

1.3 System Analysis & Design

As computers are becoming part of every activity in most of the organizations, many information systems now use computer systems for *manipulating* information.

Systems analysis is the application of the systems approach to develop Computer-Based Information Systems (CBIS) or a computer-based MIS (Management Information System).

System analysis and design refers to the process of examining a business situation with the intent of improving it through better procedures and methods.

Systems development can generally be thought of as having two major components: System Analysis and System Design.

System design is the process of planning a new system or replace or complement an existing system. But before this planning can be done, we must thoroughly understand the existing system and determine how computers can best be used to make its operation more effective.

System analysis, is the process of gathering and interpreting facts, diagnosing problems and using the information to recommend improvement to the system.

In brief, we can say that analysis specifies what the system should do. Design states how to accomplish the objective.

1.3.1 System

The term system is derived from the Greek word systems, which means an organized relationship among functioning unit's or components. A system exists because it is designed to achieve one or more objectives.

A system is a set of interrelated elements that collectively work together to achieve some goal.

For instance, computer is a system with elements such as CPU, input device, output device and users; and its basic goal is to process the data and provide information. There are hundreds of definitions of the word 'System', but here we define it as follows:

*A **system** is a set of interrelated elements that form an activity or a processing procedure in order to achieve a common goal or goals by operating on data to yield information.*

1.3.2 Subsystems

Most systems are part of a larger system. For instance, Financial Accounting System, Marketing System, and HRD (Human Resource Development) System are parts of a larger system, MIS (Management Information System) and are called subsystems. A system can be made up of many subsystems. A subsystem is defined as follows:

*A **subsystem** is that part of a system that carries one part of the system function.*

1.3.3 System Study

Systems study may be defined as “a study of the operations of a set of connected elements and of the interconnections between these elements”. It shows clearly that one cannot ignore any part or element of a system without first finding out the effect that element has on the operation of the system as a whole. We can understand this with the help of systems analysis.

1.3.4 System Approach

The information systems (such as MIS) are designed on the basis of cooperation of subsystems (such as *Production, Inventory, Sales and Marketing* systems) in order to achieve a net unified cohesive system.

The approach in developing information systems involves focus on the design of a whole integrated system rather than on independent subsystems in order to optimize the net results of the operations of an organization. This is called the systems approach.

Example: An invoicing system, an inventory control system and a financial accounting system can be designed independently. However, the net results of the operations of an integrated whole system are more than that of independent subsystems

1.3.5 Difference between System Approach and System Analysis

There is a difference between “systems approach” and “systems analysis” also. The systems approach shows a set of procedure for solving a particular problem. It applies scientific methods to observe, clarify, identify and solve a problem with special care being taken to understand the inter-relatedness between elements and their system characteristics. However, systems analysis is a management technique which helps us in designing a new system or improving an existing system.

1.3.6 System Characteristics

A system has the following characteristics:

1. **Organization:** Organization implies structure and order. It is the arrangement of components that helps to achieve objectives. The various elements of a system are organized to achieve objectives. *For instance*, input devices, output devices and the CPU of a computer system are organized to process the data and produce information.
2. **Interaction:** Interaction refers to the procedure in which each component functions with other components of the system. The various elements of a system are interacted with others to achieve a common goal. *For instance*, the ledger, journals and people are interacted in a financial accounting system for preparing the final financial statements (e.g., Profit and Loss A/c, Balance Sheet, etc.) of an organization.
3. **Interdependence:** Interdependence means that components of the organization or computer system depend on one another. The various subsystems of a system depend

on one another for sharing of input data. For instance, in a computerized MIS (a system), the financial accounting system (a subsystem) receives the input data (e.g., financial data from Invoices, cash memo etc.) from the invoicing system (a subsystem).

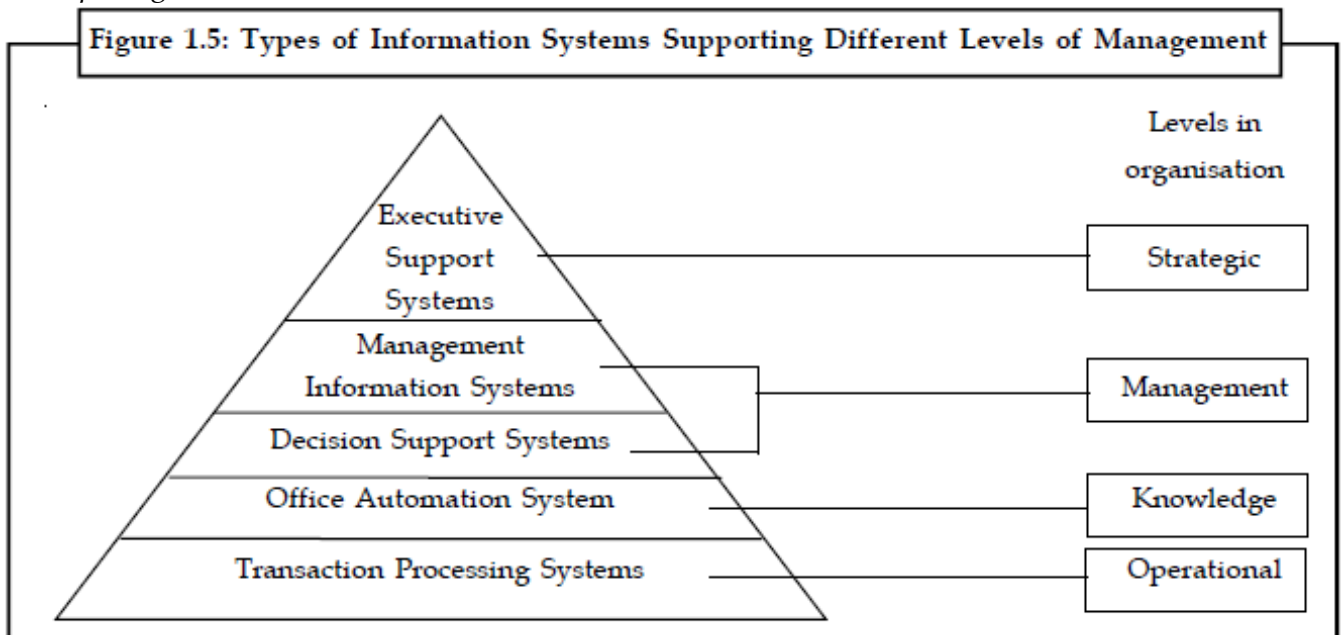
4. **Integration:** Integration is concerned with how a system is tied together. It is more than sharing a physical part or location. It means that parts of the system work together within the system even though each part performs a unique function. Successful integration will typically produce a better result as a whole rather than if each component works independently.
5. **Central objective:** Central objective is the last characteristic of a system. Objectives may be real or stated. Although a stated objective may be the real objective, it is quite common that organization may set one objective and operate to achieve another. The important point is that users must be aware about the central objective well in advance.

1.4 Categories of Information System

There are five major types of information systems for various management levels of an organization which are illustrated in Figure 1.5 and are discussed below:

1.4.1 Executive Support System (ESS)

This system is designed to address unstructured decision-making at the strategic level of an organization. The systems at strategic level help senior managers in long-term planning. *ESS employ advanced graphics and communications software for creating a generalized computing and communications environment.*



1.4.2 Management Information System (MIS)

This system is designed to serve the functions of planning, controlling and decision-making at the *management level* of an organization. The system at management level support monitoring, controlling and decision-making activities of middle level managers.

While computers were ideal for routine transaction processing, managers soon realized that the computers' capability of performing rapid calculations and data comparisons could produce meaningful information for management. Management information systems thus evolved out of transaction processing systems. A Management Information System, or MIS, is an information system that generates accurate, timely and organized information so managers and other users can make decisions, solve problems, supervise activities, and track progress. Because it generates reports on a regular basis, a management information system sometimes is called a Management Reporting System (MRS).

Management information systems often are integrated with transaction processing systems.

Example: To process a sales order, the transaction processing system records the sale, updates the customer's account balance, and makes a deduction from inventory. Using this information, the related management information system can produce reports that recap daily sales activities; list customers with past due account balances; graph slow or fast selling products; and highlight inventory items that need reordering.

An MIS generates three basic types of information:

- Detailed: Detailed information typically confirms transaction processing activities.
A Detailed Order Report is an instance of a detail report.
- Summary: To help summarize information, a summary report typically contains totals, tables, or graphs. An Inventory Summary Report is an instance of a summary report.
- Exception: Exception information filters data to report information that is outside of a normal condition. These conditions, called the exception criteria, define the range of what is considered normal activity or status. *Example: An example of an exception report is an Inventory Exception Report that notifies the purchasing department of items it needs to reorder.*

Exception reports help managers save time because they do not have to search through a detailed report for exceptions. Instead, an exception report brings exceptions to the manager's attention in an easily identifiable form. Exception reports thus help them focus on situations that require immediate decisions or actions.

1.4.3 Decision Support System (DSS)

DSS differ from MIS in mainly having more analytical power and more user-friendly capabilities. DSS combine data and analytical/modeling tools to support semi-structured/unstructured decision-making.

Transaction processing and management information systems provide information on a regular basis. Frequently, however, users need information not provided in these reports to help them make decisions.

Example: A sales manager might need to determine how high to set yearly sales quotas based on increased sales and lowered product costs. Decision support systems help provide information to support such decisions.

A **Decision Support System (DSS)** is an information system designed to help users reach a decision when a decision-making situation arises. A variety of DSSs exist to help with a range of decisions.

A decision support system uses data from internal and/or external sources. Internal sources of data might include sales, manufacturing, inventory, or financial data from an organization's database. Data from external sources could include interest rates, population trends, and costs of new housing construction or raw material pricing. Users of a DSS, often managers, can manipulate the data used in the DSS to help with decisions.

Some decision support systems include query language, statistical analysis capabilities, spreadsheets, and graphics that help you extract data and evaluate the results. Some decision support systems also include capabilities that allow you to create a model of the factors affecting a decision.

Example: A simple model for determining the best product price would include factors for the expected sales volume at each price level.

With the model, you can ask what-if questions by changing one or more of the factors and viewing the projected results. Many people use application software packages to perform DSS functions.

Example: Using spreadsheet software, you can complete simple modeling tasks or what-if scenarios.

A special type of DSS, called an Executive Information System (EIS), is designed to support the information needs of executive management. Information in an EIS is presented in charts and tables that show trends, ratios, and other managerial statistics. Because executives usually focus on strategic issues, EISs rely on external data sources such as the Dow Jones News/Retrieval service or the Internet. These external data sources can provide current information on interest rates, commodity prices, and other leading economic indicators. To store all the necessary decision-making data, DSSs or EISs often use extremely large databases, called data warehouses. A data warehouse stores and manages the data required to analyze historical and current business circumstances.