CHAPTER 2

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During the past decade there has been an increasing demand for the services provided by information systems. The world of microcircuitry and transmission of data at speeds approaching that of light is generating information at an explosive rate. Administrators of organisations in the environment expect information that is precise, accurate and timely. This information is used for record keeping as well as for decision-making, using techniques such as operations research, system analysis, planning, budgeting etc. Information has been used successfully in business and industry for these purposes in situations similar to those arising in educational institutions. Consequently, it is postulated that the performances of educational institutions could be upgraded by the use of properly designed and implemented information systems.

In industry there is evidence that information systems contribute to higher profits resulting from efficiency and greater effectiveness. Thus,
there is a demand from many sections of environment that such systems be used in education, where the growth rate is high and is continuing to increase.

Besides, there are non-economic forces that increase the demand for information systems in education; for instance, the demands for more information on educational operations from state, regional and national agencies. In addition to external demands, there are internal pressures. Students are demanding a faster and more effective system for handling their records. Since they can inquire about the availability of an aeroplane seat and make instant reservations on the plane, they expect equally fast and effective responses at the time of their registration for the class. Faculty members are making similar demands for more and faster information, which is necessary for their work to be effective. All these pressures increase the need for more effective and responsive information systems in education.

Information is power. It can be used or it can be abused. Also information can be good, accurate, timely and relevant; or it can be bad,
inaccurate, late and irrelevant. But information systems can be developed to generate information that is good and useful to management in universities.

The development of such systems is largely a technical task that requires system analysis. It can not start working without the needs of the system being specified by management. This would entail detailed definitions of terms, concepts, and decision rules, the specification of variables and information and their limits of acceptance and validity as well as specification of desired output and available input. Thus, the researcher of this study is trying to find all the information required and will focus the study in designing of an information system, which is effective in the university system.

2.1 Definition of Management Information System

The organisation of today is operating under an environment of change, which poses challenging facets of the problem to the management. To face the prevailing problems it becomes a whole time job of
management to be aware of fluctuating information under such environment of growing mechanism.

Within the organisation, information system has become an essential tool of management, which enables the executives to perform managerial and decision making activities. Most organisations always had some sort of information system such as the Accounting system, Production Scheduling System etc. to handle and process the information needed in various aspects of their work.

In recent years, the increasing size and complexities of organisations and a clear trend to set up a systematised section whose role is concerned merely with co-ordination of activities of various functional departments, made management to be more serious about management information system.

The old techniques of management such as intuition, rule of thumb, personal prestige etc. are no longer considered reliable in the decision making process of organisations particularly of the present day.
With the expansion of an organisation the executive is unable to retrieve relevant information quickly within the response time available and to hold back irrelevant information. Such a scientific system, therefore, is required to provide proper information to him at proper time for the purpose of planning, decision-making and control. The management information system is the only system which can carry out this function smoothly and successfully.

Modern management is highly information oriented. The management information system supplies the managerial and administrative information through the means of communication so that the managers or administrators may achieve the organisational goals. After having discussed the general view of the management information system, one should know how to define the management information system.

The term management information system is composed of three components viz., Management, Information, and System.
2.1.1 Management

Management is the process of getting things done through and with the people. It is an activity of planning, organising, co-ordinating, directing and controlling to achieve desired results. Koontz and O’Donnel put it thus: “Acting in their managerial capacity; presidents, departmental heads, foremen, supervisors, college deans, bishops and heads of government agencies all do the same thing.” According to F.W.Taylor, “Management is the art of knowing what you want men to do and then seeing that they do it in the best and cheapest way.” On the other hand the functional view of management was expressed by Henery Fayol, father of the principles of management when he says, “To manage is to forecast and to plan, to organise, to command, to co-ordinate and to control.” E.F.L. Brech defines management as “a social process entailing social responsibilities of effective planning and regulation operations of an enterprise in fulfilment of a given purpose of task.” Lastly, Peter Drucker in his book “The Practice of Management “, defines “management as a multipurpose organ that manages a business and manages managers and manages workers and works.” However, most of the definitions suggest: (1) different levels of
management and (2) a sequence of steps which a manager should take up. For a particular organisational task, a manager ordinarily will perform the managerial functions in sequence: creating, planning, organising, motivating, communicating and controlling the human behaviour in the organisation as shown in figure 2.1.

![Diagram showing the functions of a manager](image)

**Figure 2.1 Function of Manager**


Generally the levels of management are categorised as top management, middle management and lower management. Jerome Kanter named and explain these along with their informational requirements as under:-
Figure 2.2. Management levels and nature of information primarily used

(a) Strategic Management level:

It refers to strategic plans and policies, long term goals and objectives of the organisation. It responds to tactical and operational level and also provides a link between organisation and environment.

(b) Tactical Management level:

It is concerned with the generation of short-term plans, policies, procedures, programs and objectives within framework provided by the strategic management level.

(c) Operational Management level:

The responsibility of management at this level is to implement the policies so that goods and services may be supplied to the society.
Figure 2.1 and 2.2 reveal that all these steps (creating, planning, organising, motivating, communicating and controlling) are often involved at every level. But they are not immediately apparent. Secondly, some of these steps are repeated frequently and it is sometimes appropriate to return from one step to another to revise the plan in the light of subsequent developments and thirdly the common factor in every management activity is that a decision must be taken. So management is an active process composed of some basic functions to achieve the objective of an enterprise through the efforts of its personnel.

2.1.2 Information

The exact nature of information is not easy to be described. To Wilson and Wilson (1965) information is the "capacity for increasing knowledge"6 and to Bontell (1968) it is a "significance derived from the data."7 McDonough (1963) defines information as a label for:

"Evaluated data in a specific situation. When the individual singles out one of his problems and finds among his data materials that helps him solve the problem he is converting or isolating information from"
data... (It is a) change from data to information when it is put to use to in making a decision. The distinction between data and information gives opportunity to create classifications that can be used for further analysis."

McDonough and Garrett (1967) discuss the transformation of information as the transmission of data to relevant people in the organisation, informing them and thereby, becoming information. Until it reaches this last stage in a system, data is only potential information. The definition of information as a transfer of data through processing is illustrated in figure 2.3.

![Diagram of data processing]

Figure 2.3. Information

The production of information implicitly requires a user; the one who identifies the information needed and uses it. After the information is used, it may again become data which, along with other data, is represented and the cycle of information production continues. This cycle is depicted in the block diagram of figure 2.4. One could consider the start of the cycle, the
original data (box 1), that is checked and edited (box 2). If necessary, the data is modified to ensure that it is complete and has no apparent errors and inconsistencies. The data is then processed (box 3) and information is generated (box 4), and then it is sent to the user (box 5). The satisfaction and dissatisfaction concerning this information is then fed back, which may modify the needs for information (box 6). The modified needs for information then determine the new data (box 7), which is used for the next cycle of reprocessing, again with the checking and editing (box 2).

Figure 2.4. Production of Information
The modified needs for information (box 6) also affect the instructions for processing (box 8) which in turn determine future processing. The information once generated (box 4), in addition to being sent to the user (box 5), also becomes part of the data (box 9).

To Carl Heyel “Information is the symbolic representation of the real world (money, manpower, materials, markets etc.).” Since decision-makers at all the levels rely on information systems to supply them with intelligence that will influence the selection of particular means and ends, it is essential that the information supplied be an accurate representation of the real world. In fact, this underscores the need of a carefully designed and reliably operating information system, otherwise, a manager can be making decisions based on information that does not mirror the real world.

2.1.3 System

System concepts and techniques aid management in developing and maintaining an effective framework of systems and procedures to satisfy the specific needs of the organisation. To Carl Heyel, “A system is an orderly
arrangement of interdependent activities and related procedures which implement and facilitate the performance of major activity of an organisation."

Also shown in figure 4 are most of the basic components of a system. It has input (box 1,7,9), processing (box 2,3) control and feedback (box 5,6,8) and output (box 4). If the system has a "wholeness" because it has a common plan and objective, the figure 4 represents a system, more specifically, an information system – a system that produces information. More specifically, one can define a system as being an assemblage or combination of things or parts forming a complex or unitary whole to produce information according to a plan.

According to Murdick and Ross, "The Management Information System is the means for connecting the managed operating systems by exchange of information."11 To Paul Seigel, "A Management Information System is not a sophisticated computer system, a communication network, a generalised database management system, an accounting system ...... the Management Information System is a philosophy, an approach, a point of
view, a way of seeing the organisation as a whole. It is at the core of a hierarchy of systems.”

As shown in figure 2.5, the organisational system provides products and services for the environment system, the organisational information system provides all the data and information needed by the organisational system and the Management Information System provides the management oriented information to the organisational information system.

![Diagram](image)

Figure 2.5. The Organisational system

Carl Heyel says, “Management Information Systems are planned and organised approaches to supply executives with intelligence aids that
facilitate the managerial process.” Walter J. Kennevan explained Management Information System presenting the following diagram presented by figure 2.6.

![Diagram of Management Information System]

**Figure 2.6. Management information system structure**

[Source for Figure 2.6: Walter J. Kennevan “MIS Universe, Data Management September 1970]

According to Gordon B. Davis, Margrethe H. Olson, “Management Information System is defined as an integrated system for providing information to support operations, management, and decision-making
functions in an organisation. The system utilises computer hardware and software, manual procedures, model for analysis, planning, control and decision making; and a database.”14 The fact that it is an integrated system does not mean that it is a single, monolithic structure; rather, it means that the parts fit into an overall design.

The management information system has been described as a pyramid structure (shown in the figure 2.7) in which the bottom layer consists of information for transaction processing, status inquiries etc, the next level consists of information resources in support of day-to-day operations and control, the third level consists of information system resources to aid in technical planning and decision making for management control and the top level consists of information resources to support strategic planning and policy making by higher level management.

Each level of information processing may make use of data provided for lower level, but new data may also be introduced. For example, some of the information to support management and decision-making is provided by
the data obtained for transaction processing, while some may be new data about activities external to the organisation.

![Pyramid Structure of management information system](image)

**Figure 2.7. Pyramid Structure of management information system**

[Source for Figure 2.7: Davis G.B & Olson M.H. “Management Information Systems – Conceptual Foundations, Structures and Development” Tata Mc Graw-Hill (2nd edition)]

Conceptually, A management information system can exists without computers, but it is the power of computer, which makes management information system more feasible. The question is not whether computer should be used in management information system, but the extent to which
information used should be computerised. The concept of a user-machine system implies that some tasks are best performed by humans while others are best done by machine.

With the expansion of an organisation the need for management information system is felt more and more. The size and complexity of the organisation grow along with new problems. It is here that we feel the tremendous utility of management information system. Management information system is that important part of the study of Management Science which attempts to solve this problem by providing relevant information in the right form to the right person and at the right moment. The information system may be developed through the mechanism of computer or in simple organisations; the management may depend upon statements, schedules, reports etc.

The pattern of information system will normally depend upon

(i) The size of the organisation
(ii) Nature and urgency of the subject matter
(iii) The need for details of the subject
2.2 Integrated Management Information System and Management Information Subsystem

With systems divided into subsystems, problems of co-ordination and compatibility between subsystems arise. They should be united and co-ordinated in order to achieve system effectiveness and efficiency. The unification of subsystems in term of flow of data within a system is referred to as integration. There are many types of integration: Horizontal, Vertical or Functional, and Longitudinal. Each of these will be discussed below.

(i) Horizontal Integration

Integration at one level of administration and management is referred to as horizontal integration. It is illustrated for the operational level of administration in university system by figure 8 in which only a few organisational units are shown. Each organisational unit, starting from Admission Office and followed by the Registrar’s Office, had their own information subsystem, including sometimes a computerised system. Each
of the computerised subsystems had its own computer, its own computer personnel and its own data system. Data and information did not flow or exchange between these subsystems. This resulted not only in unrelated and inconsistent information but also in an inefficient, inaccurate and ineffective system. To overcome these problems, the systems had to be interrelated and integrated with a sharing and exchange of data and information between the subsystems. Such a flow is shown by the horizontal arrows in figure 2.8 (only flows between the adjacent offices are shown) which gives the name horizontal integration.

Figure 2.8. Horizontal Integration
(ii) Vertical Integration

Thus far, only one level of management (an administrator) was discussed. In all institutions there are at least three levels performing different functions as depicted in figure 2.9.

![Diagram of Vertical Integration]

Figure 2.9. Vertical Integration

For effective management, data and information must flow between the levels of management to perform the different functions of operations, control, planning, organisation, and direction. This flow is depicted in figure
2.10. Since the flow is vertical in the organisation the integration resulting from such flow is often referred to as vertical integration.

Figure 2.10. Flow of Information

(iv) Longitudinal Integration

Another dimension of integration is the time dimension. We are interested not only in system performance as of today, but as of yesterday, and even five or ten years ago. For example in an educational institution like university this information is needed for record purposes (such as producing the educational transcript of a student) and for predicting future values of variables such as student enrolment, staffing patterns, and curricula programs. Such integration is known as Longitudinal Integration.
2.3 Evolution of Management Information System

Various systems for processing information have been in use of organisations for years. As it was typical in the past, the small country store was owned and operated by one man. The owner was both president and chief executive undertaking all the functions required to operate the store including sales promotion, market research, accounting, inventory control, public relations and so on. The owner personally gathered all the information necessary to carry out various functions, either using it as it was gathered or storing the information in his memory for later retrieval. Once a decision was made, the owner undertook the necessary action himself.

Within the confinement of a small operation, the owner-operated information system was often very efficient. It made use of highly integrated information system of the owner himself. Information was expressed and stored in that system in a form that was readily understood by all the components of management.
The owner-operated information system could also be expected to be efficient if more than one person worked in the organisation, provided those involved were relatively close in their experience and knowledge. The similarity of purpose and experience of the individuals in such circumstances usually allow a close communication between them and facilitate the interaction between their respective stores of information.

In more recent times, an increasing proportion of our affairs has been conducted by large organisations. Many of the smaller enterprises have been superseded by large corporations or incorporated into them. Private business and industry have grown in the size and scopes of the national economies of the leading industrial nations have expanded.

The development of modern economies has a number of effects on the organisation involved in both public and private sectors. In the first place, the growth of organisations has made it much more difficult for one-man to control and direct the activities of an enterprise in the manner as the owner of the country store could do. As the staff of an organisation increased, the amount of authority that must be delegated naturally
increases too. Responsibility for routine activities and the accompanying decisions are delegated to managers at the middle and lower levels of the organisation consequently, senior management concerns itself with the less routine activities of planning and policy making.

A necessary counterpart of delegation of authority is the reporting of the results of the activities that have been assigned. Delegation of authority must, therefore, be accompanied by the establishment of a communication channel through which these results can be reported and discussed. The greater the degree of delegation, the larger is the number of communication channels needed as part of the information system.

A second effect of the growth of an organisation is that the breadth of experience and knowledge of individual members of the organisation tend to decline. In the early stages of expansion, the owner, president or director of a small organisation usually does the hiring himself, normally choosing persons with whom he can communicate easily and readily. As the organisation grows, however, the hiring process itself is delegated. The delegation of authority usually results in the hiring of individuals with a
wider range of characteristics. It is quite common that individuals with
different backgrounds place different interpretations on information that has
been acquired. This diversity of viewpoint often is a source of strength to an
organisation. It can, however, because of misunderstanding. For this reason,
greater attention to communication between individual members is needed
as the organisation grows in size. This need is particularly acute if the
expansion of the organisation involves geographic dispersion of units.

Another factor with which modern organisations must contend is the
greatly increased complexity of the activities in which they are involved.
The complexity of the external environment in which modern organisations
operate has greatly increased the amount of information that must be
processed within the organisation. The nature of the modern environment
has also increased the complexity of the necessary information handling. A
striking example of this increased complexity is the administration of a
company payroll. The owner of the proprietary shop usually paid an
employee a previously agreed upon the amount withdrawn directly from the
cash register. The owner then charged the amount to cash. A modern payroll
system has the same basic function. However, modern social conditions
require that a payroll system incorporate a large number of other features. Modern payroll systems are usually required to make deductions from the gross pay for some of the following: income taxes, health care programmes, pension schemes, etc. As a result, a modern payroll system is very large and complicated operation usually requiring computer support to accomplish the necessary data processing tasks. Organisations have met the demands of the increased complexity of their activities by diverting an increased proportion of their effort and resources to administrative tasks and information systems.

The early information systems were oriented exclusively towards the financial and managerial accounting functions. It is note-worthy that the main initial effect of the introduction of the computer into organisations was an increase in the amount of routine clerical and data manipulating capacity available to the accounting function. Design and implementation of information systems was often entirely in the hands of accountants. The concepts of an information system designed to serve a wide range of managerial functions were often given little attention. Primary emphasis at
that time was often given to the work involved in introducing the new computer-supported financial and accountings systems.

The idea of an information system to guide management decisions predates the use of computers which have nurtured the organisational capabilities for implementing such a system. Four major areas of system development can sum up evolution of management information system concepts. These are: Managerial Accounting, Managerial Science, Management theory, and Computerisation. Indeed the concepts of Management Information System can be viewed as substantial extension of these concepts.

2.4 Role of Management Information System in Organisation

An organisation does not need a huge amount of information. The information has to be specific, precise and just according to the need of planning pattern. Excessive information could lead to confusion and chaos, involving unnecessary expenses. It is true that “Too much information available but not used can be a costly waste; it is unrelated or even
undigested information then it tends to confuse management”. Obviously, there is a definite need to examine carefully incoming data so that relevant usable information may be the result. This requires discriminating, selecting, relating, and classifying of information in a form usable at specific echelon of management. Failures to relate, classify and utilise will create a big problem in the organisation for maintaining the information.

Management process cannot function without basic factual information and knowledge about the day-to-day actions and reactions of the workers. It can not plan with precision unless it has information about which the past profitability, return on investment, share of market, service conditions of workers, execution of the plan, market conditions, financial implications, price structure and supply of new materials including its sources.

To sum up “Management needs information so that it can plan intelligently for the future. The information needs of the managers are multifarious. Therefore, one may ask a basic question - what types of information a manager requires? The overall information needs of
management with reference to the overall functions of an organisation may fall under three categories.

(a) Environment: This conveys the socio-economic climate of the situation. The information needed will include data on unemployment, foreign trade, population, income, price level, availability of labour etc.

(b) Competitive: There are three main points to be considered while supplying data for competitive information.

(i) Past performance: This includes information on the profitability, return on investment, share of market and so forth of competing companies. Such information is primarily useful in identifying one's competitors. It is also one benchmark when setting company objectives.

(ii) Present activity: This covers new product introduction, management changes, price strategy and, so, on all current developments. Good intelligence on such matters can materially
influence a company’s planning as it may lead to modifying marketing strategy.

(iii) Future plans: This includes information on acquisition, intentions, facility plans and research and development efforts.

(c) Internal Information: The third and final category of planning information is made up of internal data. As it relates to the total planning process, internal data are aimed at identifying a company’s strengths and weaknesses, when views in the perspective of the general business environment and in the light of competitive activity, should help management to shape its future plans.

From the above description it is clear that there is a great need of the management information system in an organisation. Viewing the need of management information system it can be realised that management information system plays a tremendous role in the smooth running of an organisation. The role of management information system can be described in the following paragraphs.
(a) Establishment of relationship among functional department

There is considerable interdependence among various departments. In a university the Students' information that is required by the Examination Section is also required by many departments, for example, Finance Department, Library Office, Student Welfare Office etc. The data required by Examination Department to declare the examination results may also include the data from the Library Office to know the list of students who have not cleared their library dues and other relevant information. This information should be sent by the Library Office to the examination section well in advanced so as not to delay the declaration of the results. So, there is a relationship among the departments. Thus, management information system pervades relationship among various departments and informational requirements are matched accordingly.

(b) Processing of data

The mere provision of raw data is not sufficient for the running of an organisation. The data are required to be sorted, arrange, aggregated and
transformed to suit the purpose. In other words, unless the data are processed, they are meaningless. Some resources have to be developed to process data. If the data management systems were not systematised correctly and properly, then more efforts would be required for the same processing. Sometimes it may result in duplication of efforts. Management information system is the tool by which such obstacles can be avoided.

(c) Prevention of Sub-Optimisation of functional objectives

The functional objectives of an organisation are synchronised in such a way that the total objectives are achieved. The managerial co-ordination and control system based on sound management information system establishes reasonable balance between organisational goals and the sub-goals, and also among the sub-goals.

(d) Management information system increases predictability

In the real world the decision environment of the manager may have three elements: certainty, risk and uncertainty. The manager may have full
knowledge and information on certain factors, partial information on a few and no information on others. One cannot say that everything is certain or uncertain. By and large managers operated in an environment of relative complexity, diversity and uncertainty. Management information system reduces uncertainty of a decision-making. The models can be used for generating information and evaluation of alternatives.

Thus, the realisation of the importance of information in management has given a unifying theme for various activities of the system group and the systems function has been involved as an integral part of modern management.

References:


