

BCH-203 Management Information System

Unit I

Foundation of Information System: Introduction to system, its types and characteristics
Introduction to information, fundamentals of information systems, Solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

Unit II

Management Information Systems: Definition of MIS, Concept of an MIS, Structure of MIS, MIS versus Data processing, MIS & Decision Support Systems, MIS & Information Resources Management.

Unit III

Concepts of planning & control: Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.

Unit IV

Applications of IT in Business: Internet & e – commerce, Internet, Extranet & Enterprise Solutions, Data, Information, Database Management System, its advantages, Concept of Data Warehousing and architecture, Information System for Business Operations, Information System for Managerial Decision Support Security & Ethical challenges, Planning & Implementing changes, Advanced Concepts Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management and Procurement Management

UNIT-I

1. Foundation of Information System

Information is an augmentation in knowledge. It adds to the general structure of concepts and facts that people know. Information depends on the context and the recipient's general knowledge for its importance. Information systems is emerged as a discipline that is concerned with the design, construction and use of artifacts based on information technology (IT) (Weber, 1987). Information systems are extremely critical for the expansion and survival of business

organizations in competitive world. All sectors of the industry are entirely dependent on these for the management of important information and data. Small organizations to large, powerful businesses such as high street banks and central and local government need assistance of information systems to control their data. An information system is a software system to capture, convey, store, retrieve, manipulate, or exhibit information, thus supporting people, organizations, or other software systems. Basically, Information systems capture data from the organization (internal data) and its environment (external data). They store the database items over an extensive period of time. When particular information is required, the suitable data items are manipulated as necessary, and the user receives the resulting information. Depending on the type of information system, the information output may take the form a query response, decision outcome, expert-system advice, transaction document, or a report. Prescribed information systems rely on procedures for collecting, storing, manipulating, and accessing data in order to obtain information.

2. Introduction to System and its types

The word System is derived from Greek word Systema, which means an organized relationship between any set of components to achieve some common cause or objective.

A system is “an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal.”

2.1 Properties of a System

A system has the following properties –

(i) Organization

Organization implies structure and order. It is the arrangement of components that helps to achieve predetermined objectives.

(ii) Interaction

It is defined by the manner in which the components operate with each other.

For example, in an organization, purchasing department must interact with production department and payroll with personnel department.

(iii) Interdependence

Interdependence means how the components of a system depend on one another. For proper functioning, the components are coordinated and linked together according to a specified plan. The output of one subsystem is the required by other subsystem as input.

(iv) Integration

Integration is concerned with how system components are connected together. It means that the parts of the system work together within the system even if each part performs a unique function.

(v) Central Objective

The objective of system must be central. It may be real or stated. It is not uncommon for an organization to state an objective and operate to achieve another.

The users must know the main objective of a computer application early in the analysis for a successful design and conversion.

2.2 Elements of a System

The following diagram shows the elements of a system –

(i) Outputs and Inputs

- The main aim of a system is to produce an output which is useful for its user.
- Inputs are the information that enters into the system for processing.
- Output is the outcome of processing.

(ii) Processor(s)

- The processor is the element of a system that involves the actual transformation of input into output.
- It is the operational component of a system. Processors may modify the input either totally or partially, depending on the output specification.
- As the output specifications change, so does the processing. In some cases, input is also modified to enable the processor for handling the transformation.

(iii) Control

- The control element guides the system.
- It is the decision–making subsystem that controls the pattern of activities governing input, processing, and output.
- The behavior of a computer System is controlled by the Operating System and software. In order to keep system in balance, what and how much input is needed is determined by Output Specifications.

(iv) Feedback

- Feedback provides the control in a dynamic system.
- Positive feedback is routine in nature that encourages the performance of the system.
- Negative feedback is informational in nature that provides the controller with information for action.

(v) Environment

- The environment is the “supersystem” within which an organization operates.
- It is the source of external elements that strike on the system.
- It determines how a system must function. For example, vendors and competitors of organization’s environment may provide constraints that affect the actual performance of the business.

(vi) Boundaries and Interface

- A system should be defined by its boundaries. Boundaries are the limits that identify its components, processes, and interrelationship when it interfaces with another system.
- Each system has boundaries that determine its sphere of influence and control.
- The knowledge of the boundaries of a given system is crucial in determining the nature of its interface with other systems for successful design.

2.3 Types of Systems

The systems can be divided into the following types –

(i) Physical or Abstract Systems

- Physical systems are tangible entities. We can touch and feel them.
- Physical System may be static or dynamic in nature. For example, desks and chairs are the physical parts of computer center which are static. A programmed computer is a

dynamic system in which programs, data, and applications can change according to the user's needs.

- Abstract systems are non-physical entities or conceptual that may be formulas, representation or model of a real system.

(ii) Open or Closed Systems

- An open system must interact with its environment. It receives inputs from and delivers outputs to the outside of the system. For example, an information system which must adapt to the changing environmental conditions.
- A closed system does not interact with its environment. It is isolated from environmental influences. A completely closed system is rare in reality.

(iii) Adaptive and Non Adaptive System

- Adaptive System responds to the change in the environment in a way to improve their performance and to survive. For example, human beings, animals.
- Non Adaptive System is the system which does not respond to the environment. For example, machines.

(iv) Permanent or Temporary System

- Permanent System persists for long time. For example, business policies.
- Temporary System is made for specified time and after that they are demolished. For example, A DJ system is set up for a program and it is dissembled after the program.

(v) Natural and Manufactured System

- Natural systems are created by the nature. For example, Solar system, seasonal system.
- Manufactured System is the man-made system. For example, Rockets, dams, trains.

(vi) Deterministic or Probabilistic System

- Deterministic system operates in a predictable manner and the interaction between system components is known with certainty. For example, two molecules of hydrogen and one molecule of oxygen makes water.
- Probabilistic System shows uncertain behavior. The exact output is not known. For example, Weather forecasting, mail delivery.

(vii) Social, Human-Machine, Machine System

- Social System is made up of people. For example, social clubs, societies.

- In Human-Machine System, both human and machines are involved to perform a particular task. For example, Computer programming.
- Machine System is where human interference is neglected. All the tasks are performed by the machine. For example, an autonomous robot.

(viii) Man–Made Information Systems

- It is an interconnected set of information resources to manage data for particular organization, under Direct Management Control (DMC).
- This system includes hardware, software, communication, data, and application for producing information according to the need of an organization.

Man-made information systems are divided into three types –

- (a) **Formal Information System** – It is based on the flow of information in the form of memos, instructions, etc., from top level to lower levels of management.
- (b) **Informal Information System** – This is employee based system which solves the day to day work related problems.
- (c) **Computer Based System** – This system is directly dependent on the computer for managing business applications. For example, automatic library system, railway reservation system, banking system, etc.

3. Introduction to Information System

- To the managers, Management Information System is an implementation of the organizational
- systems and procedures. To a programmer it is nothing but file structures and file processing.
- However, it involves much more complexity.
- The three components of MIS provide a more complete and focused definition,
- where System suggests integration and holistic view, Information stands for processed data,
- and Management is the ultimate user, the decision makers.
- CONCEPTS: The word 'MIS' comprises of three basic elements such as:
 - a) Management
 - b) Information
 - c) System
- Management information system can thus be analyzed as follows:
- Management: Management covers the planning, control, and administration of the operations of

- a concern. The top management handles planning; the middle management concentrates on
- controlling; and the lower management is concerned with actual administration.
- Information: Information, in MIS, means the processed data that helps the management in
- planning, controlling and operations. Data means all the facts arising out of the operations of the
- concern. Data is processed i.e. recorded, summarized, compared and finally presented to the management in the form of MIS report.
- System: Data is processed into information with the help of a system. A system is made up of inputs, processing, output and feedback or control.
- Thus MIS means a system for processing data in order to give proper information to the management for performing its functions.

Meaning of MIS:

- MIS is the use of information technology, people, and business processes to record, store and process data to produce information that decision makers can use to make day to day decisions.
- MIS is the acronym for Management Information Systems. In a nutshell, MIS is a collection of systems, hardware, procedures and people that all work together to process, store, and produce information that is useful to the organization.

Objectives of MIS

The goals of an MIS are to implement the organizational structure and dynamics of the enterprise

for the purpose of managing the organization in a better way and capturing the potential of the information system for competitive advantage.

Following are the basic objectives of an MIS –

- **Capturing Data** – Capturing contextual data, or operational information that will contribute in decision making from various internal and external sources of organization.
- **Processing Data** – The captured data is processed into information needed for planning, organizing, coordinating, directing and controlling functionalities at strategic, tactical and operational level. Processing data means:
 - o making calculations with the data
 - o sorting data
 - o classifying data and

o summarizing data

- **Information Storage** – Information or processed data need to be stored for future use.
- **Information Retrieval** – The system should be able to retrieve this information from the storage as and when required by various users.
- **Information Propagation** – Information or the finished product of the MIS should be circulated to its users periodically using the organizational network.

Characteristics of MIS

Following are the characteristics of an MIS:

- It should be based on a long-term planning.
- It should provide a holistic view of the dynamics and the structure of the organization.
- It should work as a complete and comprehensive system covering all interconnecting subsystems within the organization.
- It should be planned in a top-down way, as the decision makers or the management should actively take part and provide clear direction at the development stage of the MIS.
- It should be based on need of strategic, operational and tactical information of managers of an organization.
- It should also take care of exceptional situations by reporting such situations.
- It should be able to make forecasts and estimates, and generate advanced information, thus providing a competitive advantage. Decision makers can take actions on the basis of such predictions.
- It should create linkage between all sub-systems within the organization, so that the decision makers can take the right decision based on an integrated view.
- It should allow easy flow of information through various sub-systems, thus avoiding redundancy and duplicity of data. It should simplify the operations with as much practicability as possible.
- Although the MIS is an integrated, complete system, it should be made in such a flexible way that it could be easily split into smaller sub-systems as and when required.
- A central database is the backbone of a well-built MIS.

Characteristics of Computerized MIS

Following are the characteristics of a well-designed computerized MIS:

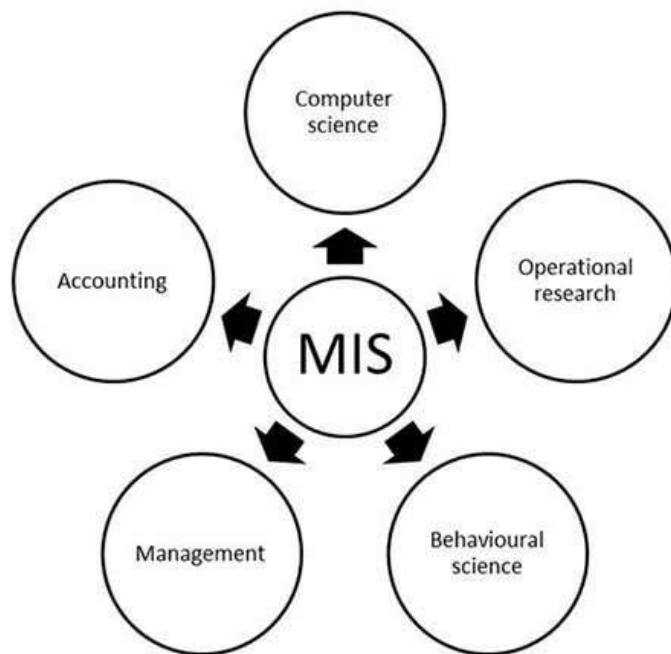
- It should be able to process data accurately and with high speed, using various techniques

like operations research, simulation, heuristics, etc.

- It should be able to collect, organize, manipulate, and update large amount of raw data of both related and unrelated nature, coming from various internal and external sources at different periods of time.
- It should provide real time information on ongoing events without any delay.
- It should support various output formats and follow latest rules and regulations in practice.
- It should provide organized and relevant information for all levels of management: strategic, operational, and tactical.
- It should aim at extreme flexibility in data storage and retrieval.

4. Nature and Scope of MIS

The following diagram shows the nature and scope of MIS:



The Systems Approach to Problem Solving

Characteristics of the systems approach:

1. A top-down approach. The well done systems analysis starts with an analysis of the strategy and goals of the project and then proceeds to the specific.
2. A rational, objective basis for analysis. Decisions are based on carefully gathered evidence and analyzed using a logical procedure.
3. Considers a generalized problem including the problem setting. A properly done systems

analysis always includes consideration of the problem environment including all stakeholders.

4. Client orientation

5. Index of performance and goals/objectives

6. Importance of Alternatives –“What do you mean you didn’t consider any alternatives?”

7. Problem decomposition

8. Normative

Analytic Sins (from Jones, Morgan D., *The Thinker’s Toolkit*, Three Rivers Press, 1998)

- We often begin our analysis by formulating our conclusion. We start at the end!
- Our analysis focuses on the solution that we intuitively favor. We give inadequate attention to alternative solutions.
- We tend to focus on the substance (evidence, arguments, conclusion) and not the process of our analysis.
- Most people are functionally illiterate when it comes to structuring their analysis.
- We instinctively rely on and are susceptible to biases and assumptions.
- We tend to stick to untrue beliefs in the face of contradictory evidence.

Simon’s Model for Decision Making- Decision-making consists of three major phases

1) Intelligence

a) Problem Identification and Definition

- i. What's the problem?
- ii. Why is it a problem?
- iii. Whose problem is it?

2) Design

a. Problem Structuring

- i. Generate alternatives
- ii. Set criteria and objectives
- iii. Develop models and scenarios to evaluate alternatives
- iv. Solve models to evaluate alternatives

3) Choice

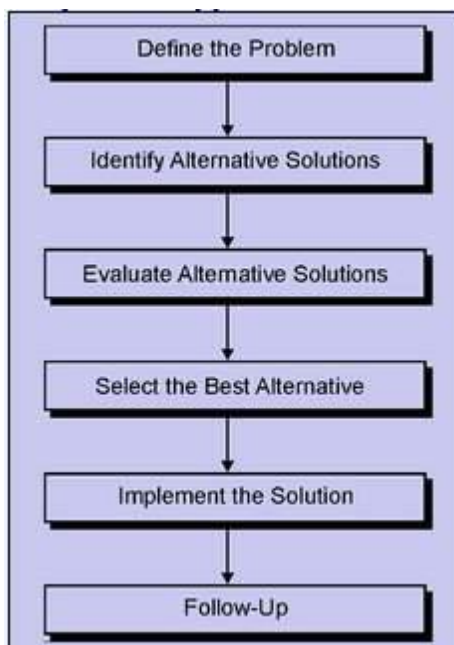
a. Solution

- i. Determine the outcome of chosen alternatives
- ii. Select “best alternative”

The system analysts and programmers, who designed and developed the MIS, were not, in the initial stages, familiar with the managerial set-up and the role of managers in the organization. So, they were not in a position to understand how managers solved problems in the organizations. In order to develop a standard and structured framework for problem solving, they introduced the systems approach to problem solving. Any manager can use the systems approach irrespective of the type of problem. It provides a universal methodology with an inherent logic to solve any kind of problem through a series of steps.

- Define the problem
- Identify alternative solutions
- Evaluate alternative solutions
- Select the best alternative
- Implement the solution
- Follow up

Another popular model was proposed by Herbert Simon which contains four steps: intelligence, design, choice, and review. Intelligence is the first step of this approach and refers to problem identification and definition. Design consists of developing and evaluating the alternative solutions. Choice is the process of selecting the best alternative and implementing it, while review is the follow-up process after implementing the solution. Let us now understand each of the steps involved in the systems approach.



Define the problem: The first step in this approach is to identify the problem. A problem is considered as a constraint or hindrance to the otherwise smooth flow of activities. It can be identified through its symptoms. A symptom is an indicator of a problem and need not be the cause. The system analysts are required to identify such possible indications. For example, a fall in sales is an indicator of a problem. As and when such an indication comes up, the management has to review the possible causes for the fall and identify the real problem(s). Once a problem has

been identified, it has to be defined in clearer terms such that no ambiguity exists in communicating the problem across the hierarchy.

Identify alternative solutions: A problem can be solved in more than one ways. It is therefore not advisable to just think of a single solution and try to implement it. Such a decision would not allow the manager to think of other possible alternative solutions and the advantages associated with them. Therefore, it is recommended that multiple alternatives be developed for the problem and the solutions that have worked in the past are a good source from which to search for new alternatives. Advice from colleagues (internal) and consultants (external) can provide fresh insights into the problem. Many organizations use expert systems to assist them in generating alternatives. Expert systems use the knowledge of various experts and develop solutions to problems in the same way as an expert does.

Evaluate alternative solutions: Once the alternative solutions have been developed, they have to

be evaluated to choose the best solution. Evaluation is mainly done to see how well an alternative

fits as the right solution to the problem. Every alternative is evaluated through different analyses like cost-benefit analysis, etc. Different criteria of each alternative are evaluated to understand their influence in arriving at a solution to the problem.

Select the best alternative: The next step is to choose the best alternative as the solution to the problem. To do this, different factors in each alternative are compared with other alternatives to eliminate the less feasible alternatives. After several comparisons, the best alternative is selected. Sometimes it so happens that none of the alternatives can serve as the solution to the problem. Then, fresh alternatives have to be developed. Sometimes, it may happen that 'no action' is the best solution to the problem.

Implement the solution: The selected solution has to be implemented to solve the problem. Sometimes, the solution has to be freshly designed in order to be implemented. For instance, if installation of new and custom-made equipment is considered as the chosen solution, then the equipment has to be designed accordingly and then installed. This is true for information systems also. Changes in MIS have to be designed and redesigned to suit the organizational requirements.

Follow-up: This is the final step in this approach. The best solution can fail to produce the expected results if put into practice in the real world. Hence, it is always recommended that the results produced by the solution be monitored and evaluated. This is called follow-up. Follow-up ensures that the post-implementation performance of the system is satisfactory. best alternative selected. In this step, such alternatives are identified and developed.

Information and Managerial Effectiveness:

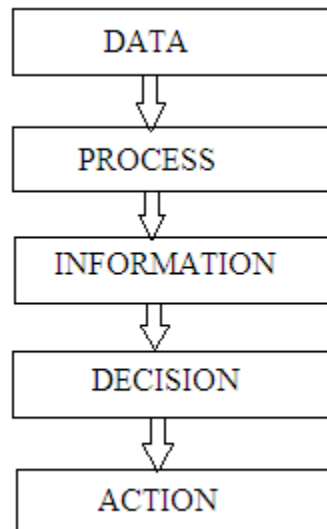
DATA: Data is raw facts or Observation about physical phenomena or Business Transaction.

Data is also objective measurement of the attributes (characteristics) of entities such as People, place, things & events.

Data is Raw, un- summarized, unanalyzed facts.

Data is used in the form of raw material & must be subjected to data manipulation or processing to produce useful information.

INFORMATION: Information is data placed in a meaningful & useful context for end users. The conversion of process of data/action is shown in the following



Importance of information:

- Its form is aggregated, manipulated and organized.
- Its content is analyzed and evaluated.
- It is placed in proper context for a human user.

Information contains:

- An element of surprise.
 - Reduces uncertainty.
 - Triggers action.
-
- Information is one of the major resources of an Information system.
 - Without information no action could take place.
 - An information system generates information using data.

If the information system generate information useful for managers in planning & control the whole system is called “management information system”.

Meaning of Managerial Effectiveness:

The term ‘managerial effectiveness’ could mean achievement of organisational goals, increase in productivity, profit, workers’ satisfaction, growth, diversification etc. Managerial effectiveness aims at optimum allocation and utilisation of scarce organisational resources in order to achieve the goals at minimum cost. It aims at deriving maximum output out of minimum input.

Managerial effectiveness means performing managerial activities effectively. An effective manager performs activities effectively and efficiently. This means doing the right things and

doing these things right. Many people believe that successful managers are intelligent, imaginative and knowledgeable. However, only effectiveness translates the intelligence, imagination, and knowledge into results and makes a manager successful.

Managerial effectiveness consists of the following elements:

1. Manager: Manager is the key pin of a successful organisation. Well-defined objectives and strategies are required to effectively transform inputs into outputs. Managerial effectiveness is governed by managerial skills, competence, intelligence, knowledge, sincerity and creativity. It is judged by not what the managers do but by how well they do. Effective managers enable the business to grow in the dynamic environment.

2. Organisation: Managerial effectiveness is also judged by the organisation itself. Highly innovative and creative managers may not perform well if the organisation structure does not permit them to do so. The structure, value system, design, culture, size and the work environment largely determine the way managers manage the organisation. A highly bureaucratic and formal organisation structure may not have committed and effective managers.

3. Entrepreneurship: Success cannot be ensured unless managers have the quality of entrepreneurship. Managerial effectiveness ensures that business in future is different from business today. It requires hard work, intelligence, creativity and innovativeness to keep the business successful in future.

4. Environment: Business operates in the dynamic and turbulent environment with ever changing factors (economic, political, legal, social etc.). Managers adapt the organisations according to demands of the environment. Successful and effective managers not only respond to environment; they also influence the environment and become market leaders in the industry.

Managerial effectiveness is not an end. It is a means to the end, that is, efficient attainment of organisational goals. In order to accomplish the tasks effectively, managerial effectiveness deals with managerial jobs, skills of managers and the organisation as a whole.

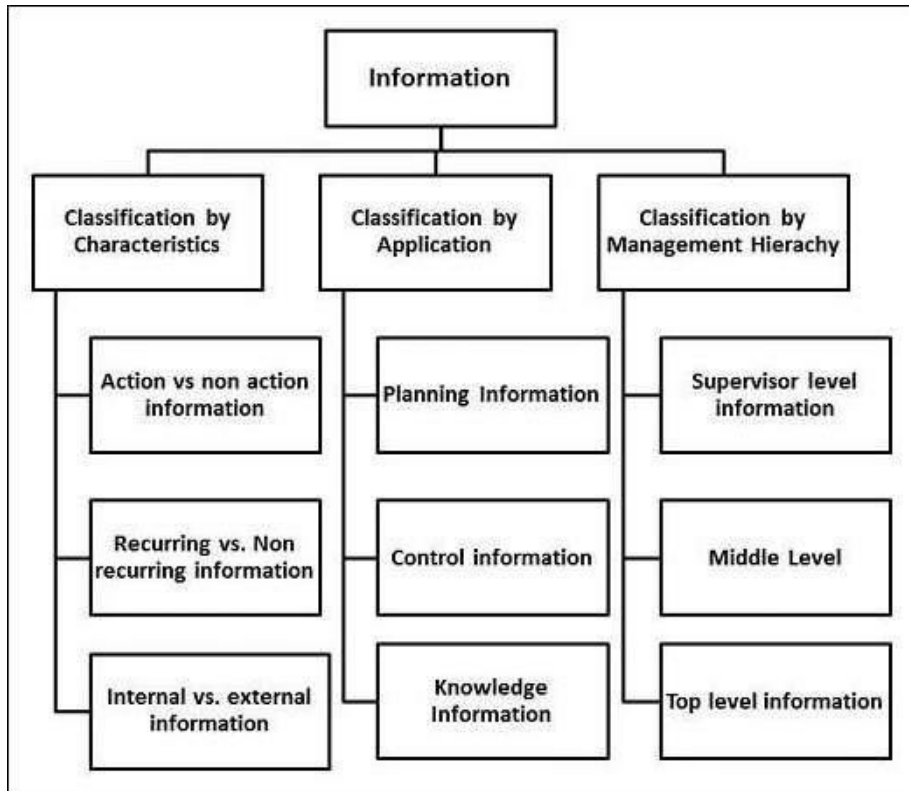
6.Types of information:

Jarvelin and Repo16 (1983) proposes three categories of information, namely:

- **Problem information:** information, which describes the structure, properties, and requirements of the problem at hand.
- **Domain information:** which consists of known facts, concepts, laws, and theories in the domain of the problem.
- **Problem-solving information:** this type of information describes:
 1. How problem should be seen and formulated
 2. What problem and domain information should be used
 3. How it should be used, in order to solve the current problem.

These three information categories represent three different dimensions and have different roles in addressing a problem.

Information can be classified in a number of ways and in this chapter, you will learn two of the most important ways to classify information.



Classification by Characteristic

Based on Anthony's classification of Management, information used in business for decisionmaking

is generally categorized into three types:

- **Strategic Information** – Strategic information is concerned with long term policy decisions that defines the objectives of a business and checks how well these objectives are met. For example, acquiring a new plant, a new product, diversification of business etc, comes under strategic information.
- **Tactical Information** – Tactical information is concerned with the information needed for exercising control over business resources, like budgeting, quality control, service level, inventory level, productivity level etc.
- **Operational Information** – Operational information is concerned with plant/business level information and is used to ensure proper conduction of specific operational tasks as planned/intended. Various operator specific, machine specific and shift specific jobs for quality control checks comes under this category.

Classification by Application

In terms of applications, information can be categorized as:

- **Planning Information** – These are the information needed for establishing standard norms and specifications in an organization. This information is used in strategic, tactical, and operation planning of any activity. Examples of such information are time standards, design standards.

- **Control Information** – This information is needed for establishing control over all

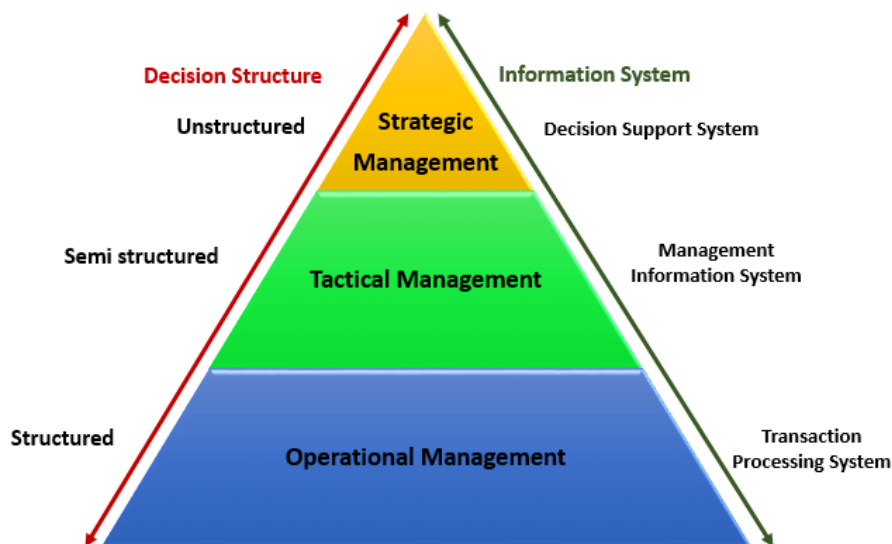
business activities through feedback mechanism. This information is used for controlling attainment, nature and utilization of important processes in a system. When such information reflects a deviation from the established standards, the system should induce a decision or an action leading to control.

- **Knowledge Information** – Knowledge is defined as "information about information". Knowledge information is acquired through experience and learning, and collected from archival data and research studies.

- **Organizational Information** – Organizational information deals with an organization's environment, culture in the light of its objectives. Karl Weick's Organizational Information Theory emphasizes that an organization reduces its equivocality or uncertainty by collecting, managing and using these information prudently. This information is used by everybody in the organization; examples of such information are employee and payroll information.

- **Functional/Operational Information** – This is operation specific information. For example, daily schedules in a manufacturing plant that refers to the detailed assignment of jobs to machines or machines to operators. In a service oriented business, it would be the duty roster of various personnel. This information is mostly internal to the organization.

- **Database Information** – Database information construes large quantities of information that has multiple usage and application. Such information is stored, retrieved and managed to create databases. For example, material specification or supplier information is stored for multiple users.



The term “**Levels of Management**’ refers to a line of demarcation between various managerial positions in an organization. The number of levels in management increases when the size of the business and work force increases and vice versa. The level of management determines a chain of

command, the amount of authority & status enjoyed by any managerial position. The levels of management can be classified in three broad categories:

1. **Top level / Administrative level**
2. **Middle level / Executory**
3. **Low level / Supervisory / Operative / First-line managers**

Managers at all these levels perform different functions. The role of managers at all the three levels is discussed by the following diagram illustrates the various levels of a typical organization



LEVELS OF MANAGEMENT

1. Top Level of Management: It consists of board of directors, chief executive or managing director. The top management is the ultimate source of authority and it manages goals and policies for an enterprise. It devotes more time on planning and coordinating functions. The role of the top management can be summarized as follows -

- a. Top management lays down the objectives and broad policies of the enterprise.
- b. It issues necessary instructions for preparation of department budgets, procedures, schedules etc.
- c. It prepares strategic plans & policies for the enterprise.
- d. It appoints the executive for middle level i.e. departmental managers.
- e. It controls & coordinates the activities of all the departments.
- f. It is also responsible for maintaining a contact with the outside world.
- g. It provides guidance and direction.

h. The top management is also responsible towards the shareholders for the performance of the enterprise.

2. Middle Level of Management: The branch managers and departmental managers constitute middle level. They are responsible to the top management for the functioning of their department. They devote more time to organizational and directional functions. In small organization, there is only one layer of middle level of management but in big enterprises, there may be senior and junior middle level management. Their role can be emphasized as -

- a) They execute the plans of the organization in accordance with the policies and directives of the top management.
- b) They make plans for the sub-units of the organization.
- c) They participate in employment & training of lower level management.
- d) They interpret and explain policies from top level management to lower level.
- e) They are responsible for coordinating the activities within the division or department.

- f) It also sends important reports and other important data to top level management.
- g) They evaluate performance of junior managers.
- h) They are also responsible for inspiring lower level managers towards better performance.

3. Lower Level of Management: Lower level is also known as supervisory / operative level of management. It consists of supervisors, foreman, section officers, superintendent etc. According to *R.C. Davis*, “Supervisory management refers to those executives whose work has to be largely with personal oversight and direction of operative employees”. In other words, they are concerned with direction and controlling function of management. Their activities include -

- a) Assigning of jobs and tasks to various workers.
- b) They guide and instruct workers for day to day activities.
- c) They are responsible for the quality as well as quantity of production.
- d) They are also entrusted with the responsibility of maintaining good relation in the organization.
- e) They communicate workers problems, suggestions, and recommendatory appeals etc to the higher level and higher level goals and objectives to the workers.
- f) They help to solve the grievances of the workers.
- g) They supervise & guide the sub-ordinates.
- h) They are responsible for providing training to the workers.
- i) They arrange necessary materials, machines, tools etc for getting the things done.
- j) They prepare periodical reports about the performance of the workers.
- k) They ensure discipline in the enterprise.
- l) They motivate workers.
- m) They are the image builders of the enterprise because they are in direct contact with the workers.