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MANAGEMENT INFORMATION SYSTEM AND COMPUTER APPLICATIONS

Management Information Systems are broad systems that provide decision-makers with information necessary to make effective decisions. As a separate discipline, MIS deals with the study of information and its impact on individuals, organizations, and the society. It is a system that creates, processes, stores and generates information within and outside an organization. Recently, MIS has become almost synonymous with computerized systems. The objective of MIS is to furnish information for decision - making , planning, initiating, organizing and controlling the operations of the subsystems of the firm, and also to provide a synergistic organization in the process.

Even though MIS can exist without computers, it is the power of the computer which makes it feasible. Conceptually, MIS is a computer-based user-machine system which implies that some tasks are performed by humans, and others by machines. All management function levels require a steady stream of information to enable them to be informed of the organisation and its environment. Without MIS, planning and

control activities will break down. It ensures that the information flows in the organisation are unhindered and every authorized user is supplied with the information he requires.

Meaning and Definition of MIS

Today's society is called information society because information is one of the key resources in organizations as well as in society. Information systems provide support on different areas of life. When they are viewed in relation to management of business organizations they are treated as Management Information Systems. MIS involves data processing, data-base design, information system analysis and design, and timely reporting of information to the various levels of management.

Management Information System is defined as "a comprehensive and co-ordinate set of information systems which are rationally integrated and which transform data into information in a variety of ways to enhance productivity in conformity with manager's styles and characteristics on the basis of established quality criteria."

In the words of Kelly, " MIS is a combination of human and computer-based resources that result in collection, storage, retrieval, communication and use of data for the purpose of efficient Management of operations and for business planning".

Gordon B. Davis defines Management Information System as " an integrated user-machine system for providing information to support the operations, management and decision-making functions of an organization. The system utilizes computer hardware and software, manual procedures, models for analysis, planning, control and decision-making, and a database".

According to Lucey, T., "MIS is a system to convert data from internal and external sources into information and to communicate that information in an appropriate form to managers at all levels in all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible".

For Jerome Kanter, "MIS is a system that aids management in making, carrying out and controlling decisions".

Robert J.Thierauf and George W. Raynolds define MIS as " a collection of subsystems and related programmed parts or modules that are interconnected in a manner which fulfils the information requirements necessary to plan, organize, direct and control business activities. It is a system for producing and delivering timely information that will support management in accomplishing its specific tasks in an enterprise."

In the words of Barrey E. Cushing, "MIS is a set of capital and human resources that enables collection, storage, and processing of data to produce and communicate relevant information to all levels of management to provide support in performing management related activities".

Evolution of the Concept

The earliest use of information system was in a Sumerian temple in the third millennium B.C., to record receipts and issues of grain to individuals out of the temple grain store. But the information system had its fast growth in the last few centuries. Even though the concept was introduced as a single highly integrated system, it was Later demonstrated to be too complex to implement; and now it is considered as a combination of subsystems conforming to overall plan, standards and procedures of the organization. Expansion in organisation size, professionalism, development of technology, etc., is a great fillip to the evolution of the management information system. After the invention of computers, they have been playing a predominant role in MIS. Advancement of computer hardware and software led to the wider application of MIS. Thus MIS commonly came to be referred to as Information Reporting System since it was mainly used to produce reports for managerial purposes. In the 1970's, improvements in database technology paved the way for Decision Support System (DSS), office automation technologies like word processing, desktop publishing, electronic mail, etc. By 1980, Information Technology attained greater momentum, which led to the further development of MIS as a strategic weapon. At present, rather than a single, global MIS, an organization may have many related information system, serving the various managerial needs. The periods of evolution and the changing focus of MIS are traced below:

Period	Major Focus	Main Functions
1950 – 1960	EDP	Transaction processing, record keeping and accounting.
1960 - 1970	IRS	Information Reporting.
1970 - 1980	DSS	Decision Support.
1980 – onwards	EIS & KBS	Special information needs of top management and use of artificial intelligence in problem solving.

Importance

Management Information System is a systematic procedure to provide relevant information at the right time, in the right format, to all levels of management in the organization for providing support to the decision making activities. MIS is assigned a strategic role in the highly competitive business world. It is the most integrated recourse in an organisation. Its role has changed over the years from information reporting system for control, to future information for forward planning and control. The importance of MIS can be understood from the three major roles it performs in today's society:

  (i)   It provides support to business operations.

  (ii) It also provides support to managerial decisions.

  (iii) It helps to gain strategic competitive advantage.

The increase in business complexity and the capability of Information Systems to provide a competitive edge to the firm has made MIS an inevitable component of modern business systems. It has become a strategic tool for business competence and success. Its role is all-pervasive. It is highly significant in the modern world since it affects activities of organizations at all levels and opens up opportunities for business growth and survival.

Objectives of MIS

An effective MIS has the following objectives:

(i) To facilitate the decision-making process in an organization by providing timely information.

(ii) To furnish planning and control tools to top managers at various levels.

(iii) To provide a system of people, equipment, procedures, documents and communications, that collects, validates, operates, transforms, stores, retrieves and presents data for use in planning, budgeting, accounting, controlling and other managerial functions.

(iv) To assist the management in controlling activities by highlighting the crucial factors and problem areas.

(v) To evaluate the approach of managers towards MIS.

(vi) To create a process of communication where information is recorded, stored and retrieved for decision-making, planning, and controlling in the organization.

Pre-requisites of a Successful MIS (Characteristics of MIS)

MIS has a number of characteristics which make it successful. Chief among them are:

1. Flexibility: Changes occur in organisations due to various reasons. A good MIS must be capable of adapting to these changes.

2. Reliability: MIS provides information to the management for taking various decisions. So the information provided must be reliable as far as possible.

3. Simplicity: It is very difficult to design simple systems which are easy to operate and control. An effective MIS should have a simple design.

4. Economy: MIS should be cost-effective. Costs should be carefully monitored and a comparison should be made with the original planned cost.

5. Helpfulness: The purpose of MIS is to help the management in planning, control and decision-making. So, an efficient MIS should serve this purpose.

6. Consistency: It means that the methods and scales used to collect and present data must be consistent in nature. For instance, if the sales reports are given in values in a particular year, they must be expressed in values in subsequent years also, instead of being shown in quantity; otherwise comparison will be hurdled.

7. Management-oriented: The development of information system efforts should start an appraisal of management needs and overall business objectives.

8. Management-directed: Management should actively direct the system's developmental efforts; to make it effective not only in the stage of designing the system but in its review as well.

9. Business-driven: MIS is driven by the philosophies and plans of the organisation. Its strategy is developed from corporate strategy.

10. Integrated system: All functional and operational subsystems should be tied together into one entity. Only then, the system has the capability of generating more meaningful information to management.

11. Common data flows: It means the use of common input, processing and output procedures and media, whenever possible or desirable, to eliminate duplication in data collection documents and procedures.

12. Heavy planning: MIS usually takes 3-5 years and therefore a heavy planning element must be involved in it. While designing the system, the designer should keep in mind the present objectives and requirements as well as the future developments to avoid system obsolescence.

13. Subsystems: Information system must be broken down into various subsystems.

14. Common database: Database is a 'super file consolidating a number of data records formerly stored in many separate data files. In an effective MIS, common database must be there to eliminate duplication in data storage, updating, deletion, and protection.

15. Computerized: Even though MIS can be developed without computers, at present it is considered an integral part of it. Its use increases the speed, accuracy, storage capacity, etc., and hence it is the symbol of an efficient information system.

16. Relevance: The information provided by MIS should be relevant to the needs and purposes of managers at various levels.

17. Brevity: Information must be brief, which does not mean that certain matters can be left out. Information should be made brief in such a way that maximum information should be communicated in minimum words.

1B. Accuracy: Information must be accurate to a great extent because decisions are taken on the basis of such information.

MIS and Its Functional Subsystems

On the basis of organizational functions, subsystems can be divided into various categories. Since MIS is a federation of subsystems each organisational function can have a subsystem. Each of these functional systems is unique in its procedures, programmes, models etc. The functional subsystems of MIS are:

(i) Production subsystem: It deals with production of data reports, and makes production planning, scheduling and cost control analysis.

(ii) Marketing subsystem: It collects data for sales forecasting and planning. It includes data relating to distribution cost, promotion cost, etc.

(iii) Finance and accounting subsystem: It keeps data on customer credit, accounts payable, accounts receivable, cash management, fund allocation, etc.

(iv) Personal (HRD) subsystem: This subsystem is concerned with planning personnel requirements, analysing performance, salary administration, etc.

(v) Information processing subsystem: It focuses on information system planning, cost-effectiveness analysis, etc.

(vi) R&D subsystem: It deals with research and development activities in an organization

MIS and Other Academic Disciplines

Many ideas of MIS are found in various other academic disciplines. Four major areas related to MIS are:

(i) Management accounting Vs MIS: Management accounting is concerned with determining relevant costs and performing other analyses useful for managerial decision

making and control. It tends to be the focus for the preparation of budgets and performance analysis. Historically, the accounting development is always responsible for data processing. Management accounting knowledge is of great help in ascertaining the information requirements, carrying analysis in designing forms for processing , procuring and providing information. Thus, the MIS concept includes much of the content of management accounting.

(ii) **Operations research Vs MIS:** Operations research is the use of scientific methods and quantitative analysis to solve the problems of management. It has a significant relationship with MIS since it has developed procedures for analysis and computer- based solutions to decision problems. The systematic approach to problem solving, use of models, and computer-based solution algorithms are generally incorporated in the Decision Support System of MIS

(iii) **Management theory Vs MIS:** There were several management theories-Behavioral, Empirical, Quantitative, Decision theory and Management process. Out of these, decision theory and management process are the more relevant to MIS. According to decision theory, the most important task of managers is to take decisions. Under the management process concept, management is defined as what managers do. The knowledge of these theories enabled the MIS designers to ascertain the type of decisions made and functions performed by executives in business organizations.

(iv) **Information technology Vs MIS:** Computer science is used in information systems to provide accurate and speedy information to the managers. Information technology facilitated the growth of MIS. It is important to MIS because it covers topics such as algorithms, computation software, and data structures. Today, computer has a major role in data processing. So computer technology has been considered a major factor for MIS development.

Role of Computers in MIS

The role of computers in MIS is to be apprised on the following grounds:

1. Forecasting: The important functions performed by computers in forecasting are:

(A) Computer can speedily perform such historical analyses as shown below, which may be difficult or even impossible manually.

   (i) Data smoothing by means of moving averages or weighted moving averages.

   (ii) Seasonal analysis used to compute seasonal indices can be performed by the computer.

   (iii) Cyclical analysis in which cycle of booms and depressions can be discussed by factoring an economic time series into trend, seasonal, cyclical and error components is done by the computer.

   (iv) Correlation and regression analysis involving a great deal of calculations are carried out by computers.

   (v) Auto-correlation analysis can be performed by computers.

   (vi) Data description in which various frequency distributions can be tried for a fit in the given data. Later, the goodness of fit tests can be performed. Summary statistics as mean, mode, median, standard deviation, skewness, etc. can be assessed with the help of computers.

   (vii) Optimal parameters of the selected forecasting model can be derived.

(B) For routine forecasting also computer provides considerable assistance

2. Planning

   (a) It can be done more frequently and even continuously. Because of constraints of computational and data processing abilities in manual systems, it used to be the practice to set reorder level annually. Now, in computerised systems, recorder levels can be revised much more frequently.

   (b) Sophisticated models of planning can be employed.

   (c) Simulation can speed up evaluation of alternative plans.

   (d) The user can interact with the computer to do better planning.

   (e) For complex planning situations heuristic rules can be derived with the help of the computer.

3. Control

(a) More comprehensive, control techniques can be used with the help of computers.

(b) Varied, accurate and frequent reports can be produced where necessary.

(c) Statistical quality control techniques can be used to monitor marketing and financial ratios.

(d) Variance analysis plus other analyses, which might assist in understanding both the reasons for variances understanding and both the courses of action that will be corrective, can be undertaken.

4. Modelling: Models can be tested for robustness simply or in conglomeration, against historical or hypothesised data by simulation or otherwise. Computer also assists in model building to sort out relationship.

5. System analysis: Several MIS designs can be evaluated by means of simulation experiments. This can be performed only with the help of computers.

6. Database facility: Data is no longer vivisected department wise. All planner, forecaster, supervisor, system analyst and modeler can discharge their functions much better through a computer.

Conclusion

Information is processed data that serves current or prospective use. A system for providing right information to the right person at the right time is called Management Information System. Modern Information Systems use information technology, to keep ahead of competition. MIS is an evolving concept rather than a single large system, it is a federation of closely integrated subsystems.

Exercise

Short Answer Questions

1. Define MIS.
2. Explain the evolution of MIS.
3. Describe the importance of MIS.
4. What are the objectives of MIS?
5. Elucidate the prerequisites of a successful MIS.
6. What are the functional subsystems of MIS?

7. Explain management accounting and MIS.

8. Describe the relationship between MIS and management theory.

9. What are the features of an MIS?

10. Explain the relationship between MIS and information technology.

Essay Questions

1. Bring out the role of computers in MIS.

2. Narrate the significance of MIS in the present day business organizations.

3. Explain the various computer applications in MIS.

4. Narrate the evolution of the concept of MIS.

5. Explain the relationship between MIS and other academic disciplines.