with several distributors and retailers as it attempts to determine ways to satisfy this demand. Information shared between supply chain partners can only be fully leveraged through process integration.

Supply chain business process integration involves collaborative work between buyers and suppliers, joint product development, common systems and shared information. The operation of integrated supply chain requires a continuous information flow. However, in many companies, management has reached the conclusion that optimizing

the product flows cannot be accomplished without implementing a process approach to the business.
- Customer relationship management
- Customer service management
- Demand management
- Order fulfillment
- Manufacturing flow management
- Supplier relationship management
- Product development and commercialization
- Returns management

Customer Relationship Management concerns the relationship between the organization and its customers. Customer service is the source of customer information. It also provides the customer with real-time information on scheduling and product availability through interfaces with the company's production and distribution operations. Successful organizations use the following steps to build customer relationships:
- determine mutually satisfying goals for organization and customers
- establish and maintain customer rapport
- produce positive feelings in the organization and the customers

Customer relationship management (CRM) is a broadly recognized, widely-implemented strategy for managing and nurturing a company's interactions with customers, clients and sales prospects. It involves using technology to organize, automate, and synchronize business processes—principally sales activities, but also those for marketing, customer service, and technical support. The overall goals are to find, attract, and win new clients, nurture and retain those the company already has, entice former clients back into the fold, and reduce the costs of marketing and client service. Customer relationship management denotes a company-wide business strategy embracing all client-facing departments and even beyond. When an implementation is effective, people, processes, and technology work in synergy to increase profitability, and reduce operational costs.

8.5 ENTERPRISE INTEGRATION TRENDS

Integration in Manufacturing (IiM) is the first systemic paradigm to organize humans and machines as a whole system, not only at the field level, but also, at the management and corporate levels, to produce an integrated and interoperable enterprise system. Business process software and Manufacturing Execution Systems are now available to meet the requirements of this fully computerized and automated integration. Major problems remain with respect to the interface between the enterprise corporate level and the manufacturing shop floor level Management and operation decisions within a closed loop are facilitated to pace the production according to the life-cycle dynamics of the products, processes and humans inside and outside the enterprise. Today, networked business encounters recurrent difficulties due to the lack of interoperability between enterprise systems. The role of research in the field is to create upstream conditions of technological breakthrough to avoid that enterprise investment be simply pulled by the incremental evolution of IT offer. However, the future relies on collaboration networks that can be created among companies, people and societies in order to generate shared knowledge and wealth. A number of important enablers are needed to support the creation of successful collaborative networks e.g. common reference models, effective interoperability mechanisms and approaches, supporting infrastructures based on open architectures, design and engineering methodologies to instantiate/duplicate already successful cases, and standardized market technologies and tools. Enterprise Engineering models and tools are needed for a seamless integration of Business and Manufacturing models, in order to completely describe the information aspects of an integrated manufacturing system. However, up to date, although some

High level standards in the area of Enterprise modeling and integration are available; they are not yet widely recognized as such and not used in industry. Future scenarios place Information and Communication Technologies to be core in new developments. Digital megatrends such as: e-Tailing, e-Government, Entertainment on demand, virtual education and a wide set of online services (finance, publishing, marketing) will be part of everyone`s life. However all these applications and systems will require satisfying the following fundamental requirements.

- Enterprise integration and interoperability
- Distributed organization
- Model-based monitor and control
- Heterogeneous environments
- Open and dynamic structure
- Cooperation
- Integration of humans with software and hardware
- Agility, scalability and fault tolerance.

EXERCISE QUESTIONS:

1) What is Enterprise system? How does enterprise software work?
2) What is supply chain? What entities does it compromise? What is supply chain management?
3) What is CRM? Why are CRM relationships so important today?
4) What are the developments in supply chain management?

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9

DECISION SUPPORT SYSTEMS

Units :
9.1 Concept and philosophy: -
9.2 Attributes of Decision Support System: -
9.3 Types of Decision Support System: -
9.4 DSS: Deterministic Systems
9.5 Types of Tools/ Models: -
9.6 MIS and the Role of DSS: -

9.1 CONCEPT AND PHILOSOPHY

Decision support systems are an application of Herbert Simon Model. The model has three phases, Intelligence, Design and Choice. The decision support system basically helps the information system in the intelligence phase where the objective is to identify the problem and then go to the design phase for solution. The choice of selection criterion varies from problem to problem. Therefore it is requires to go through these phases again and again till a satisfactory solution is found.

The decision support system helps in making a decision and also in its performance evaluation. These systems can be used to validate the decision by performing sensitivity analysis on various parameters of the problem.

The programmable decision, because of its rule base structure, can be computerized, as inputs, processing methodology; analysis and choice of decision making are predetermined. Decision support systems can be built around the rule in case of programmable decision situation. While in non-programmable decisions, the rules are not fixed or predetermined, and requires every time the user to go through the decision making cycle as indicated in the Herbert Simon Model.

The decision support system refers to a class of systems which support in the process of decision making and does not always give a decision itself.

9.2 ATTRIBUTES OF DECISION SUPPORT SYSTEM

- Flexibility: the systems are flexible so that any semi-structured or unstructured decision making situation can be tackled with ease and speed.
- Simple Models: The systems use simple models of decision making.
- Database: The decision supports the database.

9.3 TYPES OF DECISION SUPPORT SYSTEM

1. **Status inquiry systems**: The number of decisions and solution is unique relation.
2. **Data analysis systems**: These decision systems are based on comparative analysis, and use of a formula or an algorithm. But, these processes are not structured and therefore, vary.
3. **Information analysis systems**: In this system, the data is analysis, the MRP systems are examples of this system.
4. **Accounting systems**: These systems keep track of the major aspects. The contents of these systems are more data processing leading to formal reporting, with exceptions, if necessary. Systems account items such as cash, inventory, and personnel and so on and relate it to norm or norms developed by the management, for control and decision.
5. **Model based systems**: These systems are simulation models or optimization models for decision making. These decisions, generally, are one time and infrequent and provide general guidelines for operation or management. The product mix decision, the material mix, the job scheduling rules, and the resources or asset or facilities planning systems are the examples.

Facts about decision support systems:
- The decision support systems are developed by the users and system analysts jointly.
- The decision support systems use the principles of economics, science and engineering, and also the tools and techniques of management.
- The data used in the decision support system is drawn from the information systems developed in the company.
- The decision support systems are developed in isolation and form an independent system subset of the management information system,
- The most common use of the decision support system is to test the decision alternatives and also to test the sensitivity of the result to the change in the system and assumptions.
- The data and information for the decision support system are used from the internal sources such as the database and the conventional files, and from the external sources.

9.4 DSS: DETERMINISTIC SYSTEMS

There are a number of situations, where the management has to make a decision based on the analysis of business statistics. Most of these decision situations are fairly structured and therefore, can be put in the form of the business models.

If the management can design such models duly tested, they can be used by the decision makers, whenever the need arises. All such tools and models act as the support systems for decision making. The decision support systems based on such tools or models have found extensive use, as a number of computer based software tools and packages are available at a very reasonable price.

The origin of these tools and models lie in the Business Management, the Management Science and the Operations Research.

Some are universally known and proven tools and have application in the Business Management.

1. The most significant advantage of the decision support system is its use in sensitizing the decisions and assessing its implications on the result or business performance.
2. The second advantage of such system is in focusing on the critical issues in business.
3. The third advantage of the decision support system is that it provides higher management ability to delegate decision making to the lower level once the tools and the models are tested.

9.5 TYPES OF TOOLS/ MODELS:

The decision support system can be based on the different types of tools and models.

1. **Behavioral models:**

   These models are useful in understanding the behavior amongst the business variables. The decision maker can then make decisions giving due regard to such behavioral relationships.

   E.g. The trends analysis, forecasting, and the statistical analysis models. The trend analysis indicates how different variables behave in trend setting in the past and hence in the future. A regression model shows the correlation between one or more variables. It also helps in identifying the influence of one variable on the other. These types of models are largely used in process control, manufacturing, agricultural sciences, medicines, psychology and marketing. The behavioral analysis can be used to set the points for alert, alarm and action for the decision maker.

2. **Management science models:**

   These models are developed on the principles of business management, accounting and econometrics. There are also management systems, which can be converted into the decision support system models.

   E.g. The budgetary systems, the cost accounting systems, the system of capital budgeting for better return on the investment, the ABC analysis, the control of inventory through the maximum-minimum levels, the MRP systems, etc are the examples of the use of the management science in the materials management. Production planning and control, scheduling and loading systems are the examples in Production Management. Manpower planning and forecasting is the example in Personnel Management.

   Some of these models can be used straight away in the design of the decision support system. While some others require the use of management principles and practices, most of the procedure based decision making models belong to this category. Such models take away the personal bias of the decision maker.

3. **Operations research (OR) Models:**

   The Operations Research (OR) models are mathematical models. These models represent a real life problem situation in terms of the variables, constants and parameters expressed in algebraic equations. Since, the models are mathematical; there are solutions to these problems. In arriving the solution, methods or calculus, matrix algebra, probability, and set theory are used. These models have clarity to the extent that each of them has a set of assumptions which must be true in real life. Further, if the assumptions are valid, the solutions offered are realistic and practical; the model represents the real life problem situation.

   The OR models address themselves to two or more aspects of the decision situation. In business and industry, there are a number of situations where one type of cost is controlled, the other cost goes up. This play balanced at a point is an optimum point which finds a solution to minimize certain aspects of constraints.

In manufacturing business, the maximization of profit with an appropriate product mix, within the capacity and the market constraint. The allocation of an inventory to the various destinations with the least transportation costs. The minimization of capital blocked in the inventory and simultaneously meeting the market demand or the production requirement. The inventory control models offer an optimum solution, where the cost of inventory and the cost of ordering or set up is balanced. Some problems do not precisely fall in the category of the standard OR models. In such cases, the problems are solved by using a simulation approach. This approach uses a random occurrence of a large number of events, determines the status of the system and evaluates its cost of operations.

Artificial Intelligence (AI) System:
All human beings have intelligence which they use for problem solving. Intelligence when supported by knowledge and reasoning abilities becomes an artificial intelligence. When such an artificial intelligence is packed into a database as a AI system.AI system falls into three basic categories, the Expert systems (knowledge based), the Natural Language (Native languages) Systems, and the Perception System (vision, speech, touch)

Artificial intelligence is a software technique applied to the non-numeric data expressed in terms of symbols, statements, and patterns. It uses the method of symbolic processing, social and scientific reasoning and conceptual modeling for solving the problems. The AI systems are finding applications in configurations, design, diagnosis, interpretation, analysis, planning, scheduling, Training, testing and forecasting. Artificial Intelligence systems help to avoid making same mistakes, and to respond quickly and effectively to a new problem situation. The knowledge-based Expert System is a special AI System. It has wide application in business and industry.

Knowledge Based Expert System (KBES): -
Decision making or problem solving is a unique situation riddled with uncertainty and complexity, dominated by the flexible systems (open system), the unstructured situations, and the knowledge based expert system, (KBES).

The generalized problem solving approach considers the generally applicable constraints, examines all possible alternatives and selects one by trial and error method with reference to a goal. The knowledge based problem solving approach considers the specific constraints within a domain, examines the limited problem alternatives within a knowledge domain and selects the one with knowledge based reasoning with reference to a goal.

The KBES considers knowledge as the base. Knowledge is with experienced people and experience, is wide and distributed. Hence, a system is required which will hold the knowledge of experienced people and provide an application path to solve the problem. Such a system eliminates the knowledge bottleneck.

To build a knowledge-based system certain prerequisites are required. The first prerequisite is that a person with the ability to solve with knowledge-based reasoning should be available. The second prerequisite is that such an expert should be able to articulate the knowledge to the specific problem characteristics.

Knowledge in the KBES is defined as a mix of theory of the subject, knowledge of its application, organized information and the data of problems and its solutions, and an ability to generate new avenues to solve the problem. The KBES has three basic components which are necessary to build the system:
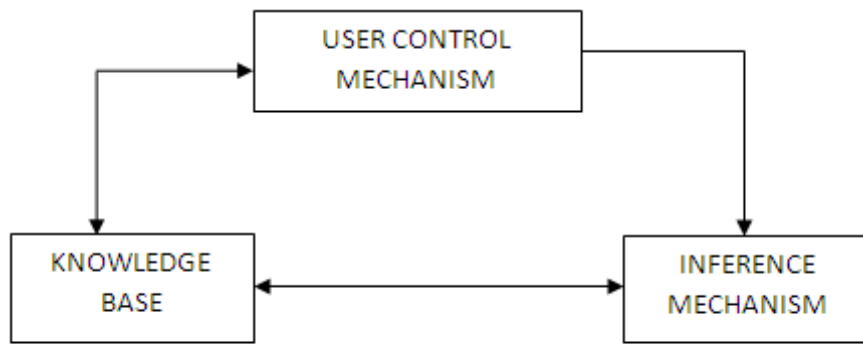
KBSE MODEL

Knowledge base: It is a database of knowledge consisting of the theoretical foundations, facts, judgments, rules, formulae, intuition, and experience. It is a structural storage with facilities of easy access.

Inference mechanism: It is a tool to interpret the knowledge available and to perform logical deductions in a given situation.

Use control mechanism: It is a tool applied to the inference mechanism to select, interpret and deduct or infer. The user control mechanism uses the knowledge base in guiding the inference process.

In the KBES, three components are independent of each other. This helps in modifying the system without affecting all the components. The KBES database, stores the data, the cause-and-effect relation rules, and the probability information on event occurrences.

KBES stores and uses knowledge, accepts judgments, questions intelligently, draws inferences, provides explanation with reasons, offers advice and prompts further queries for confirmation.

The knowledge data base uses certain methods of knowledge representation. These methods are- Semantic Networks, Frames and Rules.

Semantic networks:

Knowledge is represented on the principles of predicate functions and the symbolic data structures which have a meaning built into it are known as semantics. A semantic network is a network of nodes and arcs connecting the nodes. The node represents an entity and the arc represents association with a true and false meaning built into it. The association and meaning uses the principle of inheritance. E.g., all animals with four legs have a tail and a dog has four legs, hence the dog has a tail. The system inherits from the fact that the dog has four legs hence the dog is an animal and therefore, a dog has a tail or not.

e.g. If the table in the room is big, It would be inferred as conference room table. If the knowledge base has elliptical shape as an attribute of the table then it is correct.

The characteristics of a variety of tables are used to represent knowledge on table. A table in a drawing room inherits the characteristics of a table in a drawing room.
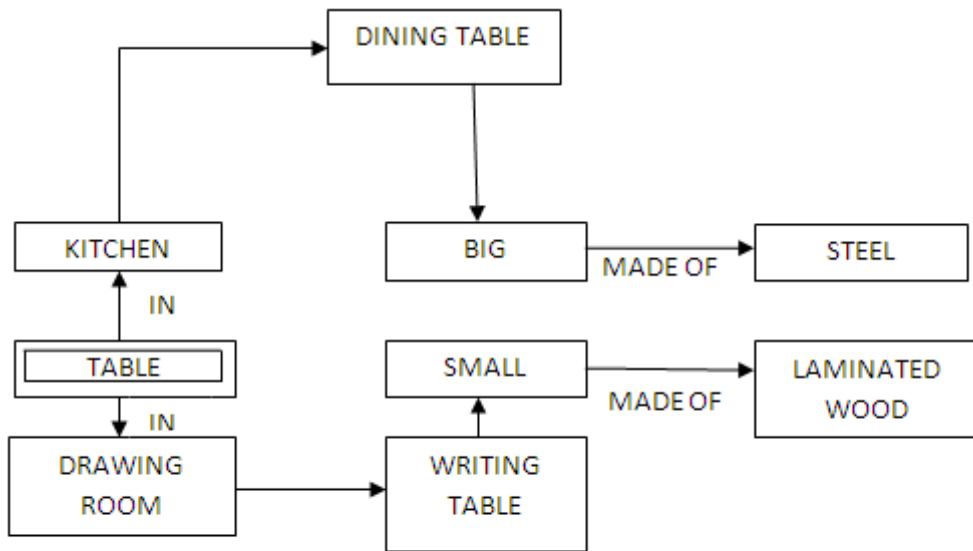
Frames:

The second method of representing the knowledge is putting the same in frames. The concept of frame is to put the related knowledge in one area called a frame. The frame is an organized data structure of knowledge. The frames can be related to other frames. A frame consists of the slots representing a part of the knowledge. Each slot has a value which is expressed in the form of data, information, process and rules.

```
        Slot : Symptoms Value
   (Temperature more than 80 degrees)
          (Water Boiling)
   (Speed  retardation)
```

```
   Slot : Inspection Value
   (Check Water Level)
   (Check Oil Engine)
   (Check Carburetor)
```

```
   Slot : Treatment Value
   (Stop Engine and Drain Water)
   (Start Engine and Pour Cold Water)
   (Increase Oil Level)
   (Adjust Carburetor)
```

Knowledge in 'Frames'

Rules:

The third method of representing the knowledge is rule based. A rule is a conditional statement of an action that is supposed to take place, under certain conditions. Some rules can be constructed in the form of 'If Then' statements. An example if If then statement is given below:

If an item is made of tungsten carbide then the item is excisable.

If an item is high speed tool then the excise duty is20%.

If an item is not high speed tool then the excise duty is 5%.

Inference mechanism:

The mechanism is based on the principle of reasoning. When reasoning is goal driven, it is called Backward Chaining to goal and when it is data driven it is called Forward Chaining to goal. The choice between backward or forward chaining really depends on the kind of situation. To resolve a problem after the event, one has to go from goal (breakdown, stoppage, etc) to data i.e., it is a case of backward chaining. But if the question is of preventing a breakdown, then the data would be monitored in such a way that if it is a directing towards a goal (breakdown, stoppage), then it is a case of forward chaining. The KBES uses both the methods of reasoning. The success of the knowledge based expert system depends on a degree of knowledge, the confidence in the knowledge and the quality of inference mechanism.

9.6 MIS AND THE ROLE OF DSS: -

The Decision Support System (DSS) is a special class of system which is used as a support decision making. The basic characteristic of the decision support system is that it is based on some tool, technique or model. The DSS could be an internal part of the MIS. When the decision making need is in real time dynamic mode, all such systems are designed to read, measure, monitor, evaluate, analyze and act as per the decision guidance embedded in the system. The MIS designer has to look for all situations and design the DSS for integration in the system. The MIS would become more useful if the decision making is made person-independent and executed with well-designed DSS. When the decision situation requires multidimensional analysis using the internal and external data, then such decision support systems are kept out of the main MIS design scope. Most of these situations call for the use of models and the nature of decision is strategic, decision for planned activity.

Decisions like new product launch, price revision, appointing new dealers, change of product design or change in the manufacturing process are strategic decisions which require critical analysis of data, careful evaluation of various alternatives and selecting one of them for implementation on the given criteria.

The decision support system plays a dominant role in the management information system, as a support to decision making.

EXERCISE QUESTIONS:

1) What is the purpose of DSS in MIS?
2) What are the types of DSS can be embedded in application?
3) Explain the term: semantic networks
4) Write a short note on Knowledge base expert system.

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