System:-

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

Examples of System:-

1. Transportation System
2. Telephone System
3. Accounting System
4. Production System
5. Computer System
6. Business System, etc.

System Concepts

Environment and boundaries

Systems theory views the world as a complex system of interconnected parts. One scopes a system by defining its boundary; this means choosing which entities are inside the system and which are outside—part of the environment. One can make simplified representations (models) of the system in order to understand it and to predict or impact its future behavior. These models may define the structure and behavior of the system.

Natural and human-made systems

There are natural and human-made (designed) systems. Natural systems may not have an apparent objective but their behavior can be interpreted [by whom?] as purposeful by an observer. Human-made systems are made with variable purposes that are achieved by some action performed by or with the system. The parts of a system must be related; they must be "designed to work as a coherent entity" — otherwise they would be two or more distinct systems.

Open systems have input and output flows, representing exchanges of matter, energy or information with their surroundings.

Theoretical framework

Most systems are open systems, exchanging matter and energy with its surroundings; like a car, a coffeemaker, or Earth. A closed system exchanges energy, but not matter, with its environment; like a computer or the project Biosphere 2. An isolated system exchanges neither matter nor energy with its environment. A theoretical example of such system is the Universe.

Process and transformation process

An open system can also be viewed as a bounded transformation process, that is, a black box that is a process or collection of processes that transforms inputs into outputs. [citationneeded] Inputs are consumed; outputs are produced. The concept of input and output here is very broad. For example, an output of a passenger ship is the movement of people from departure to destination.

System model

A system comprises multiple views. Man-made systems may have such views as concept, analysis, design, implementation, deployment, structure, behavior, input data, and output data views. A system model is required to describe and represent all these views.

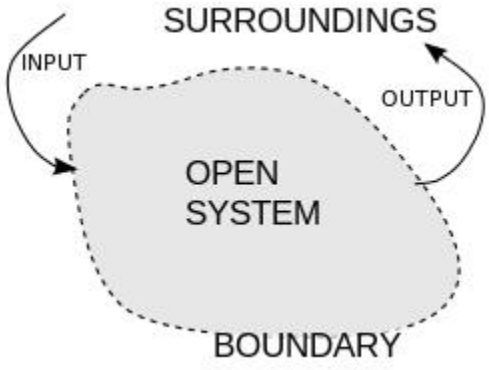
Systems architecture

A systems architecture, using one single integrated model for the description of multiple views, is a kind of system model.

Subsystem

A subsystem is a set of elements, which is a system itself, and a component of a larger system.

A subsystem description is a system object that contains information defining the characteristics of an operating environment controlled by the system.



Components/Elements of a System

INPUT: Input is what data the system receives to produce a certain output. Input involves capturing and assembling elements that enter the system to be processed.

OUTPUT: What goes out from the system after being processed is known as Output. Those elements that exists in the system due to the processing of the inputs.

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.

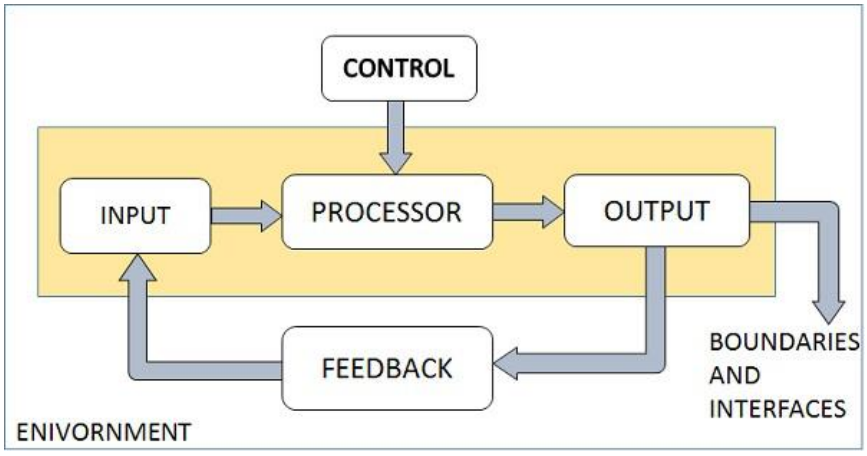
CONTROL: The control elements guide the system. It is the decision-making subsystem that controls the pattern of activities governing input, processing, and output.

FEEDBACK: Feedback is the data about the performance of the system. Feedback measures output against a standard in some form of cybernetic procedure that includes communication and control.

BOUNDARY: The boundaries are nothing but the limit of the system. Setting up boundaries helps for better concentration of the actives carried in the system.

INTERFACES: The interconnections and the interactions between the sub-systems is known as the Interfaces. They may be inputs and outputs of the systems.

ENVIRONMENT: The things outside the boundary of the system are known as environment. Change in the environment affects the working of the system.



Types of Systems

The systems can be divided into the following types −

1. Physical 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.

2. Abstract Systems

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

3. Open System

It has many interfaces with its environment. It interacts across its **boundaries**, it receives inputs from and delivers outputs to the outside world. It must adapt to the changing demands of the user.

4. Closed System

It is isolated from the environmental influences. A completely closed system is rare.

5. Natural System

Natural systems are created by the nature. **For example,** solar system, seasonal system.

6. Manufactured System

Manufactured System is the man-made system**. For example,** Rockets, dams, trains.

7. Deterministic 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.

8. Probabilistic System

Probabilistic System shows uncertain behavior. The exact output is not known. **For example,** Weather forecasting, mail delivery.

9. 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.

10. Non Adaptive System

Non Adaptive System is the system which does not respond to the environment. **For example,** machines.

11. Permanent System

Permanent System persists for long time. **For example,** business policies.

12. Temporary System

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.

13. Conceptual System

Conceptual System deal with theoretical structures which may or may not be have any counterpart in the world. They are composed of ideas. They are typified by those of science, such as economic theory, the general system of relativity etc. These are systems of explanation or classification. They may also take the form of plans, policies, procedures, accounting system, etc.

14. Empirical Systems

Empirical Systems are concrete operational systems made up of people, machines, materials, energy, and other physical things. Electrical, thermal, chemical, and other such systems also fall under this category of systems.

15. Stationary Systems

A stationary system is one whose properties and operations either do not very significantly or vary in a repetitive manner. The automatic factory, super market operations, etc. Are examples.

16. Non-Stationary Systems

In non-stationary system, the properties and operations are subject to variations at a faster rate, for instance, the human being, research and development laboratory etc.

17. Subsystems Systems

Smaller systems within the system or the components of a system are called subsystems.

18. Super Systems

Super system is the whole complex of subsystems, or it denotes any extremely large and complex system.

19. 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.

20. 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 −

- **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.
- **Informal Information System** −This is employee based system which solves the day to day work related problems.

- **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.

Characteristics of a system

1. **Organization:**

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

2. **Interaction:**

Interaction refers to the manner in which each component functions with other components of the system.

3. **Interdependence:**

Interdependence means that parts of the organization or computer system depend on one another. They are coordinated and linked together according to a plan.

4. **Integration:**

Integration refers to the holism of system. And is concerned with how a system is tied together.

5. **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.

System Approach

The **systems approach** is an old concept. The approach stands on the assumption that breaking down of a complex concept into simple easy to understand units helps in better understanding of the complexity. **Ludwig von Bertalanffy** first proposed the systems approach under the name of **'General System Theory'.**

The approach concentrates on the holistic entity of the system without neglecting the components. It attempts to understand the role each component plays in the system while simultaneously understanding the activity of the whole system. Major concepts of the systems approach are:

Holism: A change in any part/component of a system affects the whole system directly or indirectly (Boulding 1985, Litterer 1973, von Bertalanffy 1968).

Specialization: A whole system can be divided into granular (smaller easy to understand), components so that the specialized role of each component is appreciated.

Non-summational: Every component (subsystem/partial system) is of importance to the whole. It is therefore essential to understand the actions of each component to get the holistic perspective (Boulding 1985, Litterer 1973).

Grouping: The process of specialization can create its own complexity by proliferating components with increasing specialization. To avoid this it becomes essential to group related disciplines or sub-disciplines.

Coordination: The grouped components and sub components need coordination. Without coordination the components will not be able to work in a concerted manner and will lead to chaos. Coordination and control is a very important concept in the study of systems as without this we will not be a unified holistic concept.

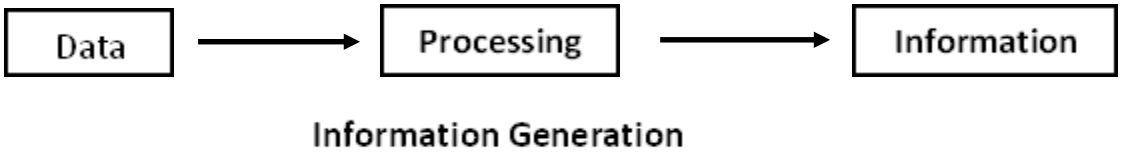
Emergent properties: This is an important concept of systems approach. It means that the group of interrelated entities (components) has properties as a group that is not present in any individual component. This is the holistic view of a system. For example, multicellular organisms exhibit characteristics as a whole which are not present in individual constituent parts like cells.

Information System

Data: Data is raw facts. Data is like raw material. Data does not interrelate and also it does not help in decision making. Data is defined as groups of nonrandom symbols in the form of text, images, voice representing quantities, action and objects.

Information: Information is the product of data processing. Information is interrelated data. Information is equivalent to finished goods produced after processing the raw material. The information has a value in decision making. Information brings clarity and creates an intelligent human response in the mind.

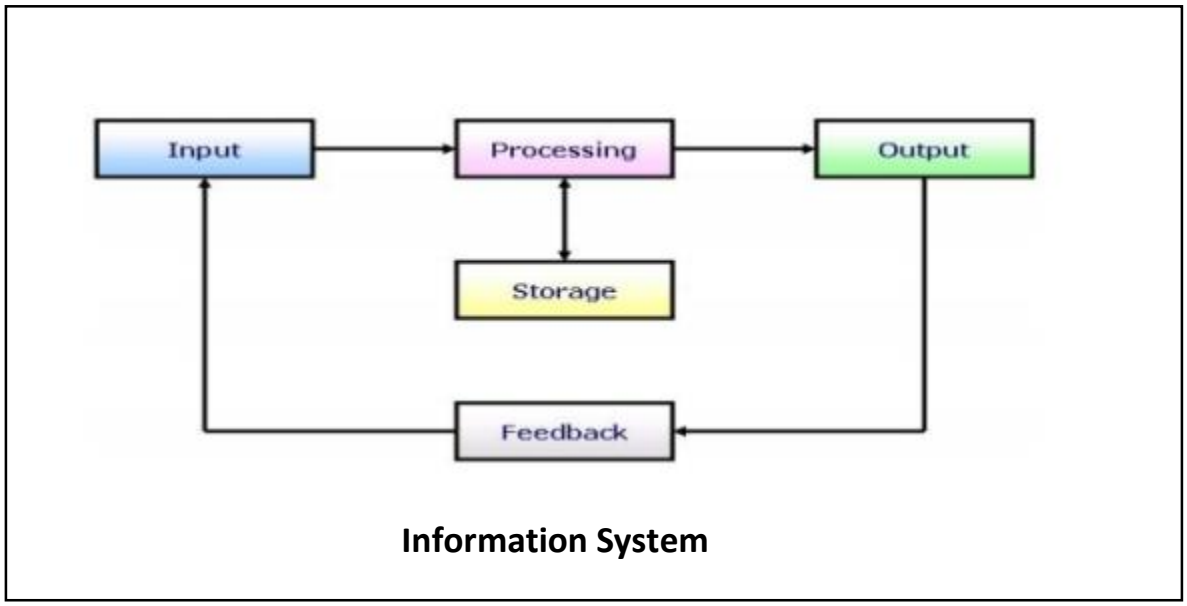
According to **Davis and Olson:** *"Information is a data that has been processed into a form that is meaningful to recipient and is of real or perceived value in the current or the prospective action or decision of recipient."*



Information Generation

Information System

Definition: An information system can be defined as a set of interrelated components that collect (or retrieve), process, store and distribute information to support decision making, coordination and control in an organization.



Information System

Characteristics of Information

The parameters of a good quality are difficult to determine for information.

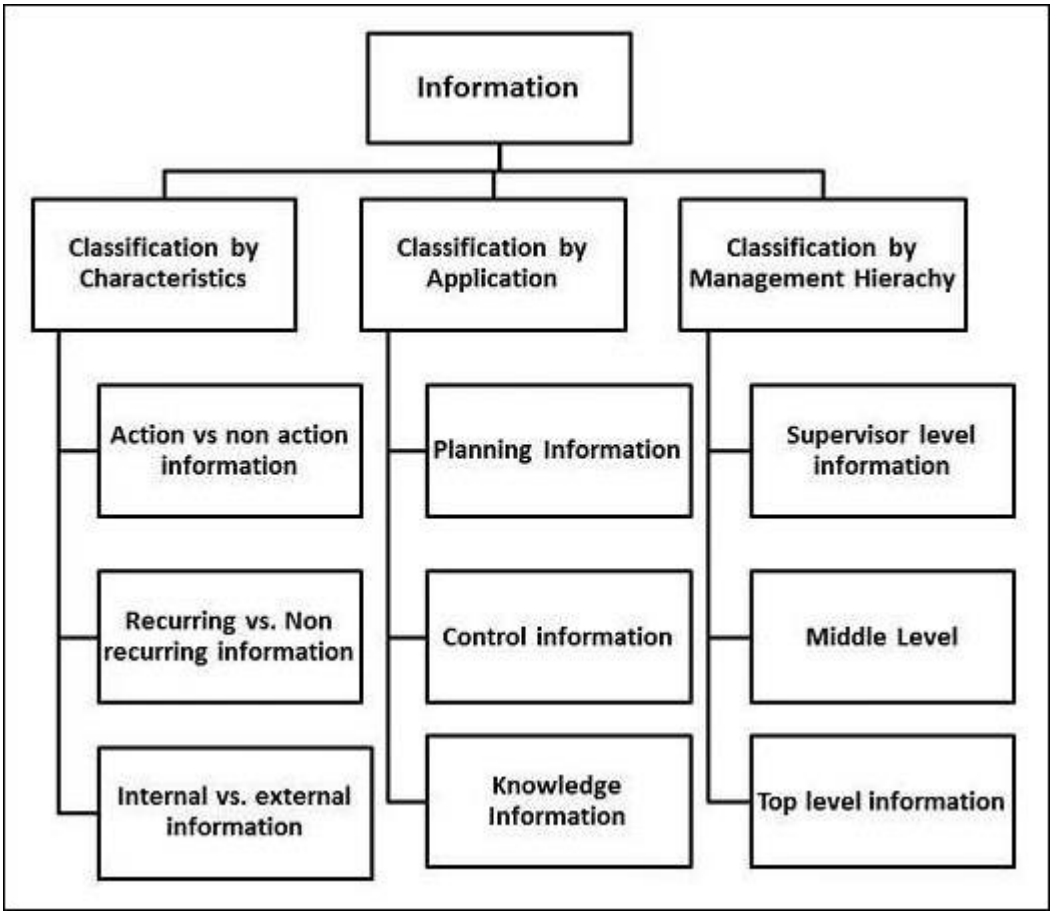
According to **Wang and Strong,** following are the dimensions or elements of Information Quality −

- **Intrinsic** − Accuracy, Objectivity, Believability, Reputation
- **Contextual** − Relevancy, Value-Added, Timeliness, Completeness, Amount of information
- **Representational** − Interpretability, Format, Coherence, Compatibility
- **Accessibility** − Accessibility, Access security
- Various authors propose various lists of metrics for assessing the quality of information. Let us generate a list of the most essential characteristic features for information quality −
- **Reliability** − It should be verifiable and dependable.
- **Timely** − It must be current and it must reach the users well in time, so that important decisions can be made in time.
- **Relevant** − It should be current and valid information and it should reduce uncertainties.
- **Accurate** − It should be free of errors and mistakes, true, and not deceptive.
- **Sufficient** − It should be adequate in quantity, so that decisions can be made on its basis.
- **Unambiguous** − It should be expressed in clear terms. In other words, in should be comprehensive.
- **Complete** − It should meet all the needs in the current context.

- **Unbiased** − It should be impartial, free from any bias. In other words, it should have integrity.
- **Explicit** − It should not need any further explanation.
- **Comparable** − It should be of uniform collection, analysis, content, and format.
- **Reproducible** − It could be used by documented methods on the same data set to achieve a consistent result.

Types of Information

Information can be classified in a number of ways:



Classification of Information: The information can be classified in a number of ways provide to better understanding (in terms of classification by characteristics).

Jhon Dearden of **Harvard University** classifies information in the following manner:

(1) Action Verses No-Action Information: The information which induces action is called **Action Information.** 'No stock' report calling a purchase action is an **Action Information.**

The information which communicates only the status is **No-Action Information.** The stock balance is **No-Action Information.**

(2) Recurring Verses No-Recurring Information: The information generated at regular intervals is **Recurring Information.** The monthly sales reports, the stock statement, the trial balance, etc. are **Recurring Information.**

The financial analysis or the report on the market research study is **No-Recurring Information.**

(3) Internal and external information: The information generated through the internal sources of the organization is termed as **Internal Information,** while the information generated through the govt. reports, the industry survey etc., termed as **External Information,** as the sources of the data are outside the organization.

The information can also be classified, in **terms of its application:**

1. **Planning Information:** Certain standard norms and specifications are used in planning of any activity. Hence such information is called the **Planning Information.** e. g. Time standard, design standard.
2. **Control Information:** Reporting the status of an activity through a feedback mechanism is called the **Controlling Information.** When such information shows a deviation from the goal or the objective, it will induce a decision or an action leading to control.
3. **Knowledge Information:** A collection of information through the library records and the research studies to build up a knowledge base as an information is known as **Knowledge Information.**
4. **Organization Information:** When the information is used by everybody in the organization, it is called **Organization Information.** Employee and payroll Information is used by a number of people in an organization.
5. **Functional/ Operational Information:** When the information is used in the operation of a business it is called **Functional/ Operational Information.**

Database Information: When the information has multiple use and application, it is called as Database Information. Material specification or supplier information is stored for multiple users.

Role of Information in Decision-making

Information plays a vital role in decision-making. Even to take very simple decisions, we need information. To understand the role played by information in decision-making, we have to understand how decisions are taken. Decision-making is basically a process that includes the following stages:

Stages of Decision-making	Role of Information
Identification and structuring of problem/opportunity	One needs information to identify a problem and put it in a structured manner. Without information about a problem or opportunity, the decision-making process does not even start.
Putting the problem/opportunity in context	Without information about the context in which the problem has occurred, one cannot take any decision on it. In a way, the .information about the context defines the problem.
Generation of alternatives	Information is a key ingredient in the generation of alternatives for decision-making. One has to have information about possible solutions to generate alternatives.
Choice of best alternative	Based on the information about the suitability of the alternatives, a choice is made to select the best alternative.

Information is thus, very important to take decisions.

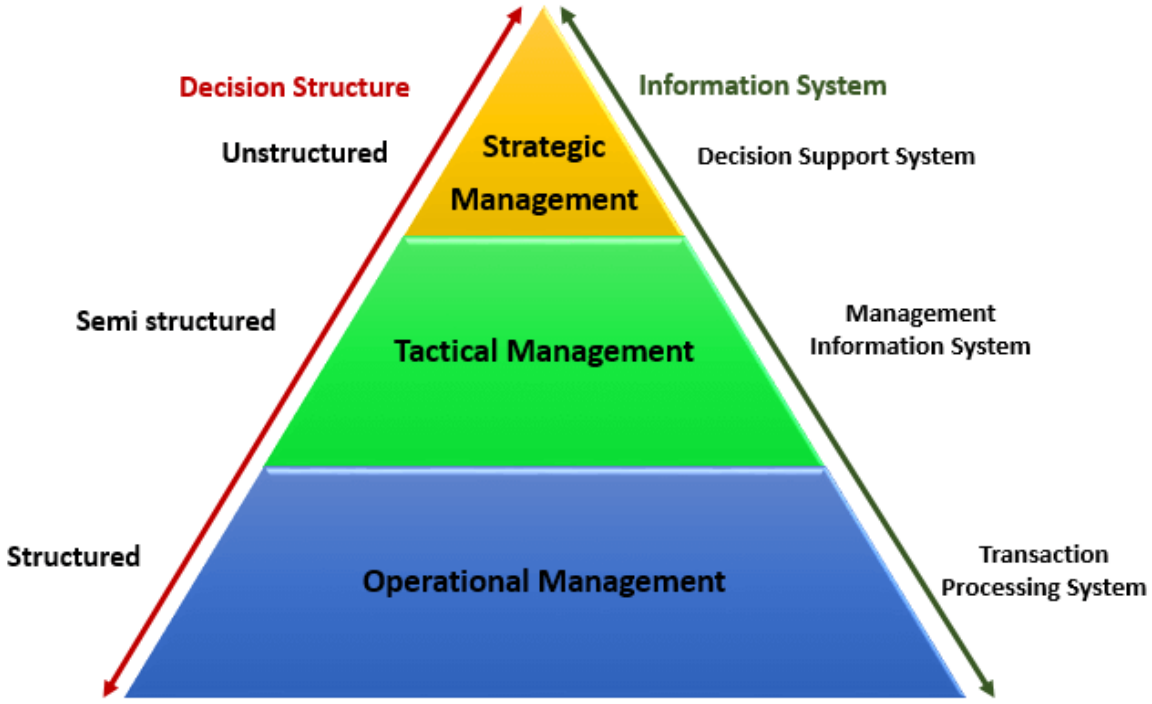
Decision-making is the most important task of managers in an organization. Therefore, to enable managers to take good quality decisions, it is very important to provide them with the right kind of information. In most organizations, business or otherwise, a systemic systems based method is used for information management. Systems based information management works best under a computerized environment and such computer based information management system is normally called ‘Management Information System (MIS)’, which provides the service of information supply to the managers enabling them to take informed decisions.

Information System

Definition: An information system can be defined as a set of interrelated components that collect (or retrieve), process, store and distribute information to support decision making, coordination and control in an organization.

Types of Information System

The type of information system that a user uses depends on their level in an organization. The following diagram shows the three major levels of users in an organization and the type of information system that they use.



Transaction Processing System (TPS)

Transaction processing systems are used to record day to day business transactions of the organization. They are used by users at the operational management level.

Examples of transaction processing systems include;

Point of Sale Systems – records daily sales

Payroll systems – processing employees' salary, loans management, etc.

Stock Control systems – keeping track of inventory levels

Airline booking systems – flights booking management

Management information systems (MIS)

Management information systems (MIS) serve the management level of the organization. Management Information Systems are used by tactical managers to monitor the organization's current performance status. Tactical managers are responsible for the semi-structured decision. The output from a transaction processing system is used as input to a management information system.

Examples of management information systems include;

Sales management systems – they get input from the point of sale system

Budgeting systems – gives an overview of how much money is spent within the organization for the short and long terms.

Human resource management system – overall welfare of the employees, staff turnover, etc.

Decision-support systems (DSS)

Decision-support systems (DSS) also serve the management level of the organization. Decision support systems are used by senior management to make non-routine decisions. Decision support systems use input from internal systems (transaction processing systems and management information systems) and external systems.

The main objective of decision support systems is to provide solutions to problems that are unique and change frequently.

Examples of decision support systems include;

Financial planning systems – it enables managers to evaluate alternative ways of achieving goals.

Bank loan management systems – it is used to verify the credit of the loan applicant and predict the likelihood of the loan being recovered.