

UI8OEBA005 MANAGEMENT INFORMATION SYSTEM

Unit I: Introduction

09 hrs.

Introduction, Concept, evolution and meaning of MIS; Information system for competitive advantage; Systems approach to problem solving; Challenges in the development of MIS, MIS function in an organization.

UNIT 1

Introduction

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 analysed 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.

Definition : Management Information System or 'MIS' is a planned system of collecting, storing, and disseminating data in the form of information needed to carry out the functions of management.

The MIS has been understood and described in a number of ways. It is also referred to as:

- a) Information system
- b) Information and decision system
- c) Computer based information system

MIS can be defined in a number of ways:

1. The MIS is defined as a system which provides information support for decision making in the organisation.
2. MIS is an integrated system of men and machines for providing the information to support the operations, the management and decision making functions in the organisation.
3. MIS is defined as a system based on the database to the Organisation evolved for the purpose of providing information to the people in the Organisation.

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:
 - making calculations with the data
 - sorting data
 - classifying data and
 - 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.

Information system for competitive advantage:

Gaining competitive advantage is critical for organisations. Baltzan and Phillips (2010, p. 16) define competitive advantage as 'a product or service that an organization's customers value more highly than similar offerings from its competitors' (in other words, you have something useful (i.e. products, services, capabilities) that your competitors do not have). Competitive advantages are typically temporary as competitors often seek ways to duplicate the competitive advantage (Baltzan & Phillips 2010, p. 16). In order to stay ahead of competition, organisations have to continually develop new competitive advantages. This section discusses how an organisation can analyse, identify, and develop competitive advantages using tools such as Porter's Five Forces, three generic strategies, and value chains.

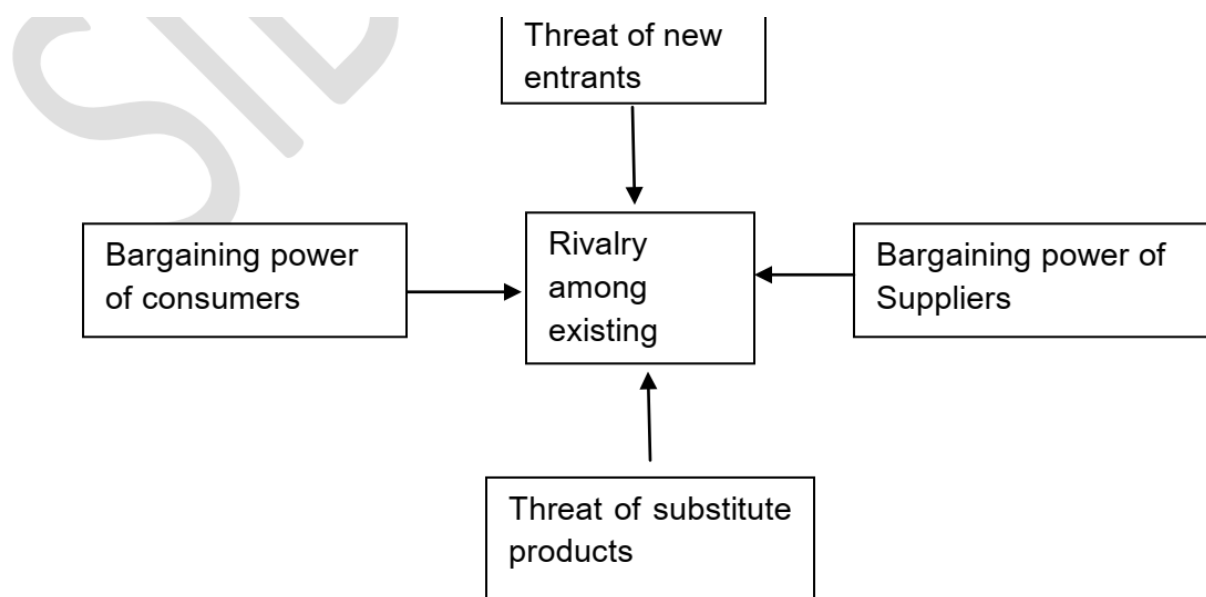
Michael Porter's Five Forces Model is a useful tool to assist in assessing the competition in an industry and determining the relative attractiveness of that industry. Porter states that in order to do an industry analysis a firm must analyse five competitive forces (Baltzan & Phillips 2010, p. 17):

- Rivalry of competitors within its industry
- Threat of new entrants into an industry and its markets
- Threat posed by substitute products which might capture market share
- Bargaining power of customers
- Bargaining power of suppliers.

Michael Porter & Victor Millar have said, IT is affecting competition in three vital ways:

1. It changes the industry structure & in so doing, affecting the rules of competitions.
2. It spawns the new business, often from within the company existing operations.
3. It creates competitive advantage by giving companies new ways to outperform their Rivals.

1. Changes the industry structure



2. Spanning of New Businesses

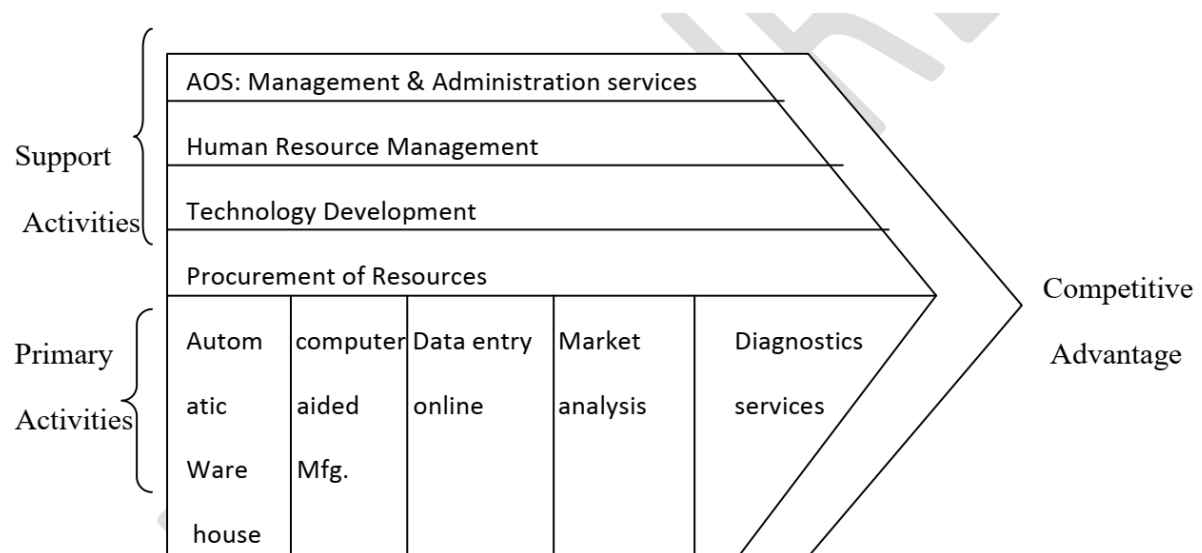
Information, information technology & information Revolution gives birth to new industries.

- Information Revolution makes new business technology feasible.
- Information & IT also spawn new business by creating derived demand for new products.
- Information & IT helps to create new business with old ones.

3. New ways to outperform their rivals

Information & IT, developments of new ways of doing things in a different way confers competitive advantage on a firm.

The Value chain model:



The **value chain** is an analytical frame work to disaggregate a firm in to the different interdependent activities that add value to its raw materials and bring the firms products or service to the customer.

The **key feature** of a value chain is to examine each step of production & determine how value is added at each step.

The second **objective** of value chain analysis is to examine the bigger picture in the industry. The value chain is combination of **primary** and **support activities**. **Primary activities involve** physical creation of the product, its marketing and delivery to buyers, its support and service after sale.

Support activities provide the input & infrastructure that allow the primary activities to take place.

Each **activity adds value**; there is a cost of adding a value in every level of the chain. Value chain **enables a company** to analyses where & how it can add value to reduce cost. If the **total cost of added values** is less then what the values is less than, what the customer pays, there is profit.

The concept of value chain is a **useful frame work** for identifying information technology opportunities.

The value chain concept can help managers decide where and how to apply the strategic capabilities of information system technology.

EVOLUTION OF MIS

The older version of MIS was Electronic Data Processing (EDP) systems. The main activity of EDP was record keeping under accounting department of an organisation. One example of EDP is the payroll software package used by any organisation.

The philosophical shift from data to information developed the concept of MIS. The main aim of EDP was to compile a chunk of data, whereas MIS took the responsibility to process those data and generate fine tuned information.

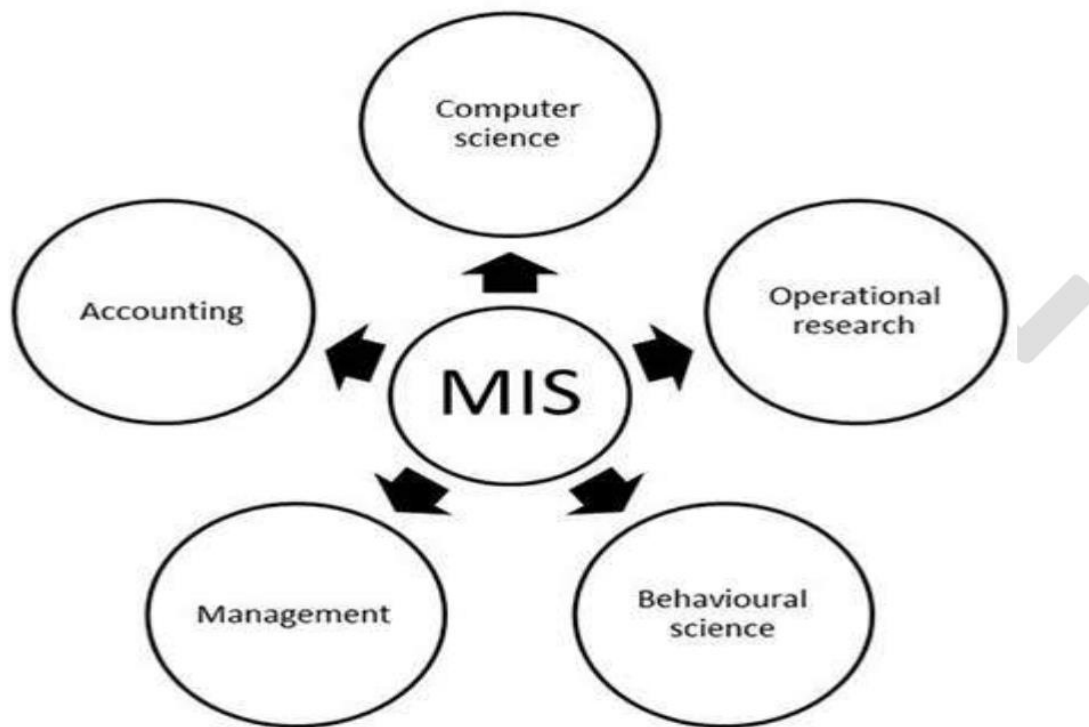
With the revolution in personal computing, the management could directly access the information base instead of depending on the EDP or MIS departments. This enhanced the decision making capabilities of management and gave birth to Decision Support Systems (DSS) pioneered by Keen. The direct use of information base created the 'What-if' analysis capability with the help of modern software packages like Spreadsheet, Word Processing and Database Management Systems (DBMS), etc.

The spectacular growth in Artificial Intelligence and Expert Systems generated Knowledge Based System (KBS). Combined with DSS, the expert systems could supply a superior class of MIS by providing software packages having self-learning capabilities. The philosophy of DSS, combined with the power of the Operation Research models together with Management Science transformed the 'What-if' capability to 'What-is-best'. This came to be known as Model Management Systems (MMS) help the management to take the optimal decision from several available alternatives.

The EDP targeted the lower level of management. The MIS/DSS/MMS targeted the middle level of management. The Executive Information System (EIS) or Executive Support System (ESS) serves the top level of management whose time value is extremely high. Here the user interface must be superior such as, Natural Language Interface, Voice Processing and Response, MultiMedia (Graphics, Sound and Video), etc

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 analysed 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

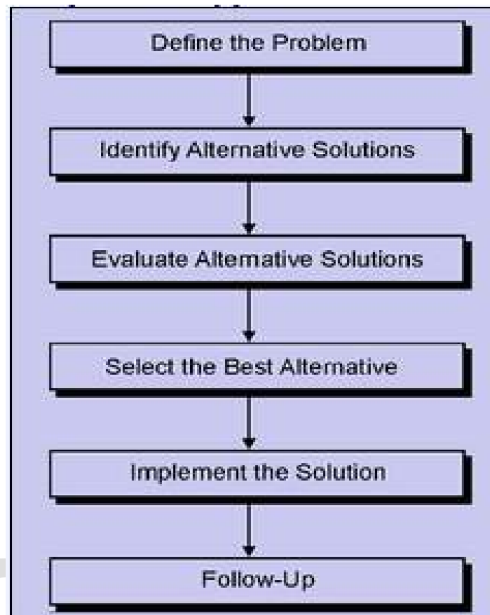
- i. Determine the outcome of chosen alternatives
- ii. Select "best alternative"**

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 best alternative selected. In this step, such alternatives are identified and developed. 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.

Challenges in the development of MIS:

If all the existing barriers are divided into humanistic, organizational and environmental factors, the major drawbacks and the reasons of failure and using MIS in public organizations are as following:

Humanistic factors

- The lack of information of the managers and users as they don't know exactly what they want and what their information needs are.
- The lack of understanding of the needs of the users by designers (the lack of correct definition of the needs and their analysis)
- The lack of information of the managers and users about the collaboration method with the designer team.

The lack of participation of the managers and users in system design.

- The lack of understanding of the managers of software and information systems.
- The lack of information of most of the analysts and programmers (designers) with new system work environment.
- The lack of acceptance of the system executers and resistance against the change.
- The lack of accuracy in the data collected
- The lack of good conditions for participation and collaboration of the managers, users and system directors
- The lack of consistency and complexity of the existing manual systems.
- The lack of existing systems and methods analysis before the system design
- The lack of evaluation of the existing power
- Bad condition of educating the specialized forces
- The lack of human resources with management and computer fields and other required specializations (the problems of absorbing human resources)
- Inadequate education of the users
- Inadequate and incomplete documentation

- Unsuitable implementation of the system

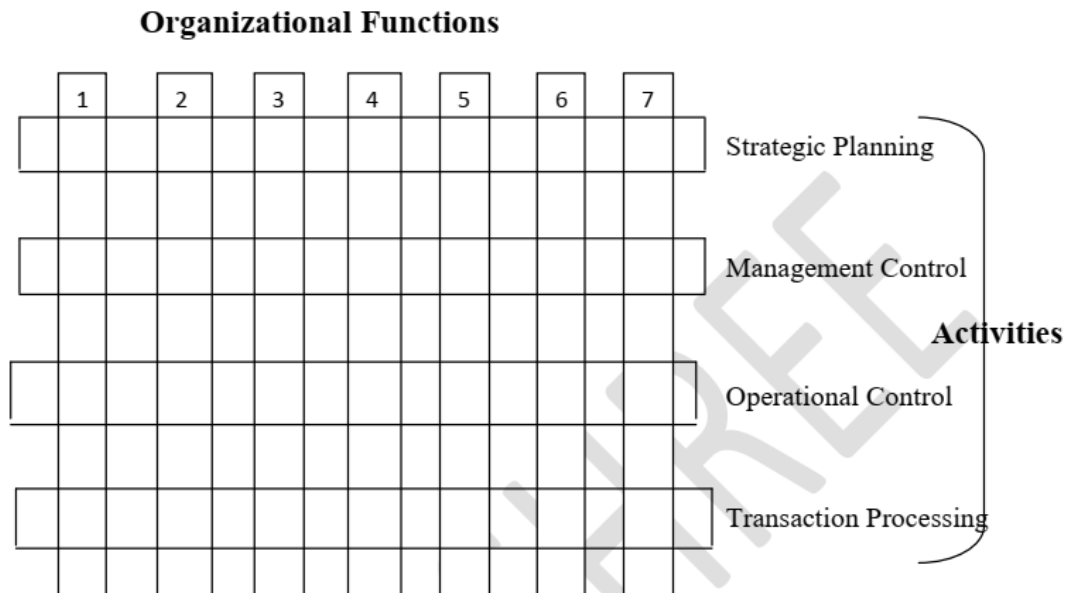
Environmental factors

- The lack of suitable consultants for designing the system and software
- The lack of procedures and methodology and stages of creating the system
- The lack of evaluation of environmental aspects in management information systems
- The lack of suitable use of mass media to develop the culture of using computer and information systems.
- The lack of holding suitable MA training courses in the universities and the lack of suitable education of human resources in this regard.
- The lack of ratification of the suitable rules in Islamic council parliament and government board and the considerable problem in this regard.
- The lack of serious consideration and adequate investment in this regard.

MIS function in an organization:

The structure of an information system can also be described in terms of the organizational functions which use information. There is no standard classification of functions, but a typical set of functions in a manufacturing organization includes Production, sales & marketing, finance and accounting, logistics, personnel, and information system. Top management is also consider as a separate management

The conceptual structure of MIS is defined as a federation of functional subsystems each of which is divide in to four major information processing components like Transaction processing, Operational control information system, Management control information and Strategic planning



Organizational Functions:

1. Sales & Marketing
2. Production
3. Logistics
4. Personnel
5. Finance & Accounting
6. Information Processing

7. Top Management

1. Sales and Marketing Subsystem: the sales and Marketing includes all activities related to the promotion and sales of products or services.

- **The Transactions** are sales order, promotion orders, etc.
- **The Operational control** activities include the hiring and training of the sales force, the day-day scheduling of sales and promotion efforts etc.
- **Management control** concerns comparisons of overall performance against a marketing plan. Information for management control may include data on customers, competitors, competitors products and sales force requirement
 - **Strategic Planning** for the marketing function involves consideration of new markets and new marketing strategy.

2. Production Subsystem: The production functions includes product engineering, planning of production facilities, scheduling and operation of production facilities, employment and training of production personnel and quality control and inspection.

- **The typical transaction** to be processed is production orders, assembly order, finished parts tickets, scrap tickets and time keeping tickets.
- **Operational control** requires detailed reports comparing actual performance to the production schedule and highlighting areas.
- **Management control** requires summary reports comparing overall planned performance to actual performance
- **Strategic planning** for manufacturing approaches and alternatives approach to automation.

3. Logistics Subsystem: The logistics function encompasses such activities as purchasing, receiving, inventory control and distribution.

- **The transaction** to be processed includes purchase requisition, purchase order, manufacturing orders.
- **The Operational control** function uses information contained in reports such as past due purchase, past due shipments to customers etc.
- **Managerial control** information for logistics consists of overall comparisons between planned and actual inventory levels.
- **Strategic control** involves the analysis of new distribution strategies, new policies with required to vendors.

4. Personnel subsystem: includes hiring, training, record keeping, payment and termination of personnel.

- **The transaction result** in documents describing employment requisition, job descriptions, training, personal data.
- **Operational control** for personnel requires decision procedures for action such as hiring, training, termination, changing pay rates, and issuing benefits.

- **Management control** of the personnel function decision is supported by reports and analysis showing the variances between actual and planned performance.

- **Strategic planning** for personnel is involved with evaluating alternatives for recruiting, salary, training, benefits and building location to ensure that the organization obtains and retains personnel.

5. Finance & Accounting subsystem: Finance function covers granting of credit to customer, collection process, cash management and financing arrangements. Accounting covers the classification of financial transaction and summarization in to the standard financial reports, preparation of budgets.

- **Transaction** associated with finance and accounting are credit applications, sales, billing, collection documents, payment vouchers etc.

- **Operational control** over the function itself require daily error and exception report, records of processing delays etc.

- **Managerial control** level for accounting and finance utilizes information on budgeted versus actual cost of financial resources and error rates.

- **Strategic planning** level for accounting finance involves a long run strategy to ensure adequate financing, a long range tax accounting policy to minimize the impact of taxes.

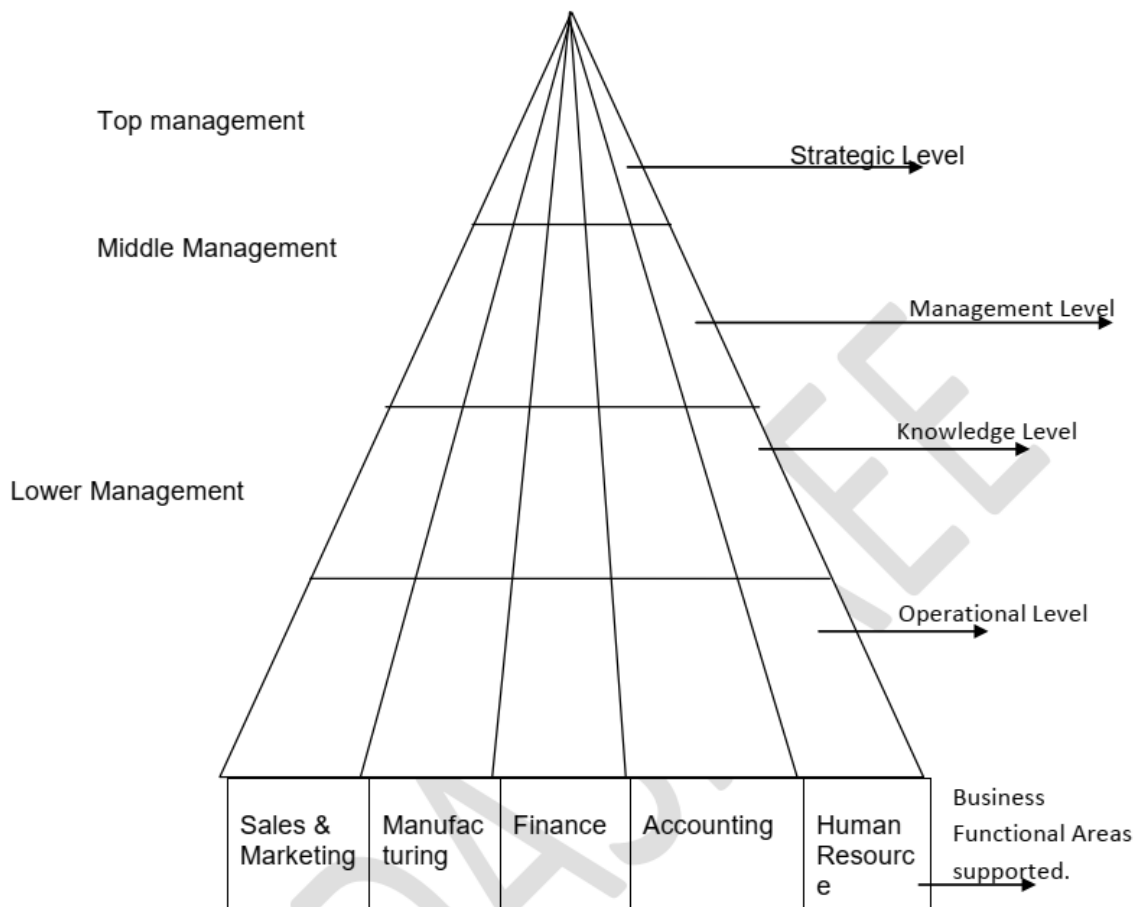
6. Information processing subsystem: The information processing function is responsible for ensuring that the other functions are provided the necessary information processing services and resources.

- **Typical transaction** for information processing service and resources, requests for corrections or changes in data and programs, reports of hardware and program performance and projects proposals.

- **Operational control** of information processing operations requires information on the daily schedule of jobs, error rates and equipment failures, for new projects development it requires daily or weekly schedules.

- **Managerial control** over information processing requires data on planned versus actual utilization, equipment cost, overall programmer performance and progress.

- **Strategic planning** for information system involves the organization of the function, the overall information system plan, selection of strategic uses of information and the general structure of the hardware and software environment.



Top Management: Strategic Planning

Middle Management: Tactical Planning or Management Control

Lower Management & Operational Management: Operational Control